Course Outcomes

(UG Programmes)

SREE VIDYANIKETHAN ENGINEERING COLLEGE

(AUTONOMOUS)

Sree Sainath Nagar, A.Rangampet – 517 102 (A.P.)

(AFFILIATED TO JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR, ANANTHAPURAMU)

Program: B.Tech. ELECTRONICS AND COMMUNICATION ENGINEERING

I B. Tech. - I Semester
(16BT1BS02) **ENGINEERING PHYSICS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Intermediate / senior secondary Physics
COURSE DESCRIPTION:
Lasers; optical fibers; principles of quantum mechanics; band theory of solids; semiconductors; dielectric properties of materials; acoustics of buildings; superconductors; crystallography and nanomaterials.
COURSE OUTCOMES:
After completion of the course, a successful student will be able to:
CO1: Acquire basic knowledge of lasers, optical fibers, quantum mechanics, dielectrics, semiconductors, and superconductors, acoustic of buildings, crystallography and nanomaterials.
CO2: Analyze the construction and working of various laser systems, semiconductor devices, various types of optical fibers and its communication system and nano materials properties.
CO3: Gain skills in designing lasers, optical fiber cable, semiconductor devices, acoustically good halls and nanomaterials.
CO4: Develop problem solving skills in engineering context.
CO5: Use relevant techniques for assessing ball milling, pulsed laser deposition, p-n junction and Lasers.

I B. Tech. – I Semester
(16BT1BS03) **MATRICES AND NUMERICAL METHODS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Intermediate /Senior secondary mathematics
COURSE DESCRIPTION: Fundamentals of matrix theory; numerical solutions of equations, curve fitting; interpolation; numerical differentiation and integration; numerical solutions of ordinary differential equations.
COURSE OUTCOMES: After completion of the course a successful student is able to
CO1: Acquire basic **knowledge** in
(a) Finding the rank of matrices and analyzing them.
(b) Solving algebraic and transcendental equations by various numerical methods.
(c) Fitting of various types of curves to the experimental data.
(d) Estimating the missing data through interpolation methods.
(e) Identification of errors in the experimental data
(f) Finding the values of derivatives and integrals through various numerical methods.
(g) Solving differential equations numerically when analytical methods fail.
CO2: Develop skills in **analyzing** the
(a) methods of interpolating a given data
(b) properties of interpolating polynomials and derive conclusions
(c) properties of curves of best fit to the given data
(d) algebraic and transcendental equations through their solutions
(e) properties of functions through numerical differentiation and integration
(f) properties of numerical solutions of differential equations
CO3: Develop skills in **designing** mathematical models for
(a) Fitting geometrical curves to the given data
(b) Solving differential equations
(c) Constructing polynomials to the given data and drawing inferences.
CO4: Develop numerical skills in **solving the problems** involving
(a) Systems of linear equations
(b) Fitting of polynomials and different types of equations to the experimental data
(c) Derivatives and integrals

(d) Ordinary differential equations

CO5: Use relevant numerical **techniques** for
- (a) Diagonalising the matrices of quadratic forms
- (b) Interpolation of data and fitting interpolation polynomials
- (c) Fitting of different types of curves to experimental data
- (d) obtaining derivatives of required order for given experimental data
- (e) Expressing the functions as sum of partial fractions

I B. Tech. - I Semester
(16BT1BS04) MULTI - VARIABLE CALCULUS AND DIFFERENTIAL EQUATIONS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Intermediate /Senior secondary mathematics

COURSE DESCRIPTION: First order differential equations; higher order linear differential equations; functions of several variables; applications of integration; multiple integrals; vector calculus.

COURSE OUTCOMES: After completion of the course a successful student is able to

CO1: Acquire knowledge in
- (a) Higher order Differential equations
- (b) Maximum and minimum values for the functions of several variables
- (c) Double and triple integrals
- (d) Differentiation and integration of vector functions.
- (e) Line and surface volume
- (f) transforming integrals from three dimensional surfaces and volumes on to plane surfaces

CO2: Develop skills in analyzing the
- (a) methods for differential equation for obtaining appropriate solutions,
- (b) Properties of oscillatory electrical circuits and heat transfer in engineering systems
- (c) The variations in the properties of functions near their stationary values
- (d) Flow patterns of fluids, electrical and magnetic flux and related aspects

CO3: Develop skills in designing mathematical models for
- (a) R-C and L-R-C oscillatory electrical circuits
- (b) Heat transfer and Newton's law of cooling
- (c) Engineering concepts involving lengths of curves and areas of planes, Flux across surfaces

CO4: Develop analytical skills in solving the problems involving
- (a) Newton's law of cooling
- (b) non homogeneous linear differential equations
- (c) maximum and minimum values for the functions
- (d) lengths of curves, areas of surfaces and volumes of solids in engineering
- (e) transformation of integrals from three dimensional surfaces and volumes on to plane surfaces

CO5: Use relevant mathematical techniques for evaluating
- (a) various types of particular integrals in differential equations
- (b) stationary values for multi variable functions
- (c) multiple integrals in change of variables
- (d) integrations of vector functions.

I B. Tech. - I Semester
(16BT10241) NETWORK ANALYSIS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	4	1	0	4

PRE-REQUISITES: --

COURSE DESCRIPTION: Basic concepts of electric circuits; Voltage - Current relationship of basic circuit elements; Mesh and Nodal analysis; Network theorems; AC circuits; Two-port network parameters; Transient analysis.

COURSE OUTCOMES: After successful completion of the course, student will be able to

CO1: Demonstrate knowledge in
- voltage and current relationships for various electric elements.
- network reduction techniques.
- concepts of AC fundamentals and single phase circuits.
- concepts of two-port networks.
- various network theorems.
- transient behavior of the circuits.

CO2: Analyze
- a circuit using conventional, mesh and nodal concepts.
- a two-port network for various network parameters.
- various types of two-port networks.
- the transient behavior of the circuits.

CO3: Design circuits to meet the required specifications

CO4: Evaluate
- electrical circuits for voltage, current and power using conventional circuit analysis methods and network theorems.
- transient response.
- two-port networks.

I B. Tech. - I Semester
(16BT10501) PROGRAMMING IN C

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: NIL

COURSE DESCRIPTION:

Program design; Operators and Expressions; Data Input and Output; Control Statements; Functions; Arrays; Strings; Pointers; Structures & Unions and File handling Techniques;

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO1: Demonstrate knowledge in:
- o Elements of C Language
- o Selection and Repetition statements.
- o Arrays, Strings and Functional statements.
- o Derived data types, Files and Pointers

CO2: Analyze complex engineering problems to develop suitable solutions

CO3: Design algorithms for specified engineering problems

CO4: Use appropriate 'C' language constructs for solving engineering problems

CO5: Write programs using 'C' language to implement algorithms

I B. Tech. I-Semester
(16BT1BS32) ENGINEERING PHYSICS LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Intermediate / senior secondary Physics.

COURSE DESCRIPTION:

Characteristics of p-n junction diode, Photodiode, LED, and semiconductor laser diode. Experimental determination of carrier concentration and energy gap of a semiconductor material, wave length of a laser source, size of fine particle, numerical aperture and acceptance angle of optical fiber. Determination of frequency of electrically vibrating tuning fork and A.C source using A.C sonometer, magnetic field along axial line of a current carrying coil and rigidity modulus of material of a wire using torsional pendulum.

COURSE OUTCOMES:

After completion of the course, a successful student will be able to:

CO1: Acquire basic knowledge about semiconductor materials, magnetic materials and lasers.

CO2: Acquire analytical skills in the estimation of carrier concentration of semiconductor materials and characterization of p-n junction.

CO3: Develop skills in designing electronic circuits using semiconductor components.

CO4: Acquire skills to use instrumental techniques in A.C sonometer and Melde's experiment.

CO5: Apply diffraction techniques for determination of size of tiny particles and wave length of lasers.

I B. Tech. - I Semester

(16BT10232) **ELECTRICAL AND ELECTRONICS WORKSHOP PRACTICE**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: NIL

COURSE DESCRIPTION: Identification and specifications of various Electric and Electronic devices; analysis of various series, parallel and series-parallel electrical circuits; develop various electrical circuits for domestic and industrial applications.

COURSE OUTCOMES: After successful completion of the course, student will be able to

CO1: Demonstrate knowledge on various Electrical and Electronic Devices.

CO2: Analyze various series and parallel electrical circuits.

CO3: Design and develop various electrical circuits for domestic and industrial applications.

CO4: Function effectively as individual and as a member in a team.

CO5: Communicate effectively both oral and written forms

I B. Tech. - I Semester

(16BT10251) **NETWORK ANALYSIS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: NIL

COURSE DESCRIPTION: Verification of KVL, KCL and network theorems; analysis of AC and DC circuits; determination of resonant frequency in series and parallel RLC circuits; evaluation of transients

COURSE OUTCOMES: After successful completion of the course, student will be able to

CO1: Demonstrate knowledge in

- Identification of various circuit elements and their values.
- Concepts of electric circuits and two-port networks.

CO2: Analyze and relate physical observations and measurements in electric circuits to theoretical perception.

CO3: Design circuit parameters to meet the required specifications.

CO4: Demonstrate skills in evaluating and interpret

- Various circuit parameters using conventional and network theorems
- Network parameters

CO5: Function effectively as individual and as a member in a team.

CO6: Communicate effectively in oral format and prepare laboratory reports.

I B. Tech. - I Semester
(16BT10531) **PROGRAMMING IN C LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES:-
A course on "Programming in C"
COURSE DESCRIPTION:
Hands on practice in developing and executing simple programs using C Programming constructs– Conditional statements, Loops, Arrays, Strings, Functions, Structures, Pointers and Functions.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
CO1: Demonstrate practical knowledge of using C language constructs:
- Selection and Repetition statements.
- Arrays, Strings and Functional statements.
- Derived data types, Files and Pointers

CO2: Analyze problems to develop suitable algorithmic solutions
CO3: Design Solutions for specified engineering problems
CO4: Use appropriate 'C' language constructs for solving engineering problems
CO5: Implement and execute programs using 'C' language
CO6: Document programs and communicate effectively while conducting Professional transactions.

I B. Tech. - II Semester
(16BT1HS01) **Technical English**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: English at Intermediate level
COURSE DESCRIPTION: Introduction to Communication; Active Listening; Effective Speaking; Reading; and Writing.
COURSE OUTCOMES:
On successful completion of this course, the students will be able to:
CO1: Demonstrate knowledge in
- ♦ Process of communication
- ♦ Modes of listening
- ♦ Paralinguistic features
- ♦ Skimming and Scanning
- ♦ Elements of style in writing

CO2: Analyze the possibilities and limitations of language for understanding
- ♦ Barriers to Communication
- ♦ Barriers to Effective Listening
- ♦ Barriers to Speaking
- ♦ Formal and metaphorical language

CO3: Design and develop functional skills for professional practice.
CO4: Apply writing skills in preparing and presenting documents
CO5: Function effectively as an individual and as a member in diverse teams.
CO6: Communicate effectively with the engineering community and society in formal and informal situations.

I B. Tech. - II Semester
(16BT1BS01): **ENGINEERING CHEMISTRY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE REQUISITE: Intermediate/Senior Secondary Chemistry
COURSE DESCRIPTION: Water technology, Chemistry of Engineering materials, Nanochemistry, Green Chemistry, Electro chemical cells, Sensors, Corrosion and Lubricants.
COURSE OUTCOMES:
After completion of the course, a successful student is able to:

CO1: Acquire basic knowledge in water technology, engineering plastics, conducting polymers, composites, Electro chemical cells, Nano Chemistry, principles of Green Chemistry, corrosion phenomenon and lubricants.
CO2: Develop analytical skills in:
- a. Determination of hardness of water.
- b. Determination of viscosity, flame and fire points, cloud and pour points.

CO3: Develop designing skills in:
- a. Synthesis of engineering plastics.
- b. Chemical methods for the synthesis of Nano materials.

CO4: Develop skills for providing solutions through:
- a. Mitigation of hardness of water.
- b. Newer Nanomaterials and engineering plastics for specific applications

CO5: Acquire awareness to practice engineering in compliance to modern techniques such as:
- a. Nalgonda technique for defluoridation of water
- b. Electroplating technique for control of corrosion.

CO6: Acquire awareness to societal issues on:
- a. Quality of water.
- b. Bio-diesel
- c. Chemical materials utility and their impact.

I B. Tech. - II Semester
(16BT2BS01) **TRANSFORMATION TECHNIQUES AND PARTIAL DIFFERENTIAL EQUATIONS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE REQUISITE: Intermediate /Senior secondary mathematics
COURSE DESCRIPTION: Fourier series; Fourier integrals and transforms; Laplace transforms; z – transforms; partial differential equations.
COURSE OUTCOMES:
After completion of the course a successful student is able to
CO1: Acquire basic knowledge in
- (a) Fourier series and Fourier transforms
- (b) Fourier integrals
- (c) Laplace transforms and their applications
- (d) z- transforms and their applications
- (e) solving partial differential equations

CO2: Develop skills in analyzing the
- (a) Properties of Fourier series for a given function
- (b) Partial differential equations through different evaluation methods
- (c) Difference equations through z – transforms
- (d) Engineering systems and processes involving wave forms and heat transfer

CO3: Develop skills in designing mathematical models for
- (a) Problems involving heat transfer and wave forms
- (b) Engineering concepts involving, Fourier transforms, Fourier integrals, Laplace transforms, z-transforms and difference equations

CO4: Develop analytical skills in solving the problems involving
(a) Fourier series and Fourier transforms
(b) Laplace transforms
(c) Z-transforms and difference equations
(d) Heat transfer and wave motion

CO5: Use relevant transformation techniques for
(a) Obtaining Fourier transforms for different types of functions
(b) Laplace transforms
(c) Z- transforms
(d) Partial differential equations

I B. Tech. - II Semester
(16BT20401) ELECTRONIC DEVICES AND CIRCUITS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A Course on Engineering Physics.

COURSE DESCRIPTION:
Characteristics of general and special purpose electronic devices; Rectifiers; filters and regulators; Biasing and small signal analysis of BJT and FET.

COURSE OUTCOMES:
On successful completion of this course the students will be able to:

CO1: Demonstrate knowledge in
- p-n junction diode and its characteristics
- Zener diode and its characteristics
- Rectifiers, Filters and Regulators
- Characteristics of BJT, FET, MOSFET and special purpose electronic devices.

CO2: Analyze numerical and analytical problems in
- Rectifiers using Filters
- Regulated Power Supplies
- Transistor biasing circuits and stabilization
- Transistor amplifiers
- FET biasing circuits and amplifiers

CO3: Design electronic circuits such as
- Rectifiers with and without filters
- Voltage regulators
- BJT and FET biasing circuits
- BJT and FET amplifiers

CO4: Solve engineering problems and arrive at solutions pertaining to electronic circuits.
CO5*:* Select appropriate technique for transistor modeling.

I B. Tech. - II Semester
(16BT20541) Foundations of Data Structures

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:
A course on "Programming in C"

COURSE DESCRIPTION:
Concepts of sorting: sorting by exchange, sorting by distribution, sorting by merging and data structures: stacks, queues, linked lists, trees, graphs, and hash table.

COURSE OUTCOMES:
On successful completion of this course the students will be able to:
CO1: Gain knowledge in Sorting techniques, Linear and Non-linear Data Structures.

CO2: Analyze the performance of sorting techniques and their relationship to Data Structures.
CO3: Design appropriate hashing function for a given application and develop programs to implement Linear and Non-Linear data structures
CO4: Apply appropriate data structure to provide solutions for real time problems using C Language.

I B. Tech. - II Semester
(16BT1HS31) **ENGLISH LANGUAGE LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: English at intermediate or equivalent level.
COURSE DESCRIPTION: Phonetics; Vocabulary Building; Functional Grammar; Just a Minute; Elocution/Impromptu; Giving Directions/Conversation Starters; Role Play; Public Speaking; Describing People, Places, Objects and Events; Reading Comprehension; Listening Comprehension; Information Transfer.
COURSE OUTCOMES:
On successful completion of this course the students will be able to:
CO1: Demonstrate knowledge in
- Phonetics
- Information Transfer

CO2: Analyze the situations in professional context by using
- Vocabulary
- Grammar

CO3: Design and develop functional skills for professional practice.
CO4: Apply the techniques of Listening and Reading skills to comprehend Listening and Reading comprehension.
CO5: Function effectively as an individual and as a member in diverse teams through
- Extempore talk and
- Role Play

CO6: Communicate effectively in public speaking in formal and informal situations.
CO7: Recognize the need to engage in lifelong learning to upgrade competence of knowledge and communication.

I B. Tech. - II Semester
(16BT1BS31): **ENGINEERING CHEMISTRY LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE REQUISITE: Intermediate/Senior Secondary Chemistry
COURSE DESCRIPTION: Estimation of hardness, alkalinity, dissolved oxygen of water samples and estimation of Iron by volumetric methods, determination of effect of P^H on rate of corrosion, measurement of viscosity of lubricants; Instrumental methods like potentiometer, conductivity meter, P^H meter and colorimeter; synthesis of Polymers and Nano materials.
COURSE OUTCOMES:
After completion of the course, a successful student is able to:
CO1: Acquire basic Knowledge about the volumetric analysis and synthesis of materials used for engineering applications.
CO2: Acquire analytical skills in the estimation of hardness of water, alkalinity of water, dissolved oxygen in water and estimation of Iron through wet laboratory methods.
CO3: Develop designing skills for the synthesis of polymers and Nanomaterials.
CO4: Acquire skills to use instrumental techniques for the determination of Electrical conductance of electrolytes, EMF of a cell, PH of a solution, determination of viscosity of lubricants and estimation of iron in cement.
CO5: Provide solutions for environmental issues through determination of quality of water.

I B. Tech. - II Semester
(16BT10331) **COMPUTER AIDED ENGINEERING DRAWING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	1	6	3

PRE-REQUISITES: *None*
COURSE DESCRIPTION:
Engineering drawing conventions; importance of engineering drawing; fundamental concepts of sketching; computed aided drafting and different types of projections of geometric entities (both 2D and 3D) through computer aided drafting packages.
COURSE OUTCOMES:
After completion of the course, a successful student is able to:
- CO1: Understand, write and read the language of engineering drawing in industry through International System of Standards.
- CO2: Develop the imagination and mental visualization ability for interpreting the geometrical details of engineering objects.
- CO3: Produce different views and projection in drawing.
- CO4: Use modern CAD software for design and drafting of drawings.
- CO5: Create multi-view drawings suitable for presentation to Engineering community.
- CO6: Introduce and communicate universally accepted conventions and symbols for their usage in technical drawing.

I B. Tech. - II Semester
(16BT20551) **FOUNDATIONS OF DATA STRUCTURES LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES:
A course on "Foundations of Data Structures"
COURSE DESCRIPTION:
Hands on programming to implement data structures - Linked lists, Stacks, Queues, Trees, Search trees, Sorting, and Hashing in C Language.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
- CO1: Gain practical knowledge on stacks, queues, trees, graphs and Hashing Techniques
- CO2: Identify suitable data structure to solve engineering problems.
- CO3: Design solutions for complex engineering problems using linear and non-linear data structures.
- CO4: Develop algorithms leading to multiple solutions by conducting investigations of complex problems.
- CO5: Apply 'C' language as a tool for implementing linear and non linear data structures
- CO6: Communicate effectively by writing Programs and document practical work.

II B.Tech. - I semester
(16BT3HS01) **ENVIRONMENTAL STUDIES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PREREQUISITES: A Course on Engineering Chemistry
COURSE DESCRIPTION: Multidisciplinary nature of environment; Natural resources; Ecosystems; Biodiversity; Environment pollution and control; Social issues and environment; Human population and environment; Field studies.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Acquire knowledge on nature of environment, natural resources, ecosystems, biodiversity, environmental pollution and control, social issues and human population.

CO2. Analyze natural resources, ecosystems, biodiversity, environmental pollution and control, social issues and human population.

CO3. Develop strategies for environmental pollution control and natural resource management.

CO4. Solve environmental problems through proper analysis and interpretation of environmental data.

CO5. Choose appropriate techniques in environmental pollution control and natural resource management.

CO6. Understand the impact of social issues and population on environment.

CO7. Provide solutions to individuals, industries and government for environmental sustainable development.

CO8. Follow environmental protection laws for sustainable development.

CO9. Communicate effectively on environmental issues in the form reports.

II B.Tech. - I semester

(16BT3BS02) SPECIAL FUNCTIONS AND COMPLEX ANALYSIS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Intermediate/senior secondary Mathematics

COURSE DESCRIPTION: Beta, Gamma functions and their properties; Limits continuity and analyticity of complex functions; Integration, power series, singularities, residues; conformal mapping.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Acquire knowledge in
- Beta and Gamma functions
- Expressing complex functions in power series
- Differentiation and integration of complex functions
- Conformal mappings and bilinear transformations
- Expressing complex functions in terms of graphs and power series

CO2. Develop skills in analyzing the
- The properties exhibited by complex functions in Argand plane
- Properties of real integrals through complex variable techniques
- The properties of improper integrals through residue theory
- Conformal transformations of complex valued functions for inferences
- The properties of complex functions by expressing them in power series and graphs

CO3. Develop skills in designing mathematical models involving
- Integrals of complex variable functions
- Improper integrals using beta and gamma functions
- Residue theory of complex functions
- Power series expansions of complex variable functions
- Transformations of complex variable functions
- Fluid flow patterns and flux functions.

CO4. Develop analytical skills in providing solutions for problems involving
- Fluid, Electrical and Magnetic Potential functions
- Integration of complex functions
- Improper real integrals

CO5. Use relevant Complex variable techniques for
- Residues and integrals of complex functions.
- Improper real integrals through complex functions
- Techniques of Beta and Gamma functions to improper integrals

II B.Tech. - I Semester

(16BT30401) **ELECTRONIC CIRCUIT ANALYSIS AND DESIGN**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: A course on Electronic Devices and Circuits

COURSE DESCRIPTION:

Single Stage Amplifiers; Multi-Stage amplifiers; Frequency Response; Feedback Amplifiers; Oscillators; Large Signal Amplifiers; Tuned Amplifiers.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge in
- Single Stage Amplifiers
- Multi Stage Amplifiers.
- BJT Frequency Response.
- Feedback Amplifiers.
- Power Amplifiers.
- Tuned Amplifiers.

CO2. Perform analysis of electronic circuits for meeting defined specifications.

CO3. Design and develop electronic circuits such as Feedback Amplifiers, Oscillators and Power amplifiers with given specifications.

CO4. Solve problems pertaining to electronic circuit design.

CO5. Select an Amplifier circuit for a specific electronic sub-system.

CO6. Apply course knowledge to assess societal issues and understand the consequent responsibilities relevant to the professional engineering practice using electronic circuits.

II B.Tech. - I Semester

(16BT30402) **SIGNALS AND SYSTEMS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: A course on transformation techniques and partial differential equations.

COURSE DESCRIPTION:

Analysis of signals and systems; Representation of signals using Fourier series and Fourier transforms; Time-Domain and Frequency-Domain aspects of signals and systems; concept of convolution and correlation; Sampling and types of sampling; Laplace transform of signals; Z-Transform of sequences.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge in
- Representation of signals and systems.
- Fourier series representation of periodic signals
- Fourier transform of signals
- Convolution and correlation of functions
- Laplace transform
- Sampling Process
- Z-Transform

CO2. Analyze various continuous and discrete time signals and systems in time and frequency domains.

CO3. Develop solutions to stable and causal systems.

CO4. Solve problems pertaining to transforms and signal processing.

CO5. Select and apply appropriate transformation techniques for understanding of the frequency content of signals at the input and output of the systems.

II B.Tech. - I Semester
(16BT30403) SWITCHING THEORY AND LOGIC DESIGN

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:—

COURSE DESCRIPTION:

Number system and Boolean algebra; Minimization; Analysis and synthesis of digital circuits; Asynchronous Sequential Logic & Programmable Memories.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate the knowledge in
- Conversion of number systems, Binary Codes.
- Basic theorems, properties and postulates of Boolean algebra.
- Minimization of switching functions using Map method and Tabular method.
- Combinational and sequential circuits.
- Realization of Boolean functions using PLDs.

CO2. Analyse combinational and sequential circuits.

CO3. Design and develop various combinational, sequential circuits and PLDs.

CO4. Solve problems and arrive at solutions pertaining to Digital Electronics.

CO5. Apply minimization techniques to asynchronous and synchronous designs and suggest appropriate design for engineering solutions.

CO6. Apply appropriate logic functions to obtain optimized designs useful for the society.

II B.Tech. - I semester
(16BT30241) **ELECTRICAL TECHNOLOGY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Courses on Network Analysis and Engineering Physics.

COURSE DESCRIPTION:

Analysis of phase & line quantities and measurement of power in three phase system; Constructional details, operation, performance evaluation and applications of DC& AC machines; Testing of DC machines and Transformers; Special machines and single phase transformers.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on
- Construction and operation of various electrical machines
- Measurement of power in three-phase system
- Applications of various types of electrical machines

CO2. Analyze
- The operation and performance of various electrical machines
- The polyphase circuit for measurement of power

CO3. Design suitable accessories / controllers for various machines to meet the nominal specifications

CO4. Solve engineering problems pertaining to various machines and provide feasible solutions

CO5. Select appropriate control techniques for various electrical machines used in domestic and industrial applications

CO6. Apply the conceptual knowledge of various electrical machines in relevance to industry and society

II B.Tech. - I semester
(16BT30251) **ELECTRICAL TECHNOLOGY LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: Courses on Network Analysis and Network Analysis lab.
COURSE DESCRIPTION:
Construction, operation, types, performance evaluation of DC& AC machines and transformers; Necessity of starter for DC motors; Three phase power measurement.
COURSE OUTCOMES:
On successful completion of course, students will be able to:
CO1. Demonstrate knowledge on
- Construction, operation of DC& ACmachines and transformers.
- Starting and speed control of DC motors.
- Testing of DC& ACmachines and transformers.
- Characteristics of DC& ACmachines and transformers.
- Measurement of three phase power.
- Applications of DC& ACmachines and transformers.

CO2. Analyzethe operation and performance of DC& ACmachines, transformers and three phase system for various operating conditions.
CO3. Design the circuit with suitable accessories / controllers for desired operation conditions of DC & AC machines.
CO4. Interpret and synthesize the data obtained from experimentation on DC& ACmachines, transformers and three phase system and provide valid conclusions.
CO5. Select and apply appropriate technique for testing and control of DC& ACmachines and transformers useful in industry.
CO6. Apply the conceptual knowledge of electrical machines in relevance to industry and society.
CO7. Commit to ethical principles and standards while exercising the practical investigations on electrical machines.
CO8. Work individually or in a group while exercising practical investigationsin the field of electrical machines.
CO9. Communicate effectively in verbal and written form in relevance to electrical machines.

II B.Tech. - I semester
(16BT30431) **BASIC ELECTRONICS AND DIGITAL DESIGN LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: Courses on Electronic Devices and Circuits & Switching Theory and Logic Design.
COURSE DESCRIPTION: Diode characteristics; Rectifiers; BJT and FET characteristics; UJT and SCR characteristics; BJT Amplifiers; Combinational Circuits; Realization of Flip-flops; Sequential Circuits; Demonstration on VHDL Programme.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge in different electronic devices, analog and digital circuits
CO2. Analyze the characteristics of different electronic devices and circuits like
- Diodes-PN Junction Diodes, Zener Diodes, SCR
- Transistors-BJT,FET,UJT
- Combinational Circuits-HA, FA
- Flip Flops-JK FF, D FF
- Sequential Circuits -Counters

CO3. Design electronic circuits like FET Amplifiers, Combinational Circuits and Sequential Circuits.
CO4. Solve engineering problems with better Electronic circuits.
CO5. Work individually and also in a group in the area of Analog and Digital circuits**.**
CO6. Communicate verbally and in written form in the area of Electronic Devices and circuits.

II B.Tech. - I semester

(16BT30432) **SIGNALS AND SYSTEMS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES:A Course on Signals and Systems.

COURSE DESCRIPTION:

Generation of various signals and sequences; convolution and correlation; verification of linearity and time invariance properties; sampling theorem verification.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge in
- Operations on Matrices.
- Generation of Various signals and Sequences.
- Convolution and Correlation of signals and Sequences
- Weiner-Khinchin relation and Sampling Theorem
- Fourier Transform , Laplace Transform and Z-Transform

CO2. Analyze the simulation results for a written program.

CO3. Design MATLAB programs for the given list of exercises.

CO4. Solve problems and obtain the required results to the given list of experiments.

CO5. Apply MATLAB tools for writing the programs.

CO6. Work individually or in group in the area of signals and systems.

CO7. Communicate orally and in written form in the area of signals and systems.

II B.Tech. - II semester

(16BT40401) **ANALOG COMMUNICATIONS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Courses on Electronic Devices and circuits, Signals and Systems.

COURSE DESCRIPTION:

Continuous wave modulations; Modulators and De-Modulators; Transmitters; Receivers; Noise performance; Pulse modulations; Multiplexing.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge in
- Elements of communication systems.
- Amplitude, Frequency, and Phase Modulations and De-Modulations.
- Noise
- Multiplexing.

CO2. Analyze Noise Performance in different modulation systems, calculation of total power and bandwidth.

CO3. Design Transmitters and Receivers with high signal to noise ratio.

CO4. Solve problems pertaining to modulation schemes, transmitters and receivers considering noise effects.

CO5. Select, and apply appropriate techniques for different modulation schemes understanding power and bandwidth limitations.

CO6. Follow standards while designing transmitters and receivers.

II B.Tech. - II semester

(16BT40402) **DIGITAL IC APPLICATIONS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:
Courses on Switching Theory and Logic Design &Electronic Devices and Circuits.

COURSE DESCRIPTION:
Logic Families – CMOS, Bipolar and its Interfacing; Verilog HDL Language Elements and Modelling; Combinational and Sequential Logic Design using ICs; Memories - ROM, SRAM, DRAM, FPGA.

COURSE OUTCOMES:
On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge in:
- Classification of Integrated Circuits.
- Characteristics of Integrated Circuits.
- MOS, TTL and ECL Logic Families.
- Interfacing Between Different Logic Families.
- Digital Integrated Circuits.
- Memories.

CO2. Perform analysis of CMOS Circuits.
CO3. Design, develop and model combinational and sequentialcircuits.
CO4. Solve problems using relevant ICs to synthesize digitalintegrated circuits.
CO5. Select appropriate source code model to optimize the design of digital ICs.
CO6. Assess and propose cost effective digital IC solutions to meet design constraints to address societal needs.

II B.Tech. - II semester

(16BT40403) **ELECTROMAGNETIC THEORY AND TRANSMISSION LINES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Courses on Engineering Mathematics and Engineering Physics.

COURSE DESCRIPTION:
Static Fields; Maxwell's Equations; Electromagnetic Wave Characteristics; Transmission Lines.

COURSE OUTCOMES:
On successful completion of the course, students will be able to:

CO1. Apply fundamental knowledge in characterizing
- Electrostatic Fields
- Magnetostatic Fields
- Boundary Conditions
- Electromagnetic Waves
- Transmission Lines

CO2. Analyze Problems in different medium conditions by using Maxwell's Equations.
CO3. Design and Develop various impedance transformation techniques.
CO4. Provide valid solutions to solve critical problems for Electromagnetic Wave Propagation in different media.
CO5. Understand limits of Electromagnetic Wave Propagation and apply appropriate technique to arrive at feasible solutions.
CO6. Create solutions to compensate impedance mismatch in real time applications for societal needs.

II B.Tech. - II semester

(16BT40404) **LINEAR IC APPLICATIONS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Courses on Network Analysis & Pulse and digital Circuits.

COURSE DESCRIPTION:

Operational Amplifier (Op-Amp) basics and its characteristics; Op-Amp Linear and Non- Linear Applications; Voltage Regulators and Analog filter Design; study of internal functional blocks and the applications of special ICs like IC 555 Timer; PLL circuits; DAC and ADCs; DAC and ADC Specification.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate the knowledge of
- operational amplifiers
- Regulators and filters
- 555 timer and PLL
- D-A and A-D convertors

CO2. Analyze Operational Amplifier circuits and evaluate parameters of Operational Amplifier circuits.

CO3. Using linear ICs, design and develop
- V to I and I to V convertors
- Integrators and Differentiators
- Multivibrators
- Triangular wave generators.

CO4. Solve engineering problems and arrive at solutions using electronic circuits designed using linear ICs.

CO5. Select appropriate technique for operating op amp and 555 timer in different modes of operation based on applications.

II B.Tech. - II semester

(16BT40405) **PROBABILITY AND STOCHASTIC PROCESS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:A Course on Engineering Mathematics.

COURSE DESCRIPTION:

Probability theory; The Random Variable; Operations on Single and Multiple Random Variables; Temporal Characteristics of Stochastic Processes; Noise analysis.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Apply knowledge of
- Concepts in Probability
- Single and multiple random variables
- Operations on Single and multiple random variables
- Random processes and their characteristics
- Noise

CO2. Analyze operations on single and multiple random variables and processes.

CO3. Formulate solutions for engineering problems involving probability and random processes.

CO4. Model random processes for the analysis of communication Systems.

II B.Tech. - II semester
(16BT40406) **PULSE AND DIGITAL CIRCUITS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Courses on Electronic Devices and Circuits & Network Analysis.
COURSE DESCRIPTION:
Linear and non-linear Wave shaping circuits; Switching characteristics of Diode and Transistor; Design of multivibrators; Sweep circuits; Sampling and logic gates.
COURSE OUTCOMES: On successful completion of the course, students will be able to:
CO1. Apply the knowledgein
- Responses of High-pass and low-pass RC circuits for different inputs
- Clipping and clamping operations.
- Multivibrators.
- Methods of generating the Time-base waveforms
- Operating Principles of of Sampling gates
- Realization of logic gates using Diodes and Transistors

CO2. Analyze the performance of Linear and non-linear Wave shaping Circuits.
CO3. Design and develop different Multivibrator Circuits, Sweep circuits, clipper and clamper circuits.
CO4. Solve engineering problems pertaining to pulse and Digital circuits to provide valid conclusions.
CO5. Apply appropriate techniques to obtain optimum solution in the field of pulse and digital circuits.
CO6. Apply contextual knowledge in pulse and digital circuits to assess propagation delay and power dissipation parameters to the Professional engineering practice for societal use.

II B.Tech. - II semester
(16BT40431) **ANALOG COMMUNICATIONS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: ACourse on Analog Communications.
COURSE DESCRIPTION:
Simulation and study of various modulation schemes and analog Communications.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge in different analog communications.
CO2. Analyze the characteristics of different communication circuits like
- Pre-emphasis & De-emphasis.
- Mixer.
- Radio Receiver.

CO3. Design and simulate various modulation systems for communication needs.
CO4. Solve problems pertaining to modulation schemes and communication systems.
CO5. Use MATLAB tools for simulation of modulation schemes.
CO6. Function effectively as an individual and as a member in a group in the area of analog communications.
CO7. Communicate in verbal and written form in the area of analog communications.

II B.Tech. - II semester
(16BT40432) **ELECTRONIC CIRCUIT ANALYSIS AND DESIGN LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES:
A Course onElectronic Circuit Analysis and Design.
COURSE DESCRIPTION:
Design, Simulation and Implementation of Single stage, Multistage Amplifiers, Feedback Amplifiers and Oscillators, Power Amplifiers, Tuned BJT Amplifiers.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge in different electronic circuits and PSPICE tool.
CO2. Analyze amplifiers, Oscillator and Tuned circuits.
CO3. Design and develop single stage, multistage & Power amplifiers and Oscillator circuits.
CO4. Conduct of experiments, analysis and interpretation of data, and synthesis of the information to provide valid solutions.
CO5. Model an electronic circuit using simulation tools.
CO6. Function effectively as an individual and as a member in a group in the area of electronic circuits.
CO7. Communicate in verbal and written form in the area of electronic circuits.

II B.Tech. - II semester
(16BT40433) **PULSE AND DIGITAL CIRCUITS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES:A course on Pulse and Digital Circuits
COURSE DESCRIPTION:
Linear and non-linear Wave shaping circuits; Transistor switching times; UJT relaxation oscillator; sampling and logic gates; Design of Multivibrator circuits.
COURSE OUTCOMES: On successful completion of the course, students will be able to:
CO1. Apply the knowledge in different Pulse and digital circuits.
CO2. Analyze the characteristics of different Circuits like
- RC Low Pass and High pass Circuits
- Clipping and Clamping Circuits
- Sampling and Logic Gates

CO3. Design the circuits like Multi-vibrators, Sampling Gates, UJT Relaxation Oscillator,Bootstrap sweep circuit, Constant Current Sweep Generator using BJT.
CO4. Provide valid conclusions through the design and conduct of experiments, analysis and synthesis.
CO5. Apply conversion techniques for design of multivibrators.
CO6. Function effectively as an individual and as a member in a group in the area of pulseand digital circuits.
CO7. Communicate effectively to write report and design documentation in the area of pulse and digital circuits.

III B.Tech. - I semester

(16BT3HS02) **MANAGERIAL ECONOMICS AND PRINCIPLES OF ACCOUNTANCY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:—

COURSE DESCRIPTION: Managerial Economics; Demand and Elasticity of Demand; Production Functions; Markets and Pricing Policies; Formation of different types of Business Organizations; Basic concepts of Accounting (Journal, Ledger and Trial balance); Trading Account, Profit and Loss Account and Balance sheet with simple adjustments; Computerized Accounting.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Acquire Knowledge in
- Tools and concepts of Micro Economics.
- Basic Principles and concepts of Accountancy.
- Provides life skills for effective utilization of scarce resources.
- Financial Accounting.
- Significance of Economics and Accountancy

CO2. Develop skills in managerial decision making of an organization.

CO3. Apply the Economic theories i.e., Demand, Production, Cost, Markets and Price.

CO4. Develop effective communication in Business and Accounting transactions.

CO5. Ascertain the profitability and soundness of an organization.

CO6. Practice Financial Accounting

III B.Tech. - I semester

(16BT50201) **CONTROL SYSTEMS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:

Courses on Multivariable Calculus and Differential Equations, Transformation Techniques and Partial Differential Equations.

COURSE DESCRIPTION:

Concepts of control system, transfer function of various physical systems, time response analysis, frequency response analysis, controller design, state space analysis.

COURSEOUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on
- The concepts of open and closed loop control systems.
- Stability analysis in time and frequency domain.
- Controllers and compensators to meet the desired specifications.
- State variable techniques.

CO2. Analyze
- Time and frequency response of second order systems.
- Stability analysis using root-locus, bode and Nyquist plots.
- Controllers and compensators to meet the desired response.
- State space representation from transfer function.

CO3. Design a compensator to meet the design specifications of control system.

CO4. Solve problems pertaining to control systems to provide feasible solutions in real time environment.

CO5. Select appropriate techniques to solve control system problems in relevance to industry.

CO6. Apply the conceptual knowledge of control systems in domestic and industrial applications.

III B.Tech. - I semester

(16BT50401) DIGITAL COMMUNICATIONS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Courses on Signals and Systems, Analog Communications & Probability and Stochastic Processes.

COURSE DESCRIPTION: Digitization techniques - PCM, DPCM, Delta modulation and Adaptive Delta Modulation; Digital Baseband and Passband signal transmission; Detection of Baseband and Passband signals and error probability; Information Theory - Source and channel coding techniques.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Apply knowledge in
- Elements of Digital Communication systems.
- Digitization techniques such as PCM, DPCM, DM and ADM
- Digital carrier modulation techniques
- Error Probability and detection of Baseband and Bandpass modulated signals
- Measure of information
- Source and Error Control Coding techniques.

CO2. Analyze different types of digital modulation schemes based on bit error probability.

CO3. Design methods for digital communications systems according to the required specifications like transmission power, bandwidth and SNR.

CO4. Solve problems using different coding techniques to improve error performance of Digital communication system.

CO5. Select appropriate coding techniques to improve transmission rates.

CO6. Apply the knowledge and skills to meet societal needs relevant to communication systems.

III B.Tech. - I semester

(16BT50402) MICROPROCESSORS AND MICROCONTROLLERS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: A Course on Switching Theory and Logic Design.

COURSE DESCRIPTION:

Architecture, Instruction set and programming of 8086; Programmable interfacing devices - architecture and programming; Interfacing Memory and I/O devices with 8086; 8051 Microcontroller - Architecture, programming, interrupts and applications.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge in
- Internal hardware details of Intel 8086, 8051 and programmable devices like 8255, 8251, 8259, 8257.
- Interfacing various peripherals to build standalone systems.

CO2. Critically analyze the requirements to meet the specifications of microprocessors and microcontrollers based systems.

CO3. Design and develop suitable interfaces for real time applications.

CO4. Exhibit programming skills, choose suitable hardware and program the devices to solve Engineering problems.

CO5. Apply appropriate techniques, resources to complex engineering activities for modeling microcomputer and microcontroller based systems with understanding of limitations.

CO6. Apply concepts of microprocessors and microcontrollers for solving societal problems.

III B. Tech. I Semester
(16BT50403) **VLSI DESIGN**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:
A Course on Digital IC Applications.
COURSE DESCRIPTION:
CMOS Technology; Stick Diagrams and Layouts; Subsystem design; Programmable Interconnect structures; Synthesis and Test Principles.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge in
- Understanding the Fabrication Process of MOS Transistors
- Electrical properties of CMOS Circuits
- Designing Static Combinational and Sequential logic at transistor level, including Mask layout.
- Estimating and optimizing combinational RC Circuit delay using RC delay models and logical effort.
- Design methodology and tools.
- Test Principles.

CO2. Analyze characteristics and performance of CMOS Circuits.
CO3. Design solutions for subsystems to compensate tradeoff between area, speed and power requirements.
CO4. Synthesize and extract information from designs and layouts for optimum solutions.
CO5. Select and apply appropriate designs to overcome the limitations of CMOS devices for high speed applications.
CO6. Assess test strategies for design and development of Integrated Circuits for societal needs.

III B.Tech. - I semester
(16BT50404) **ELECTRONIC MEASUREMENTS AND INSTRUMENTATION**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:—
COURSE DESCRIPTION:
Measurements and Measuring Systems; Signal Analyzers and Oscilloscopes; Transducers; Display Devices and Recorders; Data Acquisition Systems and Telemetry.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge in
- Working of measuring instruments
- Operating principles of various display and recording devices
- Various measurement techniques
- Errors in measurements and their rectification
- Transmitting techniques of various electrical and non-electrical quantities
- Application of digital techniques in development of instrumentation systems

CO2. Analyse and compare the performance of various measuring systems based on the response to the given inputs.
CO3. Design of basic electronic instruments according the required specifications.
CO4. Solve engineering problems using different transducers for measurement of an electrical or non-electrical quantity and establish the drawbacks of instruments.
CO5. Create effective and suitable techniques to overcome limitations of the instruments and display devices in measuring systems.
CO6. Apply the instrumentation technology to provide wide range of solutions for the problems of Societal, Health and Safety issues in real time world.

III B.Tech. - I semester
(16BT50501) **COMPUTER NETWORKS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:—
COURSE DESCRIPTION:
Introduction to Computer Networks; The Physical Layer; The Data Link Layer; The Medium Access Control Sub layer; The Network Layer; The Transport Layer; The Application Layer.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge on:
- Functionalities of Various OSI and TCP/IP layers
- 3G Mobile phone networks, 802.11
- TCP,UDP and SMTP

CO2. Analyze the issues related to data link, medium access and transport layers by using channel allocation and connection management schemes.
CO3. Design and compute subnet masks and addresses for networking requirements.
CO4. Solve problems related to Flow control, Error control, congestion control and Network Routing.
CO5. Apply Network Standards - 802.3 and 802.11 for developing computer Networks.
CO6. Assess the impact of wired and wireless Networks in the context of legal, safety, health and societal issues.

III B.Tech. - I semester
(16BT30501) **COMPUTER ORGANIZATION**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:—
COURSE DESCRIPTION:
Basic structure and operation of a digital computer; Organization and functional principles of the arithmetic and logic unit, control unit, memory unit and I/O unit; Concepts of pipelining and parallel processing techniques;
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge on:
- Computer Arithmetic units
- Register Transfer Language and Computer Instructions
- Design of Control Unit
- Input Output Organization and Memory system
- Pipelining and Multiprocessing.

CO2. Analyze the functional units of a digital computer.
CO3. Design the functional modules in a digital computer - Arithmetic Units, Memory and I/O.
CO4. Investigate the performance of memory, I/O, and pipelined processors.
CO5. Select appropriate techniques of I/O, Pipelining and Multiprocessing to solve computing problems.
CO6. Apply contextual knowledge of computer systems development to societal applications.

III B.Tech. - I semester
(16BT51241) OBJECT ORIENTED PROGRAMMING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:—
COURSE DESCRIPTION: Introduction of Java, Classes and Objects; Inheritance, Packages, Interfaces; Exception handling, Multithreading; Event handling, AWT, Collection Classes; Applets, Servlets.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge on:
- Object Oriented Programming concepts - classes, objects, inheritance, polymorphism, encapsulation and abstraction.
- Packages, interfaces, multithreading, exception handling, event handling.

CO2. Analyze complex engineering problems using object oriented concepts.
CO3. Design and develop reusable code to provide effective solutions for real world problems using inheritance and polymorphism.
CO4. Apply AWT and Applets to create interactive Graphical User Interfaces.
CO5. Use advanced programming languages to develop web applications.
CO6. Build Java Applications suitable for societal requirements.

III B.Tech. - I semester
(16BT50431) LINEAR AND DIGITAL IC APPLICATIONS LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: Courses on Linear IC Applications and Digital IC Applications.
COURSE DESCRIPTION: Design and verification of Op-Amp applications; Timers; Voltage regulator; ADC and DAC; Simulation and synthesis of combinational and sequential circuits; XILINX tools.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge in different Linear and Digital integrated circuits applications and XILINX tools.
CO2. Analyze different circuits built with linear and digital ICs.
CO3. Design different multivibrator circuits, filters and digital circuits.
CO4. Conduct of experiments, analysis and interpretation of data, and synthesis of the information to provide valid solutions.
CO5. Model a Linear and Digital integrated circuits using HDL tools.
CO6. Function effectively as an individual and as a member in a group in the area of IC applications.
CO7. Communicate in verbal and written form in the area of IC applications.

III B.Tech. - I semester
(16BT50432) MICROPROCESSORS AND MICROCONTROLLERS LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES:A course on Microprocessors and Microcontrollers.
COURSE DESCRIPTION:
Assembly language Programming for Intel 8086 & 8051; Interfacing standard peripherals & Programming-DAC, Stepper Motor, ADC, Logic Controller, Keyboard, Seven Segment Display.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge in various aspects of microprocessors, microcontrollers and interfaces.

CO2. Analyze various programming alternatives, interfacing methods & usage of various on-chip resources like Timers, Interrupts, ADC, DAC, and Stepper Motor to build standalone systems.
CO3. Design and develop microcomputer based systems to suit to market requirements.
CO4. Solve engineering problems by proposing potential solutions using microprocessors and microcontrollers.
CO5. Apply appropriate techniques, resources, and tools for modeling microcomputer based systems with understanding of limitations.
CO6. Apply concepts of microprocessors and microcontrollers to solve societal problems.
CO7. Work individually and in a group to develop microcomputer based systems.
CO8. Communicate effectively in oral and written form in the field of microprocessors and microcontrollers.

III B.Tech. - I semester
(16BT4HS31) **SOFT SKILLS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES:
English Language Laboratory in I B.Tech or English Laboratory at Diploma Level.
COURSE DESCRIPTION:
This course covers Body Language; Assertiveness; Goal Setting; Creative Thinking; Interpersonal Skills; Team Work; Conflict Management; Etiquette; Report Writing; Group Discussions; Interviewing Skills.

COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Acquire knowledge in
- Goal Setting
- Creative Thinking
- Leadership Skills and
- Team Work

CO2. Analyse the situations and develop skills for
- Body Language
- Personality Development and
- Stress Management

CO3. Apply the techniques of soft skills in a problem situation enhanced through multimedia software.
CO4. Function effectively as an individual and as a member in diverse teams.
CO5. Communicate effectively in public speaking in formal and informal forums.

III B.Tech. - II semester
(16BT5HS01) **MANAGEMENT SCIENCE**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:—
COURSE DESCRIPTION: Concepts of Management; Environmental Scanning; Concepts Related to Organization; Operations Management; Work Study; Statistical Quality Control; Inventory Management; Marketing; Human Resource Management; Project Management; Project Crashing; Entrepreneurship; Contemporary Management Practices.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate the concepts of operations management, human resources management, project management and contemporary management practices in managerial context.
CO2. Identify and analyse management problems in the business organizations reaching substantiated conclusions using principles of management.

CO3. Design appropriate organization structure for meeting the needs of the organization with consideration of the employees of the organization.
CO4. Competently employ broad based analytical tools for decision making, system design, analysis and performance.
CO5. Provide solution to organizations for sustainable development.
CO6. Apply knowledge of engineering and management principles to manage the projects in multidisciplinary environments.

III B.Tech. - II semester
(16BT60401) **ANTENNAS AND WAVEGUIDES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: A Course on Electro Magnetic Theory and Transmission Lines.
COURSE DESCRIPTION:
Waveguides, Antenna Parameters; Wire antennas; Antenna Arrays; VHF, UHF and Microwave antennas; Antenna Measurements.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Apply the knowledge of fundamentals in antenna theory and waveguides.
CO2. Analyze the characteristics and performance of different antennas and waveguides.
CO3. Design and develop various antennas.
CO4. Provide solutions through different antenna designs.
CO5. Apply appropriate techniques, resources to complex engineering activities in the field of antennas.
CO6. Apply contextual knowledge for design of antennas with required radiation levels for communication needs meeting the public health and safety conditions.

III B.Tech. - II semester
(16BT60402) **DIGITAL SIGNAL PROCESSING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: A course on Signals and Systems.
COURSE DESCRIPTION:
Continuous and discrete signals and sequences; systems; DFT and FFT algorithms for the analysis of discrete sequences; design and realization of Digital IIR and FIR filters; DSP processors and architectures.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Apply the knowledge of fundamentals in
- Frequency analysis of signals and systems.
- DFT and FFT transforms.
- Analog & Digital Filter Design.
- Digital Filter Realization.
- DSP Processors.

CO2. Analyze numerical and analytical problems of discrete time signals and systems in frequency domain using Transforms.
CO3. Design and develop digital filters to optimize system performance and their realization.
CO4. Interpret and synthesize the response of Digital filters to validate their characteristics.
CO5. Apply appropriate techniques and algorithms to design digital signal processing systems with an understanding of limitations.

III B.Tech. - II semester

(16BT40502) DATABASE MANAGEMENT SYSTEMS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:—

COURSE DESCRIPTION:

Database Systems; Database Design; Relational Model; SQL Queries, Constraints and Triggers; Schema Refinement and Normal Forms; Transaction Management; Concurrency Control; Overview of Storage and Indexing.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on Data models and Database Languages
- Database design
- Normal forms
- Storage and Indexing

CO2. Analyze databases using normal forms to provide solutions for real time applications.

CO3. Design solutions for database problems using database design, views design and framing queries.

CO4. Use database techniques for designing databases, managing databases and its security.

CO5. Select SQL, Hash based Indexing and Tree based Indexing to manage data in databases.

CO6. Apply contextual knowledge to develop database applications related to societal issues.

III B.Tech. - II semester

(16BT71205) CRYPTOGRAPHY AND NETWORK SECURITY

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:—

COURSE DESCRIPTION: Principles and Practice of Cryptography and Network Security; Classical Systems; Symmetric Block Ciphers; Public-key Cryptography; Hash Functions; Authentication; Key Management; Key Exchange; Signature Schemes; E-mail; Web Security; Malicious Software; Intrusion Detection; Phishing and Identity Theft.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on:
- Cryptographic algorithms and their mathematical models
- Message Authentication
- Digital Signatures
- Malicious Software
- Intrusion Detection
- Phishing and Identity Theft

CO2. Analyze vulnerabilities and threats on information systems based on various security parameters

CO3. Apply security and privacy methods to protect and prevent cyber crimes

CO4. Solve information privacy issues using encryption and digital signatures

CO5. Use firewall and PGP to protect network and e-mail respectively

CO6. Follow standards in implementation of network security

III B.Tech. - II semester
(16BT31501) **OPERATING SYSTEMS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:—
COURSE DESCRIPTION: Operating systems operations, scheduling; Critical section problem, deadlocks; Paging, segmentation; File Concept, Disk scheduling; I/O interface; concepts of protection.
COURSE OUTCOMES:
On Successful completion of the course, students will be able to:
CO1. Demonstrate knowledge on Operating system operations, services, file management, disk management, I/O management and protection.
CO2. Identify the functionality involved in process management concepts like scheduling and synchronization.
CO3. Design models for handling deadlock and perform memory management.
CO4. Synthesize and apply programming API's to perform Process management.
CO5. Use appropriate protection tools to provide access control to Operating system users.

III B.Tech. - II semester
(16BT61241) **WIRELESS SENSOR NETWORKS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:—
COURSE DESCRIPTION: WSN architecture, types; Physical Layer; MAC protocols; Routing related Protocols; QoS in WSNs.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge on:
- Wireless Sensor Networks
- Physical layer
- Data link layer
- Network layer
- Transport layer

CO2. Analyze various design issues related to Data link, network and transport protocols of wireless sensor network architectures.
CO3. Solve complex engineering problems pertaining to the field of wireless sensor networks.
CO4. Design and develop feasible and optimal wireless sensor networks based solutions for societal use.

III B.Tech. - II semester
(16BT60403) **ANALOG IC DESIGN**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:A Course on Electronic Circuits analysis and design.
COURSE DESCRIPTION:
MOS & CMOS Devices and Modeling; Current mirrors and biasing techniques; Single stage amplifiers; Sample and Hold Circuits; Bandgap Reference Circuits and Comparators.
COURSE OUTCOMES: On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge in
- MOS device modeling
- Current Mirrors
- Single stage amplifiers

- Bandgap Reference Circuits.
- Sample and hold circuits
- Comparators.

CO2. Analyze analog integrated circuits suitable for real time applications.
CO3. Design and Develop Analog Integrated Circuits using MOS Transistor.
CO4. Use different styles of CMOS Circuit modelling to synthesize analog ICs.
CO5. Apply appropriate biasing techniques to improve performance of analog circuits.
CO6. Assess the performance of sample and hold circuits and Bandgap reference circuits in analog ICs suitable for societal use.

III B.Tech. - II semester
(16BT60404) **IMAGE PROCESSING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Courses on Digital signal processing and Digital communications.
COURSE DESCRIPTION:
Fundamentals of image processing; Image transforms; Image enhancement techniques in spatial and frequency domains; Restoration techniques; Image segmentation techniques; Image compression techniques.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstarte knowledge in
- Image Fundamentals
- Image Enhancement & Restoration Techniques
- Image Segmentation & Compression Techniques
- Color image processing

CO2. Analyze different images using various processing techniques.
CO3. Design and develop various image processing algorithms to process the images in Real Time Applications.
CO4. Solve problems related to images for feasible and optimal solutions in the core area of Image Processing.
CO5. Apply appropriate techniques to complex engineering problems in the field of image processing.
CO6. Understand the impact of the image processing for societal needs.

III B.Tech. - II semester
(16BT60405) **RADAR ENGINEERING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:
Courses on Antennas and Wave propagation &Microwave Engineering.
COURSE DESCRIPTION:
Radar equation; Targets; classification of radars; MTI and pulsed radar;Tracking with radar; radar receivers; Echo signal detection in the presence of noise; Navigational Aids.
COURSE OUTCOMES: On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge in
- Principle of working of radars
- MTI and Pulse Doppler radars
- Tracking and detection of radar signals
- Radar displays and duplexers
- Radar receivers.
- Navigational Aids.

CO2. Analyze to detect radar echo signals, range and Doppler measurement.
CO3. Design and develop optimum matched filters, radar receivers and radar system components.

CO4. Solve engineering problems to detect radar signals for range prediction and detectable signal in the presence of noise
CO5. Apply appropriate techniques for signal detection, tracking and global positioning in the field of radar systems and navigational aids.
CO6. Provide wide range of feasible solutions for accurate echo detection and study of Navigational aids useful in real time applications.

III B.Tech. - II semester
(16BT60406) **TELECOMMUNICATION SWITCHING SYSTEMS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Courses on Analog and Digital Communications.
COURSE DESCRIPTION:
Overview of telecommunication switching systems; telephone networks; signaling techniques in telephone networks; ISDN; DSL technology and SONET.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge in:
- Switching systems.
- Subscriber loop systems, numbering plan, charging plan and transmission plan.
- Signaling techniques and traffic in the context of telecommunication network.
- Integrated Services Digital Network (ISDN).
- Frame relay and ATM.
- DSL technologies and SONET networks.

CO2. Perform analysis of traffic load parameters like blocking probability and grade of service.
CO3. Solve engineering problems pertaining to implementation of communication networks.
CO4. Apply appropriate Signaling techniques, networks and topologies of Telecommunications systems with understanding of limitations.
CO5. Understand the probabilistic methods and statistics to solve communication network problems related to societal issues.
CO6. Use standards to meet the responsibilities and norms of the engineering practice in the area of telecommunication switching systems.

III B.Tech. - II semester
(16BT60407) **DIGITAL CMOS IC DESIGN**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: A Courses on VLSI Design.
COURSE DESCRIPTION:
Design styles and characteristics of CMOS digital circuits; Layout design rules; Memory design; Interconnect strategies; Design Methodologies.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Apply knowledge in
- CMOS Circuits
- MOS Layouts
- Memories
- Interconnects
- Methodologies

CO2. Analyze Problems in Interconnect Design.
CO3. Design optimized CMOS Circuits and develop the corresponding Stick Diagrams and Layouts.
CO4. Provide valid solutions to critical problems in CMOS Design.
CO5. Understand the limitations of techniques applied in CMOS design.
CO6. Create Solutions to reduce the power dissipation in CMOS devices for societal needs.

III B.Tech. - II semester
(16BT60408) **INFORMATION THEORY AND CODING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: A Course on Digital Communications.

COURSE DESCRIPTION:
Information theory; Channel capacity; Linear block codes; Cyclic codes; Convolutional codes; Read-Solomon and Turbo codes.

COURSE OUTCOMES:
On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge in Information Theory, Channel Capacity and various error control coding technique.
CO2. Analyze complex engineering problems critically in the domain of information theory, source encoding techniques, channel capacity and error control coding.
CO3. Design various types of channel encoders, syndrome circuits and channel decoders.
CO4. Solve problems pertaining to entropy, source coding and channel coding.
CO5. Use appropriate source and channel coding techniques.
CO6. Apply source and channel coding techniques for providing optimal communication systems for societal use.

III B.Tech. - II semester
(16BT60409) **LIGHT WAVE COMMUNICATIONS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:
Courses on Engineering physics, Electronic devices and Circuits, Digital communications.

COURSE DESCRIPTION:
Ray theory; Single mode fibers; Fiber materials; Fiber losses; Optical sources and detectors; Power launching in to the fiber; Optical links; WDM.

COURSE OUTCOMES:
On successful completion of the course, students will be able to:

CO1. Apply knowledge to understand
- Mode theory of optical communication.
- Losses in optical fibers.
- Optical sources and detectors.
- Power Launching and coupling techniques.
- Optical links.
- WDM concepts.
- Optical Networks.

CO2. Analyze Problems in analog and Digital Links.
CO3. Design and Develop Optical Sources, Detectors and Links.
CO4. Provide valid solutions to overcome losses in optical fibers.
CO5. Select appropriate optical components to suit advanced optical communications and Networks.
CO6. Assess and propose cost effective solutions to minimize the radiation hazards caused by wireless links.

III B.Tech. - II semester
(16BT60410) **NANOELECTRONICS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:
Courses on Basic Engineering Physics, Basic Engineering Chemistry and Electronic Devices.
COURSE DESCRIPTION:
Basics of Nanoelectronics; Crystal structure of materials; Fabrication techniques and measurement of nanostructures; Nanoelectronic devices.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:

CO1. Demonstrate the basic knowledge in
- Nanoelectronics
- Crystal structure of semiconducting material
- Various techniques for fabrication and measurement of nanostructure,
- Semiconducting nano electronic devices.

CO2. Analyze
- Crystal lattices and energy band diagram of semiconducting hetero structures of nanomaterials
- Energy states in nanomaterials.

CO3. Design and develop new semiconducting nano structures with the knowledge of density of states and electron transport.
CO4. Solve the problems related to fabrication of nanoelectronic devices.
CO5. Apply techniques of fabrication and measurement to create nanostructures.
CO6. Apply the ethical standards and legal issues while using chemical substances in fabricating nano device structures.

III B.Tech. - II semester
(16BT60431) **DIGITAL COMMUNICATIONS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: Courses on Signal and Systems &Digital Communications .
COURSE DESCRIPTION:
Simulation and study of various Digital modulation and Demodulation schemes.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge in different Digital Communications.
CO2. Compare the characteristics of various Digital modulation schemes and analyze their performance.
CO3. Design various digital modulation and demodulation circuits and study their characteristics.
CO4. Solve problems pertaining to development of modulation schemes.
CO5. Use MATLAB tools for simulation of modulation schemes.
CO6. Function effectively as an individual and as a member in a group in the area of digital communications.
CO7. Communicate in verbal and written form in the area of digital communications.

III B.Tech. - II semester
(16BT60432) **DIGITAL SIGNAL PROCESSING LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES:A Course on Digital Signal Processing.
COURSE DESCRIPTION:
Implementation of Convolution; DFT and FFT; Design of Analog, Digital FIR and IIR filters.

COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate Knowledge in transforms, FFT algorithm, FIR and IIR filters.
CO2. Analyze the characteristics of Digital and Analog filters such as IIR, FIR and signals using various techniques.
CO3. Design the FIR and IIR filters for feasible and optimal solutions in the core area of signal processing.
CO4. Solve engineering problems using filters in communication and allied areas.
CO5. Use CCS and MATLAB tools, techniques and resource for design of analog and digital filters with understanding of limitations.
CO6. Work individually and in a group effectively in the area of digital signal processing.
CO7. Communicate effectively in oral and written form in the area of digital signal processing.

III B.Tech. - II semester
(16BT60433) **SEMINAR**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
	100	100	-	-	-	2

PREREQUISITES: All the courses of the program up to III B. Tech. – I Semester.
COURSE DESCRIPTION:
Identification of topic for the seminar; Literature survey; Performing critical study and analysis of the topic identified; Preparation of report and presentation.
COURSE OUTCOMES:
Completion of the seminar work enables a successful student to demonstrate:
CO1. Knowledge on the seminar topic.
CO2. Analytical ability exercised during the seminar work.
CO3. Ability to investigate and solve complex engineering problems faced during theseminar work.
CO4. Ability to apply techniques to complex engineering activities with anunderstanding of limitations as applied in the seminar work.
CO5. Ability to function effectively as an individual as experienced during the seminar work.
CO6. Ability to present views cogently and precisely on the seminar topic.
CO7. Ability to engage in life-long leaning as experience during the seminar work.

IV B.Tech. - I semester
(16BT70401) **CELLULAR AND MOBILE COMMUNICATIONS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Courses on Analog and Digital Communications &Antennasand waveguides.
COURSE DESCRIPTION: Concepts of cellular systems; Lee-model for cellular coverage; Desired C/I; Interference and reduction techniques; Frequency management in cellular systems; Handoff techniques; Various modulation techniques and Multiple Access techniques; 2G Systems - GSM - IS-95; 3G systems - WCDMA - CDMA 2000.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate fundamental knowledge in
- Cellular systems
- Interference and cell coverage in Cellular systems
- Handoffs and Dropped calls
- Modulation techniques for cellular systems
- 2G and 3G Wireless communication systems
- Introduction to 4G

CO2. Analyze low interference cellular systems.
CO3. Design omni-directional and directional antenna systems.
CO4. Provide appropriate solution for various scenarios to overcome interference problems.

CO5. Select appropriate antennas to suit the requirements of advanced communication systems.
CO6. Assess and propose cost effective solutions for societal use and minimize the radiation hazards caused by wireless links.

IV B.Tech. - I semester
(16BT70402) EMBEDDED SYSTEMS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:
Courses on Switching Theory and Logic Design, Microprocessors and Microcontrollers.
COURSE DESCRIPTION:
Embedded system design approaches; MSP430 Architecture; Instruction Set; On-Chip Resources; Programming; Communication with peripherals; Internet of Things related Issues.
COURSE OUTCOMES: On successful completion of the course, students will be able to:
CO1. Apply knowledge in
- MSP430 Architecture, Pin out, Instruction set
- High level programming
- Usage of On-chip resources like ADC, DAC, Timers
- Internet of Things related issues

CO2. Analyze various design issues regarding
- Usage of on chip resources
- Low power modes
- Communication support

CO3. Design embedded systems using MSP430 series microcontrollers to suit market requirements.
CO4. Solve engineering problems and arrive at solutions in designing embedded systems to support interconnectivity.
CO5. Apply techniques, program skills, On-Chip resources to design networked embedded systems with an understanding of limitations.
CO6. Reason out and practice professional engineering to deliver efficient and cost effective embedded based products to society.

IV B.Tech. - I semester
(16BT70403) MICROWAVE ENGINEERING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: A course on Electromagnetic Theory and Transmission Lines.
COURSE DESCRIPTION: Wave Propagation; Waveguide components; Microwave tubes; Microwave solid state devices; and Microwave measurements.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge in
- Wave Propagation
- Microwave Components
- Microwave Tubes
- Microwave Measurements

CO2. Analyze the Performance of Microwave components and Microwave Tubes.
CO3. Design microwave components such as hybrid junctions, ferrite devices, and phase shifters.
CO4. Solve problems pertaining to microwave junctions and waveguide components.
CO5. Use appropriate resources to solve the problems related to microwave communication systems.
CO6. Use various microwave components like phase shifters, attenuators and tubes to model a communication system for societal needs.

IV B.Tech. - I semester
(16BT70404) **ADVANCED DIGITAL SIGNAL PROCESSING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: A Course on Digital Signal Processing
COURSE DESCRIPTION:
Digital filter banks; Parametric and Non-Parametric Power Spectrum Estimation methods; Computationally efficient algorithms; Applications of DSP.
COURSE OUTCOMES: On successful completion of the course, students will be able to :
CO1. Apply knowledge in
- Filter banks and Wavelets
- Linear Prediction
- Efficient power Spectral Estimation Techniques.
- Applications of Multirate signal processing

CO2. Analyze complex engineering problems in the Power Spectrum Estimation, Sampling rate conversion and Linear Prediction.
CO3. Design optimum filters, multirate DSP systems and computationally efficient DSP algorithms.
CO4. Solve Engineering problems pertaining to Digital Signal Processing.
CO5. Apply DSP Algorithms, and algorithms related to Forward and Backward Prediction in digital system design with an understanding of the limitations.
CO6. Apply computationally efficient DSP Algorithms, Optimum Filters and perfect reconstruction filters to address societal issues in multirate signal processing and communications.

IV B.Tech. - I semester
(16BT70405) **MIXED SIGNAL DESIGN**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:A course on VLSI Design.
COURSE DESCRIPTION:
Switched Capacitor Circuits; PLLs; Nyquist Rate Data Converters.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge in
- Switched Capacitor Circuits
- PLL
- Data Converters – ADC and DAC.

CO2. Analyze non-ideal effects of switched capacitor circuits and PLLs.
CO3. Design and Develop Switched Capacitor Circuits, PLLs and Data Converters.
CO4. Solve problems by using alternate data converters to compensate performance limitations.
CO5. Apply appropriate techniques to improve the performance of data converters.
CO6. Understand the impact of mixed signal design for societal needs.

IV B.Tech. - I semester
(16BT70406) **SATELLITE COMMUNICATIONS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Courses on Analog Communications and Digital Communications.
COURSE DESCRIPTION: Orbital Aspects; Satellite Subsystems; Satellite Link Design; Earth Station Technology; Multiple Access; Orbit Considerations; Global Positioning System.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge in
- Basic concepts of satellite communications
- Satellite Orbits and Sub-Systems
- Satellite link design
- Earth station subsystems
- FDMA,TDMA,CDMA
- Geostationary and non-geostationary satellite systems
- Satellite navigation and global positioning system.

CO2. Identify and analyze critical engineering problems in the field of satellite subsystem design.

CO3. Design efficient uplink and downlink satellite subsystems.

CO4. Solve engineering problems with feasible and economical solutions during satellite systems link design.

CO5. Apply appropriate and efficient techniques of multiple accessing and spread spectrum while designing satellite subsystems.

CO6. Develop solutions following IEEE, ITU and FCC standards in the field of satellite communications.

IV B.Tech. - I semester
(16BT70407) WIRELESS COMMUNICATIONS AND NETWORKS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: A Course on Computer Networks.

COURSE DESCRIPTION:

Multiple Access techniques; Concepts of Wired and Wireless networks; operation of Mobile IP; Wireless Application Protocol; Architecture of Wireless LAN; Layered architecture of Bluetooth; High speed data networks.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Apply knowledge to understand
- Routing in wireless networks.
- Various protocols for Wireless networks.
- Various wireless LAN technologies.
- Bluetooth
- Architectures of various Wireless Data Networks.

CO2. Analyze various protocols related to wireless networks.

CO3. Design and Develop innovative techniques for implementation of high performance networking.

CO4. Provide valid solutions to overcome challenges in wireless networks.

CO5. Apply appropriate techniques to solve complex engineering problems in wireless networking domain.

CO6. Apply standards in area of wireless networking.

IV B.Tech. - I semester
(16BT70408) LOW POWER CMOS VLSI DESIGN

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: A Course on VLSI Design.

COURSE DESCRIPTION:

Basic Principles; Methodologies and techniques of CMOS Circuit Designs; Need For Low Power VLSI Design; Principles Of Low Power Circuit Design; Simulation Analysis of Low Power; Logic and Circuit Analysis; Special Techniques Of Low Power Design; Performance Management in Architecture or System level.

COURSE OUTCOMES:

On successful completion of the course, students will be able to

CO1. Demonstrate knowledge in
- Design of logic Circuits for low power Requirements
- Power Estimation
- Low power architecture & systems
- Low Power Methodologies & Techniques.

CO2. Analyze complex problems in the domain of low power devices, CMOS Circuits, effects and related issues.

CO3. Design low power circuits to negotiate various constraints such as area, speed and power.

CO4. Solve problems using relevant methods to synthesize Low power CMOS Circuits.

CO5. Apply special techniques in evaluating the performance of low power CMOS devices.

CO6. Contribute positively towards societal issues and responsibilities in designing and developing Low Power Integrated Circuits.

IV B.Tech. - I semester
(16BT70409) **RF ENGINEERING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Courses on Basic Electronics and Wave Theory

COURSE DESCRIPTION:

Concepts of transmission line theory; RF Electronics; high frequency circuit behavior; design of tuning and matching networks; RF Passive and active components; RF Transistor amplifier design; Oscillators and RF Mixers.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Understand basics of RF Electronics and transmission lines.

CO2. Analyze Transmission lines, Matching and biasing networks.

CO3. Design Matching and biasing networks, RF passive and active components, and RFtransistor amplifiers.

CO4. Solve problems in transmission lines, filters, oscillators and Mixers.

CO5. Apply appropriate Oscillators, Mixers and components to RF Circuit design.

CO6. Apply RF electronics in the field of wireless communication systems and allied areasfor societal use.

IV B.Tech. - I semester
(16BT70410) **SPEECH PROCESSING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Courses on Signals and Systems & Digital Signal Processing

COURSE DESCRIPTION:

Acoustic Theory of speech production; model for speech signals and speech processing systems; Mathematical analysis of speech signal - Homomorphic and LPC models; Speech and Speaker recognition systems.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate fundamental knowledge in
- Digital Model representation of speech signal
- STFT analysis
- LPC analysis
- Homomorphic models.

CO2. Analyze speech signal using homomorphic and linear predictive techniques.

CO3. Design efficient algorithms for feasible and optimal solutions in speech processing.

CO4. Synthesize features of speech signals to solve the problems in designing of speech and speaker recognition system.
CO5. Apply appropriate techniques and approaches to analyze and synthesis speech signals with an understanding of limitations.
CO6. Use speaker recognition system for societal needs.

IV B.Tech. - I semester
(16BT70411) **SPREAD SPECTRUM COMMUNICATIONS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: A Course on Digital Communications.
COURSE DESCRIPTION: Fundamentals of spread spectrum systems; Analysis of spread spectrum systems; Detection of spread spectrum signals; Applications of spread spectrum to communications.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge in various types of spread spectrum techniques, generation and detection of spread spectrum signals and their applications in communications.
CO2. Analyze problems in direct sequence and avoidance-type spread spectrum systems.
CO3. Consider design and development issues in spread spectrum communication systems.
CO4. Solve engineering problems pertaining to spread spectrum communications.
CO5. Apply spread spectrum techniques to communications.
CO6. Apply engineering standards to meet the responsibilities and norms of engineering practice.

IV B.Tech. - I Semester
(16BT6HS01) **BANKING AND INSURANCE**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:—
COURSE DESCRIPTION:
Origin of Banking; Functions of Banking; Role & Functions of RBI; Bank-Customer Relationship; Deposit and Loan Services of Banks; Banking Procedures; Electronic Payment Mechanisms; Business Models; Concepts of Risk and Uncertainty; Fundamentals of Insurance; Principles of Insurance; Essentials of Insurance Contracts; Insurance players in India.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Demonstrate Knowledge in · Tools and concepts of Banking and Insurance.
- Basic Principles and concepts of Insurance and Banking.
- e-fund transfers, e-payments and e-business models.

CO2. Develop skills in providing solutions for
- Online banking and e – payments...
- Risk Management through insurance benefits the society at large.
- Money management by leveraging on technology, banking and insurance services.

CO3. Exhibit conceptual soundness about banking and insurance, this would contribute to More employment opportunities.
CO4. Provide life skills for effective utilization of Banking and Insurance facilities.

IV B.Tech. - I Semester

(16BT6HS02) **BUSINESS COMMUNICATION AND CAREER SKILLS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: —

COURSE DESCRIPTION:

Nature and scope of communication; Corporate communication; Writing business documents; Careers and resumes; Interviews.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge in
- Corporate Communication
- Main Stages of Writing Messages
- Career Building

CO2. Analyze the possibilities and limitations of language in
- Communication Networks
- Crisis Management/Communication

CO3. Design and develop the functional skills for professional practice in Business Presentations & Speeches

CO4. Apply written and oral communication techniques in preparing and presenting various documents in technical writing.

CO5. Function effectively as an individual and as a member in diverse teams.

CO6. Communicate effectively with the engineering community and society in formal and informal situations.

IV B.Tech. – I Semester

(16BT6HS03) **COST ACCOUNTING AND FINANCIAL MANAGEMENT**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: —

COURSE DESCRIPTION:

Scope, Objectives and Elements ofcost Accounting; Cost Sheet and Tender quotations; Variance Analysis: Material variances, Labor variances; Meaning and Scope, Liquidity, Profitability Ratios: concept of Risk and Return on Investment.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Acquire Knowledge in
- Elements of Costing.
- Basic concepts of Financial Management.
- Risk and Return
- Significance of Cost Accountancy
- Behavioral Finance

CO2. Develop skills in
- Material, Labor, Overheads control.
- Excellence and ability to minimize the cost of the organization

CO3. Develop effective Communication in Cost control and Financial Management.

CO4. Provide solutions for effective investment decisions.

IV B.Tech. – I Semester

(16BT6HS04) **ENTREPRENEURSHIP FOR MICRO, SMALL AND MEDIUM ENTERPRISES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: —

COURSE DESCRIPTION:

Introduction to Entrepreneur Development; Idea generation and formation of Business Plan; Micro and Small Enterprises; Institutional Finance and Support to Entrepreneur; Woman Entrepreneurship.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Acquire Knowledge in
- Schemes and institutions encouraging entrepreneurship.
- Basic Principles and concepts of Accountancy.
- Significance of entrepreneurship.

CO2. Develop skills in providing solutions for
- Personal excellence through financial and professional freedom.
- Women entrepreneurship serving as contrivance in societal development

CO3. Develop critical thinking and evaluation ability.

CO4. Widens knowledge and build up attitude towards trouble shooting.

CO5. Demonstrate business acumen

IV B. Tech. – I Semester

(16BT6HS05) **FRENCH LANGUAGE (La Langue Francais)**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:—

COURSE DESCRIPTION:

Oral communications; Basic grammar; advanced grammar; basic writing; Business French (La Francais Commercial)

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge in
- Process of communication
- Modes of listening
- Paralinguistic features
- Skimming and Scanning
- Elements of style in writing

CO2. Analyze the possibilities and limitations of language, understanding
- Barriers to Communication
- Barriers to Effective Listening
- Barriers to Speaking
- Formal and metaphorical language

CO3. Design and develop language skills for professional practice**.**

CO4. Apply basic writing skills in writing Emails and understanding wide range of technical terminologies.

CO5. Understand French culture and civilization.

CO6. Communicate effectively with the native French in day to day situation**.**

IV B.Tech. - I Semester
(16BT6HS06) **GERMAN LANGUAGE (Deutsch alsFremdsprache)**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:—
COURSE DESCRIPTION:
Oral communication; Basic grammar; Advanced grammar; Basic writing; Berufsdeutcsch (Business German)
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge in
- Process of communication
- Modes of listening
- Paralinguistic features
- Skimming and Scanning
- Elements of style in writing

CO2. Analyze the possibilities and limitations of language, understanding
- Barriers to Communication
- Barriers to Effective Listening
- Barriers to Speaking
- Formal and metaphorical language

CO3. Design and develop language skills for professional practice**.**
CO4. Apply basic writing skills in writing Emails and understanding wide range of technical terminologies.
CO5. Understand German culture and civilization.
CO6. Communicate effectively with the native German in day to day situation**.**

IV B.Tech. - I Semester
(16BT6HS07) **INDIAN CONSTITUTION**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: —
COURSE DESCRIPTION:
Elements, functions and functionaries according to Indian Constitution, understanding forbetter professional practice and good citizenry.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Gain knowledge in
- Parliamentary proceedings, laws, legislature, administration and its philosophy
- Federal system and judiciary of India
- Socials problems and public services like central civil services and state civil services
- Indian and international political aspects and dynamics

CO2. Develop etiquette and professional behavior in line with the constitution of India for becoming a responsible citizen

IV B.Tech. - I Semester
(16BT6HS08) **INDIAN ECONOMY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: —
COURSE DESCRIPTION:
Introduction; Time Value of Money; Elementary Economic Analysis; Value analysis, Value Engineering; Economic Planning.
COURSE OUTCOMES:
On successful completion of the course, the students will be able to
CO1. Acquire the knowledge in
- Micro and Macro Economics.
- Traditional and Modern methods of Capital Budgeting.
- Five year plans and NITI Aayog.

CO2. Analyze
- Capital Budgeting.
- Value Analysis and Value Engineering.
- Economic analysis
- Law of supply and demand

CO3. Understand the nuances of project management and finance

IV B.Tech. - I Semester
(16BT6HS09) **INDIAN HERITAGE AND CULTURE**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: —
COURSE DESCRIPTION:
Basic traits of Indian Culture; Humanistic Reforms under Jainism and Buddhism; Culture in the medieval period; Socio Religious reforms in Indian Culture; Reform movements for harmonious relations.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Acquaint knowledge in
- Human aspirations and values in Vedic culture.
- Cultural aspects of Buddhism and Jainism
- Unification of our country under Mourya's and Gupta's administrations
- Socio Religious aspects of Indian culture
- Reform movements and harmonious relations.

CO2. Apply ethical principles and reforms as models for the upliftment of the societal status in the present cultural contexts

IV B.Tech. - I Semester
(16BT6HS10) **INDIAN HISTORY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: —
COURSE DESCRIPTION:
Introduction; Ancient India; Classical and Medieval era; Modern India; India after independence.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Gain knowledge on evolution and history of India as a nation
CO2. Analyze social and political situations of past and current periods
CO3. Practice in career or at other social institutions morally and ethically

IV B.Tech. - I Semester

(16BT6HS11) **PERSONALITY DEVELOPMENT**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: —

COURSE DESCRIPTION:

Self-esteem & Self-Management; Developing Positive Attitudes; Self-Motivation & Self-Management; Getting Along with the Supervisor; Workplace Success.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge in
- Self-Management
- Planning Career

CO2. Analyze the situations based on
- Attitudes
- Thinking strategies

CO3. Design and develop the functional skills for professional practice in

CO4. Function effectively as an individual and as a member in diverse teams.

CO5. Communicate effectively in public speaking in formal and informal situations.

IV B.Tech. - I Semester

(16BT6HS12) **PHILOSOPHY OF EDUCATION**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: —

COURSE DESCRIPTION:

Introduction to Philosophy and Engineering Education; Philosophical methods and their implications in engineering; Philosophical education in India; Values and Engineering education; Outcome based education.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Acquire knowledge in
- Philosophy of Engineering education.
- Philosophical Methods.
- Knowledge acquiring methods.
- Engineering education and responsibilities.

CO2. Understand the impact of Outcome Based Education for effective educational outcomes

CO3. Apply reasoning to assess societal issues with the contextual knowledge of engineering education and responsibilities.

IV B.Tech. - I Semester

(16BT6HS13) **PUBLIC ADMINISTRATION**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: —

COURSE DESCRIPTION:

Introduction; Public Policy; Good Governance; E-Governance; Development Administration.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Acquire knowledge in
- Public Policy.
- Good Governance.

- E-governance.
- Development Administration.

CO2. Analyze the possibilities and limitations of existing policies through Good Governance perspective.

CO3. Design and develop solutions in e-governance modelsto find and provide opportunities in e-governance.

CO4. Adopt principles of e-governance in addressing the existing issues and challenges in e-governance sector.

CO5. Understand the significance of Administrative Development in finding professional engineering solutions by probing
- Bureaucracy.
- Role of civil society.

IV B.Tech. - I Semester
(16BT60112) **BUILDING MAINTENANCE AND REPAIR**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: –

COURSE DESCRIPTION:

Durability of buildings, Failure and repair of buildings, Material Techniques for repair, Maintenance of buildings, Conservation and recycling.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Acquire basic knowledge on durability and serviceability, failures, repair and rehabilitation of buildings.

CO2. Analyze failures, repair and rehabilitation techniques.

CO3. Solve complex building maintenance problems through proper investigations and interpretation.

CO4. Use modern tools and techniques for various repairs and rehabilitation of structures.

CO5. Provide solutions for building maintenance and repair problems considering health and safety.

CO6. Consider environmental sustainability in building maintenance and repair.

CO7. Maintain ethical standards for quality in repairs and rehabilitation of structures.

CO8. Evaluate specifications and perform cost analysis of building components while repair and rehabilitation.

IV B.Tech. - I Semester
(16BT60113) **CONTRACT LAWS AND REGULATIONS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: –

COURSE DESCRIPTION:

Construction contracts; Tenders; Arbitration; Legal requirements; Labour regulations.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate basic Knowledge on construction contracts, tenders, arbitration, legal requirements and labour regulations.

CO2. Analyze contracts and tenders.

CO3. Address the legal issues in contracts and tenders.

CO4. Follow laws and regulations in the preparation of contracts and tenders.

CO5. Prepare contract and tender documents as per the standards.

CO6. Consider project schedule, cost, quality and risk in the preparation of contracts and tenders.

IV B.Tech. - I Semester
(16BT60114) **DISASTER MITIGATION AND MANAGEMENT**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: —
COURSE DESCRIPTION:
Disasters; Earthquakes; Floods; Cyclones; Droughts; Landslides; Disaster management.
COURSE OUTCOMES: On successful completion of course, students will be able to:
CO1. Demonstrate knowledge on disasters, their vulnerability and mitigation measures.
CO2. Analyze disasters and their vulnerability.
CO3. Design strategies for effective disaster mitigation.
CO4. Address pre and post disaster issues for better preparedness and mitigation measures, through proper analysis and interpretation.
CO5. Use appropriate methods in disaster mitigation and management.
CO6. Use historical data of disasters to inform the people over preparedness and mitigation measures.
CO7. Solve disaster related issues considering environment.
CO8. Consider economical issues in disaster management.

IV B.Tech - I Semester
(16BT60115) **ENVIRONMENTAL POLLUTION AND CONTROL**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: —
COURSE DESCRIPTION:
Fundamentals ofair pollution; Dispersion of pollutants; Effects and control of air pollution; Water pollution; Soil pollution and control; Municipal solid waste management.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Demonstrate knowledge on air, water, soil pollution and their control and solid waste management.
CO2. Analyze causes and effects of air, water and soil pollution and their remedial measures.
CO3. Recommend suitable solutions to complex environmental pollution problems.
CO4. Use appropriate remedial technique to solve environmental pollution problems.
CO5. Understand the effects of environmental pollution on human health and vegetation.
CO6. Encourage sustainable development through implementation of pollution control measures.
CO7. Maintain IS Codes for environmental quality control.

IV B.Tech - I Semester
(16BT60116) **PLANNING FOR SUSTAINABLE DEVELOPMENT**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: —
COURSE DESCRIPTION:
Sustainable development; Environmental impact; Sustainable Policies; Governance; Theories and strategies; Media and education for sustainability.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Demonstrate the knowledge on sustainable development, environmental impact, sustainable policies, governance, systems and strategies, media and education for sustainability.
CO2. Analyze theories, environmental impact, policies, systems and strategies for sustainable development.
CO3. Develop suitable methods and systems for sustainable development.
CO4. Use appropriate techniques in solving issues related to sustainable development.

CO5. Provide solutions to problems associated with sustainable development considering society.
CO6. Consider environment while planning sustainable development.
CO7. Communicate effectively on sustainable development issues through media and education.
CO8. Consider economical issues while planning for sustainable development.

IV B.Tech. - I Semester
(16BT60117) **PROFESSIONAL ETHICS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: —
COURSE DESCRIPTION:
Engineering ethics; Professional ideals and virtues; Engineering as social experimentation; Responsibilities and rights; Global issues.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Demonstrate the principles of ethics, importance of professional values and social responsibility.
CO2. Analyze the problems in the implementation of moral autonomy and use ethical theories in resolving moral dilemmas.
CO3. Develop suitable strategies to resolve problems arise in practicing professional ethics.
CO4. Provide solutions to complex problems associated with professional ethics by proper analysis and interpretation.
CO5. Use appropriate theories in resolving issues pertain to professional ethics.
CO6. Understand the impact of professional ethics on society and address the limitations of codes of ethics.
CO7. Practice engineering with professionalism, accountability and ethics.
CO8. Function as a member, consultant, manager, advisor and leader in multi-disciplinary teams.
CO9. Write reports without bias and give instructions to follow ethics.

IV B.Tech. - I Semester
(16BT60118) **RURAL TECHNOLOGY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: —
COURSE DESCRIPTION:
Rural technology; Non conventional energy; Community development; IT in rural development.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Demonstrate the knowledge on technologies for rural development.
CO2. Analyze various technologies available which are appropriate for rural development.
CO3. Carryout feasibility study on the public and private partnership for rural development.
CO4. Develop and use latest technologies for rural development.
CO5. Address health and safety issues while choosing technologies for rural development.
CO6. Educate the rural populace on the positive impacts of bio-fertilisers and usage of agro machinery in agriculture.

IV B.Tech - I Semester
(16BT60308) **GLOBAL STRATEGY AND TECHNOLOGY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: —

COURSE DESCRIPTION:

Introduction to strategic management; Strategic management process; Principles of good strategy; Globalization strategies; Research and Development strategies; Technology Management and Transfer; Elements of Transfer Process; Corporate Governance in the Indian scenario.

COURSE OUTCOMES:

On successful completion of the course, students will be able to

CO1. Demonstrate the knowledge on Strategic management, Research & development strategies, Technology management and transfer, Globalization and Corporate governance.

CO2. Identify and analyze crucial problems in strategic management to improve performance of the organizations.

CO3. Develop the products and production process by using research and development strategies.

CO4. Conduct investigations on the impact of globalization in current scenario in the context of corporate governance.

CO5. Appraise the resources and capabilities of the firm in terms of their ability to confer sustainable development.

CO6. Apply ethics in strategic decision making.

IV B.Tech - I Semester
(16BT60309) **INTELLECTUAL PROPERTY RIGHTS AND MANAGEMENT**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: —

COURSE DESCRIPTION:

Protection of ideas; innovation and artistic endeavors; Acts and procedure related to patents, trademarks, copy right, design registration, trade secrets and cyber laws; Infringement; Commercialization of intellectual property rights; Case studies in each.

COURSE OUTCOMES:

On successful completion of the course, students will be able to

CO1. Demonstrate knowledge on intellectual property rights, patents, trademarks, copyrights, trade secrets and commercialization of intellectual property.

CO2. Analyse the commercial significance of discoveries and developments and to assist in bringing these into public use.

CO3. Investigate and ensure smooth transition from concept to final product by following National & International Laws of Intellectual Property.

CO4. Utilize the various policies and procedures related to patents, trademarks and copyrights relating to IPR.

CO5. Safeguard, review and manage the intellectual property so that it may receive adequate and appropriate legal protection against unauthorized use.

CO6. Follow ethical standards in capacity building and work as a platform for development, promotion, protection, compliance, and enforcement of intellectual property and knowledge.

CO7. Prepare documents and fill applications needed for filing a patent, design, copyright and trade mark.

IV B.Tech. - I Semester

(16BT60310) **MANAGING INNOVATION AND ENTREPRENEURSHIP**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:—

COURSE DESCRIPTION:

Evolution of entrepreneurship from economic theory Managerial and entrepreneurial competencies; Concepts of Shifting Composition of the Economy Purposeful Innovation & Sources of Innovative Opportunity; The Innovation Process; Innovative Strategies; Entrepreneurial Motivation; Entrepreneurs versus inventors; Ethics and International Entrepreneurship; Strategic Issues in International Entrepreneurship; Problem solving Innovation and Diversification.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate the principles of business innovation and entrepreneurship for establishing industrial ventures.

CO2. Analyze business plans for potential investors and stakeholders and effectively answer probabilistic questions on the substance of plan.

CO3. Develop a comprehensive and well planned business structure for a new venture.

CO4. Conduct investigation on complex problems, towards the development of Project.

CO5. Apply modern statistical and mathematical tools to design projects and subsequent work procedures.

CO6. Apply ethics in constructive innovation framework.

CO7. Exhibit professionalism by employing modern project management and financial tools.

IV B.Tech. - I Semester

(16BT60311) **MATERIALS SCIENCE**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:—

COURSE DESCRIPTION:

Structure and Bonding in metals; Steels, Cast Irons and Non Ferrous alloys; Material Selection for conductors, Insulators and semiconductors; Strengthening mechanisms of metals; Plastics and Ceramics as Insulators; AC and DC properties of Insulators; Semiconductors and Magnetic materials; Composite materials in Electrical and Electronics engineering; Material Selection and manufacturing of Optical fibers.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate the knowledge on concepts of fundamental science and engineering principles relevant to materials.

CO2. Analyze the structures of various types of Ferrous, Non-ferrous alloys influencing various engineering applications.

CO3. Conduct investigations to select suitable materials with desired properties for engineering applications.

CO4. Use phase diagrams to interpret the data regarding microstructure of materials.

CO5. Consider health and safety issues while providing materials to real time applications.

CO6. Use composite materials that reduce material waste in design and manufacturing for sustainability.

IV B.Tech. - I Semester
(16BT70412) GREEN TECHNOLOGIES

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: —
COURSE DESCRIPTION:
Principles of green engineering; Green communications; Green energy; Green computing; Green construction; Green manufacturing.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Deploy conceptual knowledge in green technologies pertaining toengineering practice.
CO2. Analyze various green technologies for engineering practice.
CO3. Provide green solutions to engineering problems.
CO4. Apply various green techniques in the engineering practice.
CO5. Consider health and safety issues while providing green solutions to the society.
CO6. Understand issues related to environment sustainability.
CO7. Apply ethical standards for environmental sustainability in the engineering practice.

IV B.Tech. - I Semester
(16BT70413) INTRODUCTION TO NANOSCIENCE AND NANOTECHNOLOGY

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:—
COURSE DESCRIPTION:
Introduction to the concept of nano; Description of nanomaterial; Nanostructure characterization tools; Classification of nanomaterials; Fabrication of nanomaterial; Different applications of nanostructures and nanomaterials.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Demonstrate knowledge in
- Nanoscale technology.
- Difference between micro and nanotechnology
- Classification of Nanostructure and Nanomaterial
- Fabrication of various nanomaterials and nanostructures.

CO2. Analyze numerical and analytical problems in
- Nanomaterial size by using Scanning Electron Microscope and X-Ray diffraction

CO3. Design and fabricate devices based on nanostructures like
- Nano solar cell
- Nano cantilever
- Nano bio-sensor

CO4. Synthesize nano particle of different materials to solve the problems related to fabrication of nanostructures.
CO5. Select appropriate technique for fabrication of nanostructures and Nano composites.
CO6. Apply ethical standards and legal issues while using chemical substances in fabrication of new nanostructures.

IV B.Tech. - I Semester
(16BT60505) ENGINEERING SYSTEM ANALYSIS AND DESIGN

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:—
COURSE DESCRIPTION:
Systems Process; Technologies for Systems; System Development Life Cycle; System Analysis and Modeling; Levels of Management; Project Management; Systems Implementation and Importance of UML Prototyping; Maintaining and Managing the Systems Output Process.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge in
- Systems Process and System Design
- Systems Analysis and Modeling
- System Development Life Cycle
- Design Management and Maintenance Tools.

CO2. Analyze system Process and estimate the given models by using case tools.
CO3. Design and develop a model to the organizational systems.
CO4. Solve complex problems related to engineering systems and produce accurate results
CO5. Apply object oriented techniques for modeling dynamic systems.
CO6. Contribute towards societal issues and responsibilities in designing, modeling and developing of organizational systems.

IV B.Tech.- I Semester
(16BT71011) **MICRO-ELECTRO-MECHANICAL SYSTEMS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:—
COURSE DESCRIPTION:
Overview of Micro Electro Mechanical Systems (MEMS); scaling laws; working principles of microsensors and microactuators; materials; microfabrication processes; packaging of Microsystems.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Demonstrate knowledge on MEMS devices, scaling laws, microsensors and microactuators
CO2. Analyze the properties of materials and identify its suitability for MEMS devices.
CO3. Design MEMS devices that meet desired specifications and requirements.
CO4. Analyze and synthesize the information to provide effective solution to engineering problems with MEMS devices.
CO5. Use modern techniques in micro manufacturing process.
CO6. Develop efficient and cost effective MEMS based products for society.

IV B.Tech. – I Semester
(16BT61205) **CYBER SECURITY AND LAWS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:—
COURSE DESCRIPTION:
Cyber Crimes and Indian IT Act; Cyber Offenses; Tools and Methods used in Cyber Crime; Phishing ad Identity Theft; Indian and Global Perspective on Cyber Crimes and Cyber Security; Organizational Implications on Cyber Security; IPR Issues; Cyber Crime and Terrorism; Cyber Crime Illustrations
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Demonstrate knowledge in Cyber security, Cybercrimes and its related laws in Indian and Global Act.
CO2. Analyze the legal perspectives and laws related to cybercrimes in Indian context.
CO3. Apply security and privacy methods in development of modern applications and in organizations to protect people and to prevent cybercrimes.
CO4. Solve Cyber security issues using privacy policies.
CO5. Use antivirus tools to minimize the impact of cyber threats.
CO6. Follow security standards for the implementation of Cyber Security and laws.

IV B.Tech. - I Semester
(16BT61505) **BIO-INFORMATICS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: –
COURSE DESCRIPTION:
Introduction to Bioinformatics; Biology and Information; Sequence alignment and dynamic programming; Biological Database; Homology Modeling; Structure Prediction; Molecular Dynamics.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Demonstrate knowledge on concepts of biological databases, Genome and proteome.
CO2. Analyze biological sequences for Homology Modeling.
CO3. Apply clustering methods for Phylogenetic trees.
CO4. Solve bio sequencing problems using dynamic programming.
CO5. Select and apply appropriate techniques and tools to structure Prediction.

IV B.Tech. - I semester
(16BT70431) **ANTENNAS AND MICROWAVE ENGINEERING LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: Courses on EM theory, Antennas and Microwave Engineering.
COURSE DESCRIPTION:
Design and verification of various antennas; Study of Microwave components' characteristics; Power supplies.
COURSE OUTCOMES: On successful completion of the course, students will be able to:
CO1. Apply the knowledge of antennas and microwaves to understand the working of various devices.
CO2. Analyze the characteristics of different microwave components like
- Attenuators
- Directional Couplers
- Horn antennas etc.,

CO3. Design various antennas for different communication needs.
CO4. Solve problems using different antenna designs and microwave devices.
CO5. Apply appropriate tools to design and analyze various antennas.
CO6. Understand the working of various antennas and microwave components and provide engineering solutions for societal use.
CO7. Commit to ethical principles in the design of antennas and microwave components.
CO8. Work individually or in a group in the field of antennas and microwaves.
CO9. Communicate effectively in verbal and written form in the area of antennas and microwaves.

IV B.Tech. - I semester
(16BT70432) **EMBEDDED SYSTEMS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: Courses on Embedded systems, C Programming.
COURSE DESCRIPTION:
IDE for Embedded System Design using MSP430; Interfacing Switch & LED; Timers-WDT, Configuring, Programming; ADC-usage; Power down modes; DAC; PWM Generator; Networking – SPI, Wi-Fi.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge in designing complex energy efficient embedded systems.
CO2. Analyze usage of various on-chip resources like GPIO, Timers, Interrupts, ADC, DAC, Comparator, SPI.

CO3. Design embedded systems to suit market requirements.
CO4. Solve engineering problems by proposing potential solutions using industry choice advanced Microcontrollers.
CO5. Apply appropriate techniques, resources, and CCSV6 based IDE for modeling embedded systems with understanding of limitations.
CO6. Provide embedded system solutions for societal needs.
CO7. Work individually and in a group to develop embedded systems.
CO8. Communicate effectively in oral and written form in the field of embedded systems.

IV B.Tech. - I semester
(16BT70433) **COMPREHENSIVE ASSESSMENT**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
	100	100	-	-	-	2

PREREQUISITES: All the courses of the program.
COURSE DESCRIPTION:
Assessment of student learning outcomes in the courses of the program.
COURSE OUTCOMES:
Comprehensive Assessment enables a successful student to demonstrate:
CO1. Knowledge in the courses of the program.
CO2. Analytical ability in the courses of the program.
CO3. Design skills in the courses of the program.
CO4. Ability to investigate and solve complex engineering problems in the courses of the program.
CO5. Ability to apply tools and techniques to complex engineering activities with anunderstanding of limitations in the courses of the program.
CO6. Ability to provide solutions as per societal needs with consideration to health, safety, legal and cultural issues in the courses of the program.
CO7. Understanding of the impact of the professional engineering solutions in environmental context and need for sustainable development in the courses of the program.
CO8. Ability to apply ethics and norms of the engineering practice in the courses of the program.
CO9. Ability to function effectively as an individual in the courses of the program.
CO10. Ability to present views cogently and precisely in the courses of the program.
CO11. Ability to engage in life-long leaning in the courses of the program.

IV B.Tech. - II semester
(16BT80431) **PROJECT WORK**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
100	100	200	-	-	-	12

PREREQUISITES: All the courses of the program.
COURSE DESCRIPTION:
Identification of topic for the project work; Literature survey; Collection of preliminary data; Identification of implementation tools and methodologies; Performing critical study and analysis of the topic identified; Time and cost analysis; Implementation of the project work; Preparation of thesis and presentation.
COURSE OUTCOMES:
Completion of the project work enables a successful student to demonstrate:
CO1. Knowledge on the project topic.
CO2. Analytical ability exercised in the project work.
CO3. Design skills applied on the project topic.
CO4. Ability to investigate and solve complex engineering problems faced during theproject work.
CO5. Ability to apply tools and techniques to complex engineering activities with anunderstanding of limitations in the project work.
CO6. Ability to provide solutions as per societal needs with consideration to health, safety, legal and cultural issues considered in the project work.

CO7. Understanding of the impact of the professional engineering solutions in environmental context and need for sustainable development experienced duringthe project work.
CO8. Ability to apply ethics and norms of the engineering practice as applied in theproject work.
CO9. Ability to function effectively as an individual as experienced during the project work.
CO10. Ability to present views cogently and precisely on the project work.
CO11. Project management skills as applied in the project work.
CO11. Ability to engage in life-long leaning as experience during the project work.

Program: B.Tech. ELECTRICAL AND ELECTRONICS ENGINEERING

I B. Tech. - I Semester
(16BT1BS02) **ENGINEERING PHYSICS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Intermediate / senior secondary Physics
COURSE DESCRIPTION:
Lasers; optical fibers; principles of quantum mechanics; band theory of solids; semiconductors; dielectric properties of materials; acoustics of buildings; superconductors; crystallography and nanomaterials.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. demonstrate basic knowledge of lasers, optical fibers, quantum mechanics, dielectrics, semiconductors,and superconductors, acoustic of buildings, crystallography and nanomaterials.
CO2. analyze the construction and working of various laser systems, semiconductor devices, various types of optical fibers and its communication system and nano materials properties.
CO3. demonstrate skills in designing lasers, optical fiber cable, semiconductor devices, acoustically good halls and nanomaterials.
CO4. develop problem solving skills in engineering context.
CO5. use relevant techniques for assessing ball milling, pulsed laser deposition, p-n junction and Laser

I B. Tech. – I Semester
(16BT1BS03) **MATRICES AND NUMERICAL METHODS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Intermediate /Senior secondary mathematics
COURSE DESCRIPTION: Fundamentals of matrix theory; numerical solutions of equations, curve fitting; interpolation; numerical differentiation and integration; numerical solutions of ordinary differential equations.
COURSE OUTCOMES: On successful completion of this course, students will be able to:
CO1. demonstrate basic knowledge in
- Finding the rank of matrices and analyzing them.
- Solving algebraic and transcendental equations by various numerical methods.
- Fitting of various types of curves to the experimental data.
- Estimating the missing data through interpolation methods.
- Identification of errors in the experimental data
- Finding the values of derivatives and integrals through various numerical methods.
- Solving differential equations numerically when analytical methods fail.

CO2. develop skills in analyzing the
- methods of interpolating a given data
- properties of interpolating polynomials and derive conclusions
- properties of curves of best fit to the given data
- algebraic and transcendental equations through their solutions
- properties of functions through numerical differentiation and integration
- properties of numerical solutions of differential equations

CO3. develop skills in designing mathematical models for
- Fitting geometrical curves to the given data
- Solving differential equations
- Constructing polynomials to the given data and drawing inferences.

CO4. develop numerical skills in solving the problems involving
- Systems of linear equations
- Fitting of polynomials and different types of equations to the experimental data
- Derivatives and integrals
- Ordinary differential equations

CO5. use relevant numerical techniques for
- Diagonalising the matrices of quadratic forms
- Interpolation of data and fitting interpolation polynomials
- Fitting of different types of curves to experimental data
- obtaining derivatives of required order for given experimental data
- Expressing the functions as sum of partial fractions

I B. Tech. - I Semester
(16BT1BS04) **MULTI - VARIABLE CALCULUS AND DIFFERENTIAL EQUATIONS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Intermediate /Senior secondary mathematics

COURSE DESCRIPTION: First order differential equations; higher order linear differential equations; functions of several variables; applications of integration; multiple integrals; vector calculus.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. demonstrate knowledge in
- Higher order Differential equations
- Maximum and minimum values for the functions of several variables
- Double and triple integrals
- Differentiation and integration of vector functions.
- Line and surface volume transforming integrals from three dimensional surfaces and volumes on to plane surfaces

CO2. develop skills in analyzing the
- methods for differential equation for obtaining appropriate solutions,
- Properties of oscillatory electrical circuits and heat transfer in engineering systems
- The variations in the properties of functions near their stationary values
- Flow patterns of fluids, electrical and magnetic flux and related aspects

CO3. develop skills in designing mathematical models for
- R-C and L-R-C oscillatory electrical circuits
- Heat transfer and Newton's law of cooling
- Engineering concepts involving lengths of curves and areas of planes, Flux across surfaces

CO4. develop analytical skills in solving the problems involving
- Newton's law of cooling
- non homogeneous linear differential equations
- maximum and minimum values for the functions
- lengths of curves, areas of surfaces and volumes of solids in engineering
- transformation of integrals from three dimensional surfaces and volumes on to plane surfaces

CO5. use relevant mathematical techniques for evaluating
- various types of particular integrals in differential equations
- stationary values for multi variable functions
- multiple integrals in change of variables
- integrations of vector functions.

I B. Tech. - I Semester

(16BT10201) **ELECTRIC CIRCUITS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	4	1	-	4

PREREQUISITES: Physics at Intermediate Level

COURSE DESCRIPTION:

Fundamentals of electric circuit parameters; nodal and mesh analysis; analysis of single phase and polyphase systems; analysis of coupled circuits; network theorems.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. demonstrate knowledge on

- voltage and current relationships for various electric elements
- network reduction techniques
- concepts of 1-phase and 3-phase electric circuits
- concepts of magnetically coupled circuits
- various circuit theorems

CO2. analyze electric and coupled circuits with conventional concepts and theorems

CO3. design resonant circuits to meet the required specifications

CO4. evaluate electric and magnetically coupled circuits parameters using conventional techniques and theorems.

I B. Tech. - I Semester

(16BT10501) **PROGRAMMING IN C**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: --

COURSE DESCRIPTION:

Program design; Operators and Expressions; Data Input and Output; Control Statements; Functions; Arrays; Strings; Pointers; Structures & Unions and File handling Techniques;

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO1. demonstrate knowledge in:

- Elements of C Language
- Selection and Repetition statements.
- Arrays, Strings and Functional statements.
- Derived data types, Files and Pointers

CO2. analyze complex engineering problems to develop suitable solutions

CO3. design algorithms for specified engineering problems

CO4. use appropriate ‘C’ language constructs for solving engineering problems

CO5. write programs using ‘C’ language to implement algorithms

I B. Tech. - I Semester

(16BT1BS32) **ENGINEERING PHYSICS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: Intermediate / senior secondary Physics.

COURSE DESCRIPTION:
Characteristics of p-n junction diode, Photodiode, LED, and semiconductor laser diode. Experimental determination of carrier concentration and energy gap of a semiconductor material, wave length of a laser source, size of fine particle, numerical aperture and acceptance angle of optical fiber. Determination of frequency of electrically vibrating tuning fork and A.C source using A.C sonometer, magnetic field along axial line of a current carrying coil and rigidity modulus of material of a wire using torsional pendulum.

COURSE OUTCOMES:
On successful completion of this course, students will be able to:

CO1. demonstrate basic knowledge about semiconductor materials, magnetic materials and lasers.

CO2. demonstrate analytical skills in the estimation of carrier concentration of semiconductor materials and characterization of p-n junction.

CO3.develop skills in designing electronic circuits using semiconductor components.

CO4. use instrumental techniques in A.C sonometer and Melde's experiment.

CO5.apply diffraction techniques for determination of size of tiny particles and wave length of lasers.

I B. Tech. - I Semester

(16BT10231) **ELECTRIC CIRCUITS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: -

COURSE DESCRIPTION:
Verification of Ohm's law, KVL, KCL and network theorems; analysis of AC and DC circuits; determination of resonant frequency in series and parallel RLC circuits; determination of self and mutual inductances in coupled circuits;

COURSE OUTCOMES:
After successful completion of the course, student will be able to:

CO1. demonstrate knowledge on
- identification of various circuit elements and their values.
- concepts of electrical and magnetic circuits.

CO2. analyze and relate physical observations and measurements in electric circuits to theoretical principles and theorems.

CO3. design circuit parameters to meet the required specifications

CO4. demonstrate skills in
- obtaining the current locus diagrams.
- determining the parameters of magnetically coupled circuits.
- measuring of active and reactive powers.

CO5. function effectively as an individual and as a member in a team

CO6. communicate effectively both oral and prepare laboratory reports.
opposing fluxes.

I B. Tech. - I Semester
(16BT10232) **ELECTRICAL AND ELECTRONICS WORKSHOP PRACTICE**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: --
COURSE DESCRIPTION: Identification and specifications of various Electric and Electronic devices; analysis of various series, parallel and series-parallel electrical circuits; develop various electrical circuits for domestic and industrial applications.
COURSE OUTCOMES: After successful completion of the course, student will be able to
CO1. demonstrate knowledge on various Electrical and Electronic Devices.
CO2. analyze various series and parallel electrical circuits.
CO3. design and develop various electrical circuits for domestic and industrial applications.
CO4. function effectively as individual and as a member in a team.
CO5. communicate effectively both oral and written forms

I B. Tech. - I Semester
(16BT10531) **PROGRAMMING IN C LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES:-
A course on Programming in C
COURSE DESCRIPTION:
Hands on practice in developing and executing simple programs using C Programming constructs– Conditional statements, Loops, Arrays, Strings, Functions, Structures, Pointers and Functions.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. demonstrate practical knowledge of using C language constructs:
- Selection and Repetition statements.
- Arrays, Strings and Functional statements.
- Derived data types, Files and Pointers

CO2. analyze problems to develop suitable algorithmic solutions
CO3. design Solutions for specified engineering problems
CO4. use appropriate 'C' language constructs for solving engineering problems
CO5. implement and execute programs using 'C' language
CO6. document programs and communicate effectively while conducting Professional transactions.

I B. Tech. - II Semester
(16BT1HS01) **Technical English**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: English at Intermediate level
COURSE DESCRIPTION: Introduction to Communication; Active Listening; Effective Speaking; Reading; and Writing.
COURSE OUTCOMES:
On successful completion of this course, the students will be able to:
CO1. demonstrate knowledge in
- Process of communication
- Modes of listening
- Paralinguistic features
- Skimming and Scanning
- Elements of style in writing

CO2. analyze the possibilities and limitations of language for understanding
- Barriers to Communication
- Barriers to Effective Listening
- Barriers to Speaking
- Formal and metaphorical language

CO3. design and develop functional skills for professional practice.
CO4. apply writing skills in preparing and presenting documents
CO5. function effectively as an individual and as a member in diverse teams.
CO6. communicate effectively with the engineering community and society in formal and informal situations.

I B. Tech - II Semester
(16BT1BS01): **ENGINEERING CHEMISTRY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Intermediate/Senior Secondary Chemistry
COURSE DESCRIPTION: Water technology, Chemistry of Engineering materials, Nanochemistry, Green Chemistry, Electro chemical cells, Sensors, Corrosion and Lubricants.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:

CO1. acquire basic knowledge in water technology, engineering plastics, conducting polymers, composites, Electro chemical cells, Nano Chemistry, principles of Green Chemistry, corrosion phenomenon and lubricants.
CO2. develop analytical skills in:
- Determination of hardness of water.
- Determination of viscosity, flame and fire points, cloud and pour points.

CO3. develop designing skills in:
- Synthesis of engineering plastics.
- Chemical methods for the synthesis of Nano materials.

CO4. develop skills for providing solutions through:
- Mitigation of hardness of water.
- Newer Nanomaterials and engineering plastics for specific applications

CO5. acquire awareness to practice engineering in compliance to modern techniques such as:
- Nalgonda technique for defluoridation of water
- Electroplating technique for control of corrosion.

CO6. acquire awareness to societal issues on:
- Quality of water.
- Bio-diesel
- Chemical materials utility and their impact.

I B. Tech. - II Semester
(16BT2BS01) **TRANSFORMATION TECHNIQUES AND PARTIAL DIFFERENTIAL EQUATIONS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Intermediate /Senior secondary Mathematics
COURSE DESCRIPTION: Fourier series; Fourier integrals and transforms; Laplace transforms; z – transforms; partial differential equations.
COURSE OUTCOMES:
On successful completion of this course, students will be able to
CO1. demonstrate basic knowledge in
- Fourier series and Fourier transforms

- Fourier integrals
- Laplace transforms and their applications
- z- transforms and their applications
- solving partial differential equations

CO2. analyze
- Properties of Fourier series for a given function
- Partial differential equations through different evaluation methods
- Difference equations through z – transforms
- Engineering systems and processes involving wave forms and heat transfer

CO3. design mathematical models for
- Problems involving heat transfer and wave forms
- Engineering concepts involving, Fourier transforms, Fourier integrals, Laplace transforms, z transforms and difference equations

CO4. solve problems involving
- Fourier series and Fourier transforms
- Laplace transforms
- Z-transforms and difference equations
- Heat transfer and wave motion

CO5. use relevant transformation techniques for
- Obtaining Fourier transforms for different types of functions
- Laplace transforms
- Z- transforms
- Partial differential equations

I B. Tech. - II Semester

(16BT20401) **ELECTRONIC DEVICES AND CIRCUITS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: A Course on Engineering Physics.

COURSE DESCRIPTION:

Characteristics of general and special purpose electronic devices; Rectifiers; filters and regulators; Biasing and small signal analysis of BJT and FET.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. demonstrate knowledge in
- p-n junction diode and its characteristics
- Zener diode and its characteristics
- Rectifiers, Filters and Regulators
- Characteristics of BJT, FET, MOSFET and special purpose electronic devices.

CO2. analyze numerical and analytical problems in
- Rectifiers using Filters
- Regulated Power Supplies
- Transistor biasing circuits and stabilization
- Transistor amplifiers
- FET biasing circuits and amplifiers

CO3. design electronic circuits such as
- Rectifiers with and without filters
- Voltage regulators
- BJT and FET biasing circuits
- BJT and FET amplifiers

CO4. solve engineering problems and arrive at solutions pertaining to electronic circuits.

CO5. select appropriate technique for transistor modeling.

I B. Tech. - II-Semester

(16BT20541) **Foundations of Data Structures**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: A course on Programming in C

COURSE DESCRIPTION:

Concepts of sorting: sorting by exchange, sorting by distribution, sorting by merging and data structures: stacks, queues, linked lists, trees, graphs, and hash table.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. demonstrate knowledge in Sorting techniques, Linear and Non-linear Data Structures. CO2. analyze the performance of sorting techniques and their relationship to Data Structures.

CO3. design appropriate hashing function for a given application and develop programs to implement Linear and Non-Linear data structures

CO4. apply appropriate data structure to provide solutions for real time problems using C Language.

I B. Tech. - II Semester

(16BT1HS31) **ENGLISH LANGUAGE LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: English at intermediate or equivalent level.

COURSE DESCRIPTION: Phonetics; Vocabulary Building; Functional Grammar; Just a Minute; Elocution/Impromptu; Giving Directions/Conversation Starters; Role Play; Public Speaking; Describing People, Places, Objects and Events; Reading Comprehension; Listening Comprehension; Information Transfer.

COURSE OUTCOMES:

On successful completion of this course the students will be able to:

CO1**.** demonstrate knowledge in
- Phonetics
- Information Transfer

CO2**.** analyze the situations in professional context by using
- Vocabulary
- Grammar

CO3**.** design and develop functional skills for professional practice.

CO4**.** apply the techniques of Listening and Reading skills to comprehend Listening and Reading comprehension.

CO5**.** function effectively as an individual and as a member in diverse teams through
- Extempore talk and
- Role Play

CO6**.** communicate effectively in public speaking in formal and informal situations.

CO7**.** recognize the need to engage in lifelong learning to upgrade competence of knowledge and communication.

I B. Tech- II Semester
(16BT1BS31): **ENGINEERING CHEMISTRY LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: Intermediate/Senior Secondary Chemistry
COURSE DESCRIPTION: Estimation of hardness, alkalinity, dissolved oxygen of water samples and estimation of Iron by volumetric methods, determination of effect of P^H on rate of corrosion, measurement of viscosity of lubricants; Instrumental methods like potentiometer, conductivity meter, P^H meter and colorimeter; synthesis of Polymers and Nano materials.
COURSE OUTCOMES:
After completion of the course, a successful student is able to:
CO1. Acquire basic Knowledge about the volumetric analysis and synthesis of materials used for engineering applications.
CO2. Acquire analytical skills in the estimation of hardness of water, alkalinity of water, dissolved oxygen in water and estimation of Iron through wet laboratory methods.
CO3. Develop designing skills for the synthesis of polymers and Nanomaterials.
CO4. Acquire skills to use instrumental techniques for the determination of Electrical conductance of electrolytes, EMF of a cell, PH of a solution, determination of viscosity of lubricants and estimation of iron in cement.
CO5. Provide solutions for environmental issues through determination of quality of water.

I B. Tech. - II Semester
(16BT10331) **COMPUTER AIDED ENGINEERING DRAWING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	1	6	3

PREREQUISITES: --
COURSE DESCRIPTION:
Engineering drawing conventions; importance of engineering drawing; fundamental concepts of sketching; computed aided drafting and different types of projections of geometric entities (both 2D and 3D) through computer aided drafting packages.
COURSE OUTCOMES:
On Successful completion of this course, students will be able to:
CO1. understand, write and read the language of engineering drawing in industry through International System of Standards.
CO2. develop the imagination and mental visualization ability for interpreting the geometrical details of engineering objects.
CO3. produce different views and projection in drawing.
CO4. Use modern CAD software for design and drafting of drawings.
CO5. create multi-view drawings suitable for presentation to Engineering community.
CO6. introduce and communicate universally accepted conventions and symbols for their usage in technical drawing.

I B. Tech. - II Semester
(16BT20551) **FOUNDATIONS OF DATA STRUCTURES LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: *A course on "Foundations of Data Structures"*
COURSE DESCRIPTION:
Hands on programming to implement data structures - Linked lists, Stacks, Queues, Trees, Search trees, Sorting, and Hashing in C Language.

COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. demonstrate practical knowledge on stacks, queues, trees, graphs and Hashing Techniques
CO2. identify suitable data structure to solve engineering problems.
CO3. design solutions for complex engineering problems using linear and non-linear data structures.
CO4. develop algorithms leading to multiple solutions by conducting investigations of complex problems.
CO5. apply 'C' language as a tool for implementing linear and non linear data structures
CO6. communicate effectively by writing Programs and document practical work.

II B.Tech. - I semester
(16BT3HS01) **ENVIRONMENTAL STUDIES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	0	-	3

PREREQUISITES: Course on Engineering Chemistry
COURSE DESCRIPTION:
Multidisciplinary nature of environment; Natural resources; Ecosystems; Biodiversity; Environment pollution and control; Social issues and environment; Human population and environment; Field studies.
COURSE OUTCOMES: On successful completion of this course, students will be able to
CO1. demonstrate knowledge on nature of environment, natural resources, ecosystems, biodiversity, environmental pollution and control, social issues and human population.
CO2. analyze natural resources, ecosystems, biodiversity, en vironmental pollution and control, social issues and human population.
CO3. develop strategies for environmental pollution control and natural resource management.
CO4. solve environmental problems through proper analysis and interpretation of environmental data.
CO5. choose appropriate techniques in environmental pollution control and natural resource management.
CO6. understand the impact of social issues and population on environment.
CO7. provide solutions to individuals, industries and government for environmental sustainable development.
CO8. follow environmental protection laws for sustainable de velopment.

II B.Tech. - I Semester
(16BT3BS02) **SPECIAL FUNCTIONS AND COMPLEX ANALYSIS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Intermediate/senior secondary Mathematics
COURSE DESCRIPTION: Beta, Gamma functions and their properties; Limits continuity and analyticity of complex functions; Integration, power series, singularities, residues; conformal mapping.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1.demonstrate knowledge in
- Beta and Gamma functions
- Expressing complex functions in power series
- Differentiation and integration of complex functions
- Conformal mappings and bilinear transformations
- Expressing complex functions in terms of graphs and power series

CO2.develop skills in analyzing the
- the properties exhibited by complex functions in Argand plane
- properties of real integrals through complex variable techniques
- the properties of improper integrals through residue theory
- conformal transformations of complex valued functions for inferences
- the properties of complex functions by expressing them in power series and graphs

CO3.develop skills in designing mathematical models involving
- Integrals of complex variable functions
- Improper integrals using beta and gamma functions
- Residue theory of complex functions
- Power series expansions of complex variable functions
- Transformations of complex variable functions
- Fluid flow patterns and flux functions.

CO4.develop analytical skills in providing solutions for problems involving
- Fluid, Electrical and Magnetic Potential functions
- Integration of complex functions
- Improper real integrals

CO5.(i) use relevant Complex variable techniques for
- Residues and integrals of complex functions.
- Improper real integrals through complex functions

(ii) techniques of Beta and Gamma functions to improper integrals

II B.Tech. - I Semester
(16BT30201) **DC MACHINES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Courses on Electric Circuits and Engineering Physics.

COURSE DESCRIPTION:
Construction, operation, types and applications of DC machines; Performance evaluation of various DC machines.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on
- construction and operation of various types of DC machines
- armature reaction and commutation
- characteristics of DC machines
- parallel operation of DC generators
- starting, braking and speed control of DC motors
- testing of DC machines

CO2.analyze the performance of DC machine for various operating conditions
CO3. design suitable accessories / controllers for desired operation of DC Machines
CO4. solve engineering problems pertaining to DC machines and provide feasible solutions
CO5. apply the conceptual knowledge of DC machines in relevance to societal needs

II B.Tech. - I Semester
(16BT30202) **ELECTROMAGNETIC FIELDS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:
Courses on Multi-Variable Calculus & Differential Equations and Engineering Physics.

COURSE DESCRIPTION: Static electric fields; Gauss's law and its applications; Potential and Potential Gradient; steady magnetic fields; Ampere's circuital law and its applications; Force in magnetic fields; behavior of various materials in electric and magnetic fields; Inductance and capacitance calculations; Maxwell's equations for time variant and time invariant fields.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on:
- static electric fields due to electric charges
- static magnetic fields due to steady currents
- time varying electric and magnetic fields

CO2. analyze Maxwell's equations for both time variant and time invariant electric and magnetic fields.

CO3. solve problems using laws of electromagnetics to provide feasible solutions in electric and magnetic circuits.
CO4. select and apply appropriate law of electromagnetics to determine electric and magnetic fields around various charge distributions and current carrying conductors.
CO5. apply various principles and laws of electromagnetics to industrial applications.

II B.Tech. - I Semester

(16BT30203) SIGNALS, SYSTEMS AND NETWORKS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:
Courses on Multi-variable calculus and Differential equations, Transformation Techniques & Partial Differential Equations and Electric circuits.
COURSE DESCRIPTION:
Signals and systems in continuous-time domain; Transformations on signals; Transient analysis of DC and AC circuits; Two Port networks; Filters.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. demonstrate knowledge on

- signals and systems
- transformation of signals in time and frequency domain
- transient behavior of various circuits
- two port network parameters
- various filters

CO2. analyze

- continuous signals and linear time invariant systems
- signals transformed in time and frequency domain
- transient response for various circuits
- network parameters for various networks
- various filter circuits

CO3. Design

- different types of filters based on frequency and impedance.
- Two-port network for the given parameters.

CO4. evaluate the response of various LTI systems & signal transformations, transient response and different parameters of two port networks & filters to provide viable solutions.
CO5. apply appropriate transformation techniques for analyzing the signals and networks in time and frequency domains.
CO6. apply the conceptual knowledge of signals, transients, filters and two port network models in relevance to industry and society.

II B.Tech. - I Semester

(16BT30441) **ANALOG ELECTRONIC CIRCUITS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:
Courses on Electronic Devices and Circuits and Electric Circuits.
COURSE DESCRIPTION:
BJT frequency response; Feedback amplifiers and Oscillators; Power amplifiers; Wave-shaping circuits; Multivibrators.
COURSE OUTCOMES: On successful completion of this course, students will be able to
CO1. apply the knowledge in

- BJT Frequency Response
- Feedback Amplifiers
- Oscillators

- Power Amplifiers
- Wave-shaping circuits
- Multi-vibrators

CO2. analyze BJT frequency response, amplifiers, oscillators and pulse circuits.
CO3. design and develop different types of amplifiers, oscillators and pulse circuits.
CO4. solve engineering problems pertaining to analog electronic circuits to provide valid conclusions.
CO5. apply appropriate techniques to obtain optimum solution in the field of analog electronic circuits.
CO6. provide real time solutions for societal needs in the area of analog electronic circuits.

II B.Tech. - I Semester
(16BT30231) **DC MACHINES LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES:
Courses on Electric Circuits and Electric Circuits Lab
COURSE DESCRIPTION:
Construction, operation, types and applications of DC machines; Performance evaluation of various DC machines.
COURSEOUTCOMES: On successful completion of the course, students will be able to
CO1. demonstrate knowledge on
- construction and working of various types of DC ma-chines.
- starting, braking and speed control of DC motors.
- testing of DC machines.
- parallel operation of DC generators.
- characteristics of DC machines.

CO2. analyze the performance of DC machines for various operating conditions.
CO3. design the circuit with suitable accessories / controllers for desired operating conditions of DC machines.
CO4. interpret and synthesize the data obtained from experi mentation on DC machines and provide valid conclusions.
CO5. select and apply appropriate technique for testing and control of DC machines used in industry.
CO6. apply the conceptual knowledge of DC machines in relevance to industry and society.
CO7. commit to ethical principles and standards while exercising the practical investigations on DC machines.
CO8. work individually or in a group while exercising practical investigations in the field of DC machines.
CO9. communicate effectively in verbal and written form in relevance to DC machines.

II B.Tech. - I Semester
16BT30232: **SIGNALS AND NETWORKS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES:
Courses on Multi-variable calculus & Differential equations, Transformation Techniques & Partial Differential Equations, Electric circuits and Electric Circuits Lab.
COURSE DESCRIPTION:
Experimentation on Signals and systems; Transient analysis; Twoport network parameters and passive filters.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. demonstrate knowledge on signals, transients, two port networks & filters and their experimental implementation.
CO2. analyze and relate the experimental observations & mea surements for validation.

CO3. design a suitable experimental/simulation procedure for practical investigations on signals, systems and net works.
CO4. demonstrate skills in evaluating various parameters and interpret the observations to provide feasible solutions.
CO5. select appropriate technique for experimental investigations, analysis and interpretation of signals and net works.
CO6. apply the conceptual knowledge of signals, transients, filters and twoport network models in relevance to industry and society.
CO7. commit to ethical principles and standards while exercising the practical investigations on signals and net works.
CO8. work individually or in a group in the field of signals and networks.
CO9. communicate effectively in verbal and written form in signals and networks domain.

II B.Tech. - I Semester

(16BT30451) **ANALOG ELECTRONIC CIRCUITS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES:
Courses on Electronic Devices and Circuits andAnalog Electronic Circuits.
COURSE DESCRIPTION:
Diode characteristics; Rectifiers; BJT and FET characteristics; UJT and SCR characteristics; BJT Amplifiers; Non-linear AND Linear Wave shaping circuits; Feed Back Amplifiers; Design of Multi-vibrator circuits; Power Amplifiers.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. apply the knowledge in
- Diodes-PN Junction Diodes, Zener Diodes, SCR
- Transistors-BJT,FET,UJT
- Feedback amplifiers and oscillators
- Clipping and Clamping Circuits
- RC High Pass and Low Pass Circuits
- Multi-vibrators

CO2. analyze different types amplifier, oscillator and pulse cir cuits.
CO3. design different types of Electronic circuits like feedback amplifiers, Oscillators, Multi-vibrators, Schmitt Trigger.
CO4. provide solutions through the design and conduct of experiments, analysis and synthesis.
CO5. apply biasing technique for design of amplifiers.
CO6. function effectively as an individual and as a member in a group in the area of analog electronic circuits.
CO7. communicate effectively in oral and written form in the area of analog electronic circuits.

II B.Tech. - II Semester

(16BT40201) **ELECTRICAL MEASUREMENTS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Courses on Transformation Techniques &Partial Differential Equations and Signal, Systems & Networks.
COURSE DESCRIPTION:
Measurement of electrical quantities; construction, working, design and applications of various electrical measuring instruments; Performance evaluation of various electrical measuring instruments.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. demonstrate knowledge on
- construction, working and testing of various measuring instruments

• various errors and compensation
• measurement of various electrical parameters and quantities

CO2. analyze
• errors and compensations in instruments
• instrument performance
• measuring circuits

CO3. design appropriate arrangement for extension of range in measuring instruments.

CO4. estimate various electrical quantities using suitable instruments and techniques to provide viable solutions.

CO5. select& use appropriate technique and instrument for the measurement of electrical quantities in domestic and industrial applications.

CO6. apply the conceptual knowledge of electrical measuring instruments and testing in relevance to industry and society.

II B.Tech - II Semester

(16BT40202) **GENERATION OF ELECTRIC POWER**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:
Courses on Engineering Physics, Engineering Chemistry, Electronic Devices and Circuits.

COURSE DESCRIPTION:
Generation of electric power using hydro, thermal, nuclear, gas and renewable energy sources; Cogeneration; Economic aspects of power generation and power factor improvement.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on
• layout of various power plants and their operation.
• different types of turbines and their applications in power generating stations.
• non-conventional energy sources.
• aspects of cogeneration.
• economic aspects of power generation.
• power factor improvement methods.

CO2. analyze
• load factor, loss factor and their relations.
• power factor improvement methods and economic as pects of power generation.

CO3. design capacitors for most economic power factor.

CO4. evaluate various parameters and economic aspects of power generation to provide aviablesolution.

CO5. select feasible geographical sites for erecting different power plants.

CO6. apply the conceptual knowledge of electric power generation through conventional and non-conventional sources to substantiate the societal needs.

CO7. realizeconstraints and impacts of conventional & non-conventional power generation technology on environment and society.

CO8. adhere environmental regulations for eco-friendly operation of power plants.

II B.Tech. - II Semester

(16BT40203) **TRANSFORMERS AND INDUCTION MACHINES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Course on DC Machines, Electromagnetic Fields.

COURSE DESCRIPTION:
Constructional details, principle of operation, equivalent circuit, testing, performance and applications of transformers and three phase induction motors.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on
- construction, operation of various types of transformers and induction machines.
- characteristics of transformers and induction machines.
- parallel operation of transformers.
- starting, braking and speed control of induction machines.
- testing of transformers and induction machines.

CO2. analyze the operation and performance of transformers and induction machines for various operating conditions.

CO3. design suitable accessories / controllers for machines to meet the desired specifications.

CO4. solve engineering problems pertaining for transformers and induction machines to provide viable solutions.

CO5. select appropriate techniques and tools for desired operation of transformers and induction machines in domestic, agriculture and industrial applications.

CO6. apply the conceptual knowledge of Transformers and Induction Machines in relevance to industry and society.

II B.Tech - II Semester

(16BT41002) **LINEAR AND DIGITAL ICs**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Courses on Electronic Devices and Circuits& Analog Electronic Circuits.

COURSE DESCRIPTION:

Differential Amplifier; Characteristics of Operational Amplifiers; Linear & Non-Linear Applications of Op-Amp; IC 555 timer and phase locked loops; Application of PLL; A-D & D-A Converters; CMOS and Bipolar Logic Interfacing; HDL with combinational and sequential logic design.

COURSE OUTCOMES: On successful completion of the course,students will be able to

CO1. demonstrate knowledge in
- Op-amp operation and applications.
- Timer & PLL circuits.
- A-D & D-A Converters
- CMOS and Bipolar logic Interfacing.
- HDL design and programming.

CO2. analyze
- Op-amp based circuits.
- Timers for various circuits.
- Different logic families.

CO3. design
- Circuits using Op-amps.
- Logic gates using CMOS.
- Combinational and sequential circuits.

CO4. solve problems in
- Evaluating parameters of Op-amp based circuits.
- Programming of various combinational and sequential logic design.

CO5. apply appropriate modeling technique to suit IC Design.

CO6. understand the impact of design and use of Linear and Digital ICs on the development of efficient and cost effective products.

II B.Tech - II Semester

(16BT30403) **SWITCHING THEORY AND LOGIC DESIGN**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:--

COURSE DESCRIPTION:

Number system and Boolean algebra; Minimization; Analysis and synthesis of digital circuits; Asynchronous Sequential Logic & Programmable Memories.

COURSE OUTCOMES: On successful completion of the course, students willbe able to

CO1. demonstrate the knowledge in
- Conversion of number systems, Binary Codes.
- Basic theorems, properties and postulates of Boolean algebra.
- Minimization of switching functions using Map method and Tabular method.
- Combinational and sequential circuits.
- Realization of Boolean functions using PLDs.

CO2. analyse combinational and sequential circuits.
CO3. design and develop various combinational, sequential circuits and PLDs.
CO4. solve problems and arrive at solutions pertaining to Digital Electronics.
CO5. apply minimization techniques to asynchronous and syn chronous designs and suggest appropriate design for engineering solutions.
CO6. apply appropriate logic functions to obtain optimized designs useful for the society.

II B.Tech - II Semester

(16BT41041) **COMPUTER ARCHITECTURE AND ORGANIZATION**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: --

COURSE DESCRIPTION:

Basic structure of computers; computer arithmetic operations; register transfer and organization; 8085 architecture, programming and interfacing of 8085 microprocessor; Concepts of micro programmed control, pipelining and memory system.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on
- Internal organization of a computer.
- Various memories and hierarchy in a computer.
- Architecture, instruction set and addressing modes of 8085 microprocessor.

CO2. analyze the performance of a computer.
CO3. design microprocessor based systems for real time ap plications.
CO4. solve engineering problems and arrive at solutions by developing embedded products.
CO5. choose appropriate hardware, algorithm and program using suitable IDE.
CO6. practice professional engineering to deliver efficient and cost effective embedded based products for society.

II B.Tech. - II Semester

(16BT40231)**ELECTRICAL MEASUREMENTS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES:

Courses on Signal, Systems and Networks,Electric Circuits Lab and DC Machines Lab.

COURSE DESCRIPTION:

Measurement of electrical quantities; Testing of single phase energy meter and current transformer.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on
- measurement of electrical quantities
- measuring instruments and their testing

CO2. analyze various electrical quantities, parameters and measuring instruments.
CO3. design the circuit with suitable accessories for desired measurement and testing.

CO4. interpret and synthesize the data obtained from experimentation on measurement of electrical quantities to provide valid conclusions.
CO5. select and use various measuring instruments in domestic and industrial applications.
CO6. apply the conceptual knowledge of instruments, measurement and testing techniques in relevance to industry and society.
CO7. commit to ethical principles and standards while exercising the practical investigations on measurement and testing techniques.
CO8. work individually or in a group in the field of electrical measurements and instrument testing.
CO9. communicate effectively in verbal and written form in relevance to electrical measurements and instrument testing.

II B.Tech. - II Semester

(16BT40232)**TRANSFORMERS AND INDUCTION MACHINES LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: Course on DC Machines Lab

COURSE DESCRIPTION:

Construction, types, operation and applications of transformers and induction machines; Performance evaluation of transformers and induction machines.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on
- construction, operation of various types of transformers and induction machines.
- starting and speed control of induction machines.
- testing of transformers and induction machines.
- parallel operation of transformers.
- characteristics of transformers and induction machines.

CO2. analyze the performance of transformers and induction motors for various operating conditions.
CO3. design the circuit with suitable accessories / controllers for desired operation of Transformers and Induction motors.
CO4. interpret and synthesize the data obtained from experi mentation on transformers & induction machines and provide valid conclusions.
CO5. select and apply appropriate technique for testing and control of transformers & induction machines used in domestic and industrial applications.
CO6. apply the conceptual knowledge of Transformers and Induction motors in relevance to industry and society.
CO7. commit to ethical principles and standards while exercising the practical investigations on Transformers and Induction motors.
CO8. work individually or in a group while exercising practical investigations in the field of Transformers and Induction motors.
CO9. communicate effectively in verbal and written form in relevance to Transformers and Induction motors.

II B.Tech.- II Semester

(16BT41033)**LINEAR AND DIGITAL ICs LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: A course on Linear and Digital ICs.

COURSE DESCRIPTION:

Op-Amp characteristics; Applications of Op-Amp; 555 timer; PLL; Digital logic families and interfacing; Digital IC Applications; Programming of digital IC's in HDL.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. demonstrate knowledge on analog and digital circuits.
CO2. apply analytical skills to determine the op-amp parameters.

CO3. design of analog and digital circuits for Linear & Nonlinear applications.
CO4. provide valid conclusions through analysis and synthesis of analog and digital circuits.
CO5. apply appropriate simulation tools for programming of analog and digital circuits.
CO6. work individually and also in a group to develop applica tions using linear and digital ICs.
CO7. communicate effectively with engineering community to design analog circuits.

III B.Tech. - I Semester
(16BT3HS02) **MANAGERIAL ECONOMICS AND PRINCIPLES OF ACCOUNTANCY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:--
COURSE DESCRIPTION:
Managerial Economics; Demand and Elasticity of Demand; Production Functions; Markets and Pricing Policies; Basic concepts of Accounting (Journal, Ledger and Trial balance); Trading Account, Profit and Loss Account and Balance sheet with simple adjustments; Computerized Accounting.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. demonstrate Knowledge in
- •Tools and concepts of Micro Economics
- •Basic Principles and concepts of Accountancy
- •Financial Accounting
- •Significance of Economics and Accountancy

CO2. apply skills in managerial decision making of an organiza tion.
CO3. apply the economic theories i.e., Demand, Production, Cost, Markets and Price
CO4. demonstrate effective communication in Business and Accounting transactions
CO5. ascertain the profitability and soundness of an organization
CO6. practice financial accounting

III B.Tech. - I Semester
(16BT50201) **CONTROL SYSTEMS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Courses on Multivariable Calculus and Differential Equations, Transformation Techniques and Partial Differential Equations and DC Machines/Electrical Technology.
COURSE DESCRIPTION:
Concepts of control system, transfer function ofvarious physical systems, time response analysis, frequency responseanalysis, controller design, state space analysis.
COURSEOUTCOMES: On successful completion of the course, students will be able to
CO1. demonstrate knowledge on
- •the concepts of open and closed loop control systems.
- •stability analysis in time and frequency domain.
- •controllers and compensators to meet the desired speci fications.
- •state variable techniques.

CO2. analyze
- •time and frequency domain response of second order systems.
- •stability analysis using root-locus, Bode and Nyquist plots.
- •controllers and compensators to meet the desired response.
- •state space representation from transfer function.

CO3. design a compensator to meet the design specifications of control system.
CO4. solve problems pertaining to control systems to provide feasible solutions inreal time environment.
CO5. selectappropriate techniques to solve control system problems in relevance to industry.
CO6. apply the conceptual knowledge of control systems in domestic and industrial applications.

III B.Tech. - I Semester
(16BT50202) **POWER ELECTRONICS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Courses on Engineering Physics, Electrical Circuits and Electronic Devices & Circuits.
COURSE DESCRIPTION:
Power semiconductor devices; Silicon Controlled Rectifier - Turn-on methods, Triggering and commutation circuits for SCR; Single phase and three phase Rectifiers; AC voltage controllers; Cycloconverters; Choppers and Inverters.
COURSEOUTCOMES: On successful completion of the course, students will be able to
CO1. demonstrate knowledge on
- the characteristics of various power transistors.
- operation, switching characteristics, ratings, protection and combinations of SCR.
- various triggering methods and commutation techniques for SCR.
- operation of line commutated converters and SCR based forced commutated converters.

CO2. analyze the performance of different power converters subjected to various loads.
CO3. design static and dynamic equalizing circuits, snubber circuits and commutating elements for protection and functionality of power electronic circuits.
CO4. investigate various configurations of power electronic circuits to provide feasible solutions.
CO5. select an appropriate power semiconductor device and/ or circuit for real time applications.
CO6. apply the conceptual knowledge of power semiconduc tor devices and/or circuitsin relevance to industry.

III B.Tech. - I Semester
(16BT50203) **SYNCHRONOUS MACHINES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Course onTransformers and Induction machines.
COURSE DESCRIPTION:
Construction, operation, characteristics, voltage regulation and parallel operation of alternators; operation and performance characteristics of synchronous motors; construction, operation, characteristics and applications of fractional kW motors.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. demonstrate knowledge on
- constructional details, working, characteristics and per formance of a three phase synchronous machine and fractional kilowatt motors.
- armature reaction, voltage regulation and synchronization of alternator.
- starting of a synchronous motor.
- parallel operation of alternators.

CO2. analyse the performance of synchronous and single phase machines for various operating conditions.
CO3. design suitable accessories/controllers for desired opera tion of synchronous machines.
CO4. solve problems pertaining to synchronous machines and fractional kWmotors to provide feasible solutions.
CO5. select appropriate techniques for control and operation of synchronous and fractional kW machines in relevance to industrial applications.
CO6. apply the conceptual knowledge of synchronous machines in relevance to industry.

III B.Tech.- I Semester
(16BT50204)**TRANSMISSION AND DISTRIBUTION**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Courses on Generation of Electric Power, Electromagnetic Fields and Signals, Systems & Networks.
COURSE DESCRIPTION:
Parameters of overhead transmission lines and underground cables; Performance of transmission lines, travelling wave phenomenon; Types of insulators; Sag and corona; Distribution systems classification, analysis and its planning.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. demonstrate knowledge on
- •classification of transmission and distribution systems
- •parameters and configurations of transmission and distribution systems
- •transients, corona and sag
- •insulation system for cables and transmission lines

CO2. analyze
- •the electrical and mechanical aspects of cables and transmission lines
- •various distribution feeder configurations
- •voltage drop and power loss in distribution system

CO3. design
- •parameters for transmission lines and underground cables.
- •substation feeders.

CO4. evaluate the parameters, performance& mechanical aspects of transmission lines, underground cables and distribution systems to provide feasible solutions.
CO5. select appropriate model for transmission and distribution systems while exercising modeling and planning of power system.
CO6. apply the conceptual knowledge of transmission and distribution systems in relevance to industry and society.
CO7. follow professional norms for voltage regulation in transmission and distribution systems.

III B.Tech.- I Semester
(16BT40502) **DATABASE MANAGEMENT SYSTEMS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:--
COURSE DESCRIPTION:
Database Systems; Database Design; Relational Model; SQL Queries, Constraints and Triggers; Schema Refinement and Normal Forms; Transaction Management; Concurrency Control; Overview of Storage and Indexing.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. demonstrate knowledge on
- •Data models and Database Languages
- •Database design
- •Normal forms
- •Storage and Indexing

CO2. analyze databases using normal forms to provide solutions for real time applications.
CO3. design solutions for database problems using database design, views design and framing queries.
CO4. use database techniques for designing databases, managing databases and its security.
CO5. Select SQL, Hash based Indexing and Tree based Indexing to manage data in databases.
CO6. apply contextual knowledge to develop database applications related to societal applications like Information Retrieval Systems, Banking and Financial systems.

III B.Tech.- I Semester

(16BT51003) PRINCIPLES OF COMMUNICATIONS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Course on Signals, Systems and Networks.

COURSE DESCRIPTION:

Fundamentals of Communications; Analog and digital communications - modulation and Demodulation Techniques; Information theory and coding.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate fundamental knowledge in
- elements of communication systems.
- amplitude, Frequency, and Phase Modulators and De modulators.
- data transmission and detection of digital signals.
- information theory and coding techniques.

CO2. perform analysis of different modulation techniques and calculate various performance parameters

CO3. design and develop modulators and demodulators for communication systems.

CO4. solve engineering problems for feasibility and provide optimal solutions in the area of Analog and Digital Communication Systems.

CO5. select the appropriate modulation and demodulation techniques for transmission and reception of signals.

CO6. follow standards while developing the communication systems.

III B.Tech. - I Semester

(16BT51041) SENSORS AND SIGNAL CONDITIONING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Courses on Electrical Measurements and Linear & Digital ICs.

COURSE DESCRIPTION:

Principle of operation, construction, advantages, limitations and applications of resistive, inductive, capacitive, self-generating, digital and other sensors; Signal conditioning circuits and their operations.

COURSE OUTCOMES: On completion of the course, the students will be able to

CO1. demonstrate knowledge on
- various sensors.
- signal conditioning circuits.

CO2. analyze
- various sensors for measuring physical quantities.
- signal conditioning circuits.

CO3. design an appropriate instrumentation amplifiers for commercial applications.

CO4. evaluate physical quantities using sensors and signal conditioning circuits to provide feasible solutions.

CO5. select& use appropriate sensors for the measurement of physical quantities in domestic and industrial applications.

CO6. apply the conceptual knowledge of sensors and signal conditioning circuits in relevance to industry and society.

III B.Tech. - I Semester

(16BT31501) **OPERATING SYSTEMS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: --

COURSE DESCRIPTION:

Operating systems operations, scheduling; Critical section problem, deadlocks; Paging, segmentation; File Concept, Disk scheduling; I/O interface; concepts of protection.

COURSE OUTCOMES: On Successful completion of the course, students will be able to

CO1. demonstrate knowledge on Operating system operations, services, file management, disk management, I/O management and protection.

CO2. identify the functionality involved in process management concepts like scheduling and synchronization.

CO3. design models for handling deadlock and perform memory management.

CO4. synthesize and apply programming API's to perform Pro cess management.

CO5. use appropriate protection tools to provide access con trol to Operating system users.

III B.Tech. - I Semester

(16BT50231) **CONTROL SYSTEMS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: Courses on Signals, Systems and Networks, DC Machines, Transformers & Induction Machines, Analog Electronic Circuits and Linear & Digital ICs.

COURSE DESCRIPTION:

Open and closed loop systems; DC and AC servo motor; stability analysis for mechanical and electrical systems; process control system; design of compensators.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on
- open and closed loop systems
- stability analysis of a given system
- process control
- speed control of DC motor
- compensators

CO2. analyze
- characteristicsof AC and DC servomotors
- stability of the system using root locus, Bode and Nyquist plots
- time and frequency domainspecifications of second order system
- concept of controllability and observability of the system

CO3. design
- compensators& controllers to analyze the stability of the system
- ladder network for PLC to verify boolean expressions

CO4. interpret the experimental investigations to provide fea sible solutions using the concepts of control engineering.

CO5. select and apply appropriate technique for solving com plex problems in control systems.

CO6. apply the conceptual knowledge of control systems in relevance to industry and society.

CO7. commit to ethical principles and standards while exercising the practical investigations on control systems.

CO8. work individually or in a group in the domain of control systems.

CO9. communicate effectively in verbal and written form in relevance to control systems.

III B.Tech. - I Semester
(16BT50232) **SYNCHRONOUS MACHINES LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: Course on Transformers and Induction Machines Lab
COURSE DESCRIPTION:
Construction, performance and parallel operation of alternators; V and inverted-V curves for synchronous motor; determination of equivalent circuit and performance characteristics of single phase induction motors.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. demonstrate knowledge on
- construction and operation of 3-phase synchronous machines and 1-phase motors.
- V and inverted-V curves of synchronous motor.
- parallel operation of 3-phase synchronous generators.
- characteristics of synchronous machines.

CO2. analyze the performance of synchronous and fractional kW machines for various operating conditions.
CO3. design the circuit with suitable accessories / controllers for desired operating conditions of synchronous and fractional kW machines.
CO4. interpret and synthesize the data obtained from experimentation on synchronous and fractional kW machines to provide valid conclusions.
CO5. select and apply appropriate technique for testing and control of synchronous and fractional kW machines for domestic and industrial applications.
CO6. apply the conceptual knowledge of synchronous and fractional kW machines in relevance to domestic and industrial needs.
CO7. follow ethical principles and standards while exercising the practical investigations on synchronous and fractional kW machines.
CO8. work individually or in a group while exercising practical investigations in the field of synchronous and fractional kW machines.
CO9. communicate effectively in verbal and written form in relevance to synchronous and fractional kW machines.

III B.Tech. - I Semester
(16BT4HS31) **SOFT SKILLS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: English Language Laboratory in I B.Tech or English Laboratory at Diploma Level.
COURSE DESCRIPTION:
This course covers Body Language; Assertiveness; Goal Setting; Creative Thinking; Interpersonal Skills; Team Work; Conflict Management; Etiquette; Report Writing; Group Discussions; Interviewing Skills.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. demonstrate knowledge in
- Goal Setting
- Creative Thinking
- Leadership Skills and
- Team Work

CO2. analyse the situations and develop skills for
- Body Language
- Personality Development and
- Stress Management

CO3. apply the techniques of soft skills in a problem situation enhanced through multimedia software.
CO4. function effectively as an individual and as a member in diverse teams.
CO5. communicate effectively in public speaking in formal and informal forums.

III B.Tech.- II Semester

(16BT5HS01) **MANAGEMENT SCIENCE**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: --

COURSE DESCRIPTION:

Concepts of Management; Environmental Scanning; Concepts Related to Organization; Operations Management; Work Study; Statistical Quality Control; Inventory Management; Marketing; Human Resource Management; Project Management; Project Crashing; Entrepreneurship; Contemporary Management Practices.

COURSE OUTCOMES: On successful completion of the course, students will be able to

- CO1. demonstrate the concepts of operations management, human resources management, project management and contemporary management practices in managerial context.
- CO2. identify and analyse management problems in the business organizations reaching substantiated conclusions using principles of management.
- CO3. design appropriate organization structure for meeting the needs of the organization with consideration of the employees of the organization.
- CO4. competently employ broad based analytical tools for decision making, system design, analysis and performance.
- CO5. provide solution to organizations for sustainable development.
- CO6. apply knowledge of engineering and management principles to manage the projects in multidisciplinary environments.

III B.Tech - II Semester

(16BT60201) **POWER SEMICONDUCTOR DRIVES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:Courses on Power Electronics, Synchronous Machines and Control Systems.

COURSE DESCRIPTION:

DC drives: Rectifier fed and Chopper fed drives; AC Drives: Induction motor drives, Synchronous and Stepper motor drives.

COURSEOUTCOMES:On successful completion of the course, students will be able to

- CO1. demonstrate knowledge on
  - dynamics of electrical drives.
  - operation and speed control of various DC & AC drives.
  - open loop and closed loop control of DC & AC drives.
- CO2. analyze single and multi-quadrant operations of DC & AC drives with speed-torque characteristics.
- CO3. design and develop various configurations of power electronic converters for AC & DC drives.
- CO4. investigateopen and closed loop operations of various drives using different speed control techniquesto enhance the drive performance.
- CO5. applyappropriate power converters for controlling the drives in real time applications.
- CO6. apply the conceptual knowledge of power semiconductor drivesin relevance to industry and society.

III B.Tech.- II Semester

(16BT60202) **POWER SYSTEM ANALYSIS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Courses on Matrices & Numerical Methods, Electric Circuits and Transmission and Distribution.

COURSE DESCRIPTION:

Per unit representation; Symmetrical component theory; Sequence networks for power system networks; Formulation of bus impedance and admittance matrices; Computation of power flow using various numerical techniques; Analysis of various faults; Power system stability analysis.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on
- per unit representation, symmetrical component theory and sequence network representation of power system networks.
- formation of power system network matrices.
- load flow studies.
- various faults.
- power system stability.

CO2. analyze
- the power system network for sequence network representation.
- the power system networks for the formation of bus impedance and admittance matrices.
- the load flow problem of a power system network for different conditions.
- various faults.
- the stability of the power system under different operating conditions.

CO3. evaluate
- per unit quantities for various power system components and networks.
- the power system network for various planning strategies and provide a feasible solution.

CO4. apply appropriate techniques/methods to analyze power system network operating under various conditions.

CO5. apply the conceptual knowledge of power system analysis to assess and analyze a power system for various scenarios.

III B.Tech. - II Semester

(16BT50501) **COMPUTER NETWORKS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Course on Computer Architecture and Organization

COURSE DESCRIPTION:

Introduction to Computer Networks; The Physical Layer; The Data Link Layer; The Medium Access Control Sublayer; The Network Layer; The Transport Layer; The Application Layer.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on:
- Functionalities of Various OSI and TCP/IP layers
- 3G Mobile phone networks, 802.11
- TCP,UDP and SMTP

CO2. analyze the issues related to data link, medium access and transport layers by using channel allocation and connection management schemes.

CO3. design and compute subnet masks and addresses for networking requirements.

CO4. solve problems related to Flow control, Error control, congestion control and Network Routing.

CO5. apply Network Standards - 802.3 and 802.11 for developing computer Networks.

CO6. assess the impact of wired and wireless Networks in the context of societal applications like VoIP, Multi-user Net work Games, Internet of Things.

III B.Tech.- II Semester
(16BT61001) **ARM PROCESSORS & PIC MICROCONTROLLERS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Course on Switching theory and logic design.
COURSE DESCRIPTION:
ARM Processors architecture, Programming, PIC microcontroller architecture, Interrupts and timers of PIC microcontroller, Interfacing.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. demonstrate knowledge in ARM Processors architecture, PIC architecture, Pin out, Instruction set.
CO2. analyze various design issues regarding usage of on chip resources and Low power modes.
CO3. design embedded systems using ARM Processors and PIC microcontrollers to suit market requirements.
CO4. solve engineering problems and arrive at solutions in de signing embedded Systems.
CO5. use on-chip resources to design embedded systems with an understanding of limitations.
CO6. practice professional engineering to deliver efficient and cost effective microcontroller based products.

III B.Tech.- II Semester
(16BT61041) **PROGRAMMABLE LOGIC CONTROLLERS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Course on Switching Theory and Logic Design.
COURSE DESCRIPTION:
Introduction to PLC; PLC ladder diagrams; programming PLC; timers, counters and sequences used in PLC; data handling functions; Bit Patterns; advanced PLC functions.
COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on programmable logic controllers, various functions of PLCs.
CO2. analyze the process of automation using PLCs.
CO3. design skills in automating a process control.
CO4. solve engineering problems in industries using PLCs.
CO5. select suitable PLC with an understanding of limitations.
CO6. practice professional engineering to deliver efficient and cost effective designs for society and domestic applications.

III B.Tech.- II Semester
(16BT51241) **OBJECT ORIENTED PROGRAMMING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: --
COURSE DESCRIPTION:
Introduction of Java, Classes and Objects; Inheritance, Packages, Interfaces; Exception handling, Multithreading; Event handling, AWT, Collection Classes; Applets, Servlets.
COURSE OUTCOMES: On successful completion of the course, students will be able to:
CO1. demonstrate knowledge on:
- Object Oriented Programming concepts - classes, objects, inheritance, polymorphism, encapsulation and abstraction.
- Packages, interfaces, multithreading, exception handling, event handling.

CO2. analyze complex engineering problems using object oriented concepts.

CO3. design and develop reusable code to provide effective solutions for real world problems using inheritance and polymorphism.
CO4. apply AWT and Applets to create interactive Graphical User Interfaces.
CO5. use advanced programming languages to develop web applications.
CO6. build Java Applications suitable for societal requirements.

III B.Tech.-II Semester
(16BT60203) **DESIGN AND ESTIMATION OF ELECTRICAL SYSTEMS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Course on Electrical and Electronic workshop practice.
COURSE DESCRIPTION:
Design and estimation of residential & commercial buildings, overhead transmission & distribution lines and industrial buildings; Light sources, principals of light & design, types of lamps; electric heating, welding and their applications.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. demonstrate knowledge on
- electrical wiring of residential & commercial and indus trial buildings.
- material and size of conductors for overhead transmission & distribution lines.
- light sources and illumination.
- electric heating & welding.

CO2. analyze
- estimation of residential & commercial buildings, over head transmission & distribution lines and industrial buildings.
- proper illumination strategy for effective lighting.
- heating and welding schemes for industrial purpose.

CO3. design of electrical wiring for residential & commercial buildings and industrial buildings, overhead transmission & distribution lines and suitable illumination system for effective lighting.
CO4. solve engineering problems pertaining to utilization of electrical energy and provide feasible solutions.
CO5. apply suitable electric wiring, heating, welding and illumination techniques for domestic and industrial applications.
CO6. apply the conceptual knowledge of utilization strategies and techniques in relevance to industry and society.
CO7. adhere the constraints and standards for applications of electric energy in different fields.

III B.Tech. - II Semester
(16BT60204) **DIGITAL SIGNAL PROCESSING FOR ELECTRICAL ENGINEERS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Courses on Signals, Systems &Networks and Power Electronics.
COURSE DESCRIPTION:
Discrete-time signals and systems; Discrete Fourier series, Discrete Fourier Transforms (DFT) and Fast Fourier Transform (FFT) algorithms for the analysis of discrete time sequences; design and realization of Digital IIR and FIR filters; DSP based control of stepper motors; DSP based implementation of DC-DC buck-boost converters.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. demonstrate knowledge on
- digital signals and systems
- DFT and FFT
- analog & digital filter
- digital filter realization

CO2. Analyze discrete time signals and systems using DFT and FFT techniques.
CO3. design and realize IIR and FIR digital filters using different techniques.

CO4. evaluate the Discrete Fourier Transform (DFT) of a sequence and use the DFT to compute the convolution of two sequences and plot the frequency response of lin eartime-invariant systems.
CO5. Use relevant DSP controllers and techniques for applica tions in power electronics and electrical machines.
CO6. apply the conceptual knowledge of digital signal processing in relevance to industry and society.

III B.Tech. - II Semester
(16BT60205) **ELECTRICAL MACHINE DESIGN**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Course on Synchronous Machines.
COURSE DESCRIPTION:
Electrical machine design concepts; Design of transformers, DC machines, Induction machines and Alternators.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. demonstrate knowledge on design concepts of various types of electrical apparatus.
CO2. analyze the specific electric& magnetic loading characteristics for performance evaluation.
CO3. design a suitable electrical machine for domestic and industrial needs.
CO4. investigate and interpret the design data for evaluating the performance of electrical apparatus to provide valid conclusions.
CO5. apply appropriate technique/procedure for designing electrical apparatus.

III B.Tech. - II Semester
(16BT60206) **HVDC TRANSMISSION**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	--	3

PREREQUISITES: Courses on Power Electronics and Transmission & Distribution.
COURSE DESCRIPTION:
Need for HVDC Transmission, planning and modern trends; Analysis and control of power converters; Harmonics; Characteristics and design of filters; Faults and protection of converters.
COURSEOUTCOMES: On successful completion of the course, students will be able to
CO1. demonstrate knowledge on
- different types of HVDC transmission system, various converter configurations and their control.
- effects of harmonics, faults and their control methods.

CO2. analyze
- different converter configurations.
- different control and protection strategies in HVDC system.
- power flow in HVDC transmission system.

CO3. demonstrate skills in designing filter circuits for minimiz ing harmonics.
CO4. solve problems in HVDC transmission to provide viable solutions.
CO5. select and apply appropriate devices, schemes and tech niques for real time applications in HVDC transmission.
CO6. apply the conceptual knowledge of HVDC transmission in relevance to industry and society.

III B.Tech.- II Semester

(16BT60207) **ADVANCED CONTROL SYSTEMS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	--	3

PREREQUISITES: Course on Control systems

COURSE DESCRIPTION:

Design of compensators and controllers, state space, canonical forms, controllability and observability, describing function, phase plane analysis, Lyapunov's stability analysis, Full order observer and reduced order observer.

COURSEOUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on
- state space analysis.
- various compensators and controllers.
- stability in the sense of Lyapunov.
- full and reduced order observers in state space analysis.

CO2. analyze the stability of nonlinear system using
- describing function approach.
- phase plane analysis.
- Lyapunov's method.

CO3. design suitable compensator and controllers using root locus and Bode plot.

CO4. evaluate stability of systems using pole placement and Lyopunov method to provide valid solutions.

CO5. select appropriate techniques for analyzing the stability of the system.

CO6. apply the conceptual knowledge of advanced control systems in relevance to industry and society.

III B.Tech.- II Semester

(16BT60208) **HIGH VOLTAGE ENGINEERING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	--	3

PREREQUISITES: Courses on Engineering Physics, Engineering Chemistry, Electromagnetic Fields and Electrical Measurements.

COURSE DESCRIPTION:

Types of insulation systems; Breakdown process in solid, liquid and gaseous dielectrics; Generation of high AC and DC voltages, Impulse voltages and currents; Measurement of high voltage, current, resistivity, dielectric constant and loss factor; Testing of electrical apparatus.

COURSE OUTCOMES: on successful completion of the course, students will be able to

CO1. demonstrate knowledge on
- various insulation systems and their behavior under voltage stress.
- generation and measurement of high voltages and cur rents.
- testing of various high voltage electrical apparatus.

CO2. analyze
- breakdown phenomenon in different insulation systems.
- circuits for generation of high voltage and currents.
- methods of measuring high voltage quantities.

CO3. design circuits for high voltage generation, measurement and testing.

CO4. evaluate different parameters in high voltage engineering to provide valid conclusions.

CO5. select suitable testing and diagnostic techniques for the high voltage apparatus.

CO6. apply contextual knowledge of high voltage engineering to sustain industrial needs.

CO7. follow the appropriate standard for testing of high volt age apparatus.

III B.Tech.- II Semester
(16BT60209) **INSTRUMENTATION**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	--	3

PREREQUISITES: Courses on Analog Electronic Circuits, Electrical Measurements, Computer Architecture and Organization.

COURSE DESCRIPTION:
Principle of operation, advantages and limitations of various types of electronic and digital instruments for measurement of electrical quantities; Storage oscilloscopes, Data acquisition, display devices and recorders.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstration knowledge on
- various types of electronic and digital instruments.
- signal analyzers and storage oscilloscopes.
- data acquisition systems, display devices and recorders.

CO2. analyze
- various types of electronic and digital instruments.
- signal analyzers and storage oscilloscopes.
- display devices, recorders and various data acquisition systems.

CO3. design an appropriate display system for industrial and commercial applications.

CO4. estimate the magnitude, phase, frequency and spectrum of signal with oscilloscope to provide feasible solution.

CO5. selectan appropriate instrumentation principles and tech niques to substantiate the industrial requirements.

CO6. apply the conceptual knowledge of various instrumentation principles and techniques in relevance to industry.

III B.Tech.- II Semester
(16BT60210) **SPECIAL ELECTRICAL MACHINES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	--	3

PREREQUISITES: Course on Synchronous Machines

COURSE DESCRIPTION:
Construction, operation, types, characteristics and applications of Stepper Motors, Switched Reluctance Motor, PM Brushless DC Motor, Synchronous Reluctance, Linear Induction and synchronous Motors.

COURSEOUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on
- construction and operation of various types of special electrical machines.
- characteristics of special electrical machines.
- open loop and closed loop operation of special electrical machines.

CO2. analyze the operation and performance of special electrical machines for various operating conditions.

CO3. design suitable accessories / controllers for desired op eration and control of special electrical machines.

CO4. solve engineering problems pertaining to special electri cal machines to provide feasible solutions.

CO5. Select and apply appropriate technique and tools for con trol and operation of special electrical machines in domestic and industrial applications.

CO6. apply the conceptual knowledge of special electrical machines in relevance to industry and society.

III B.Tech.- II Semester

(16BT60231) **POWER ELECTRONICS AND DRIVES LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	--	--	3	2

PREREQUISITES: Courses on Transformers & Induction Machines and Power Electronics.
COURSE DESCRIPTION: Characteristics of power switching devices; Triggering and commutation circuits of SCR; working of various power electronic converters and AC & DC drives.
COURSE OUTCOMES:On successful completion of the course, students will be able to

CO1. demonstrate knowledge on characteristics of power switching devices, their triggering and commutation circuits, various converters and drives.
CO2. analyse physical observations and measurements of vari ous parameters related to powerswitching devicwes, converter circuitsand drives.
CO3. design, validate and applydifferent triggering and commutation circuits for SCR.
CO4. interpret and synthesize the data obtained from experi mentation on power electronic devices / circuits / drives to provide valid conclusions.
CO5. select an appropriate power switching device and/or cir cuit for real time applications.
CO6. apply the conceptual knowledge of power semiconduc tor drives in relevance to industry and society.
CO7. commit to ethical principles and standards while exercising the practical investigations on power electronics and drives.
CO8. work individually or in a group in the field of Powerelectronics and drives.
CO9. communicate effectively in verbal and written form in relevance to power electronics and drives.

III B.Tech.- II Semester

(16BT60232) **POWER SYSTEM - I LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	--	--	3	2

PREREQUISITES: Course on Transmission &Distribution and Power System Analysis.
COURSE DESCRIPTION: Experimentation on Transmission and distributionsystems; Load flow, Fault and Stability analysis.
COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on transmission & distribution systems and various types of power system analysis for experimental implementation.
CO2. analyze, evaluate and relate experimental observations and measurements for validation.
CO3. design a suitable measuring and testing setup for experimentation on power systems.
CO4. interpret the data obtained from experimentation to provide valid conclusions
CO5. select and apply appropriate technique for solving complex problems in the power systems.
CO6. apply the conceptual knowledge of power systems in relevance to industry and society
CO7. commit to ethical principles and standards while exercising the practical investigations on power system.
CO8. work individually or in a group while exercising practical investigations in the field of power system analysis.
CO9. communicate effectively in verbal and written form in relevance to power system.

III B.Tech.- II Semester
(16BT60233) **SEMINAR**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
--	100	100	--	--	--	2

PREREQUISITES: All the courses of the program up to III B. Tech. - I Semester.

COURSE DESCRIPTION: Identification of topic for the seminar; Literature survey; Performing critical study and analysis of the topic identified; Preparation of report and presentation.

COURSE OUTCOMES: Completion of the seminar work enables a successful student to demonstrate:

CO1. Knowledge on the seminar topic.
CO2. Analytical ability exercised during the seminar work.
CO3. Ability to investigate and solve complex engineering problems faced during the seminar work.
CO4. Ability to apply techniques to complex engineering activities with an understanding of limitations as applied in the seminar work.
CO5. Ability to function effectively as an individual as experienced during the seminar work.
CO6. Ability to present views cogently and precisely on the seminar topic.
CO7. Ability to engage in life-long leaning as experience during the seminar work.

IV B.Tech - I Semester
(16BT70201) **POWER SYSTEM OPERATION AND CONTROL**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	--	3

PREREQUISITES: Courses on Transmission & Distribution and Control Systems.

COURSE DESCRIPTION: Load forecasting; Optimal operation of generators in thermal power station; Optimal scheduling of hydrothermal system; Unit commitment; Modeling of Power system components; Reactive power and Voltage control; Load frequency control.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on:
- load forecasting methods.
- characteristics, scheduling and optimal operation of thermal and hydro power plants
- unit commitment.
- modeling of power system components for LFC and AVR studies.
- concepts of reactive power and voltage control.
- load frequency control in single - and two-area systems.

CO2. analyze
- the criteria for optimal operation of thermal and hydro thermal plants with and without transmission losses.
- unit commitment of thermal units.
- compensation and tap settings required for reactive power and voltage control
- LFC parameters in single - and two-area power system.

CO3. design suitable strategy to control reactive power, voltage and LFC dynamics in power system.
CO4. evaluate various operational parameters for scheduling & economic operation and control of power system to provide viable solution.
CO5. apply appropriate tools and techniques for secured operation and control of power system.
CO6. apply the conceptual knowledge of power system operation and control in relevance to industry and society.

IV B. Tech. - I Semester

(16BT70402) **EMBEDDED SYSTEMS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	--	3

PREREQUISITES: Courses on Switching Theory and Logic Design and Computer Architecture and Organization

COURSE DESCRIPTION: Embedded system design approaches; MSP430 Architecture; Instruction Set; On-Chip Resources; Programming; Communication with peripherals; Internet of Things related Issues.

COURSE OUTCOMES: On successful completion of the course, student will be able to

CO1. demonstrate knowledge in
- MSP430 Architecture, Pin out, Instruction set
- High level programming
- Usage of On-chip resources like ADC, DAC, Timers
- Internet of Things related issues

CO2. analyze various design issues regarding
- Usage of on chip resources
- Low power modes
- Communication support

CO3. design embedded systems using MSP430 series micro controllers to suit market requirements.

CO4. solve engineering problems and arrive at solutions in de signing embedded systems to support interconnectivity.

CO5. apply techniques, program skills, On-Chip resources to design networked embedded systems with an under standing of limitations.

CO6. reason out and practice professional engineering to de liver efficient and cost effective embedded based products to society.

IV B.Tech. - I Semester

(16BT70202) **SWITCHGEAR AND PROTECTION**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	--	3

PREREQUISITES: Courses on Transformers and Induction Machines, Synchronous Machines and Transmission & Distribution.

COURSE DESCRIPTION: Overview of protection schemes; Fuses and circuit breakers; Electromagnetic, static and microprocessor based relays; Protection schemes for various components under various operating conditions; Neutral grounding.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on
- operation of various protective devices and schemes.
- protection principles for power system components.
- neutral grounding.

CO2. analyzedifferent protective devices and protection schemes under various operating conditions.

CO3. designproper protection scheme for different power sys tem components.

CO4. Evaluate operating parameters and settings of protective devices in different protection schemes to provide feasible solutions.

CO5. select and apply appropriate protective device and scheme for different scenarios.

CO6. apply various grounding methods for safety of power system components and personnel.

IV B.Tech. - I Semester

(16BT70203) **ENERGY CONSERVATION AND MANAGEMENT**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	--	3

PREREQUISITES: Courses on Electrical Measurements and Transmission & Distribution.
COURSE DESCRIPTION: Principles of energy conservation, audit and management; Energy efficient motors, lighting, instruments and significance of energy economics.
COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on
- energy auditing practices.
- energy conservation schemes.
- energy economics and management.

CO2. analyze
- energy conservation measures.
- energy auditing practices.
- energy economics and management.

CO3. design an appropriate energy conservation scheme for commercial and industrial applications.
CO4. explore relevant methods of energy auditing in various industries and provide feasible solutions to conserve energy.
CO5. select and apply appropriate technique for energy auditing and conservation.

IV B.Tech. - I Semester

(16BT70204) **FLEXIBLE AC TRANSMISSION SYSTEMS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	--	3

PREREQUISITES: Courses on Power Electronics and Transmission & Distribution.
COURSE DESCRIPTION: Conventional AC Power Transmission System; Real and Reactive Power Transmission; load and line compensation; Concepts of FACTS; Compensation using FACTS Devices and Controllers; Shunt Compensation, Series Compensation, Phase angle Regulation and Combined compensation.
COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on
- real and reactive power flow in conventional system.
- concept of FACTS devices and controllers.
- shunt and series compensation using FACTS devices.
- phase angle regulation and combined compensation.

CO2. analyze
- stability and voltage profile of a compensated and un compensated transmission lines.
- Voltage regulation, improvement of transient stability, prevention of voltage instability, power oscillation damping with various FACTS devices and controllers.

CO3. design suitable compensation strategy for better volt age profile and secured operation of power system.
CO4. solve problems of transmission system to provide feasible solutions.
CO5. select and apply appropriate devices, schemes and tech niques for real time applications in AC power transmission.

IV B.Tech. - I Semester
(16BT70205) **POWER SYSTEM AUTOMATION**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	--	3

PREREQUISITES: Course on Switchgear and Protection.
COURSE DESCRIPTION: Power system operation and control, Substation and Distribution automation; Deregulation and Restructuring of power system.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. demonstrate knowledge on
- real time operation and control of power system.
- substation and distribution automation.
- restructuring of power system.

CO2. analyze
- various automation devices.
- technical issues.
- restructured model of power system.

CO3. design a suitable architecture for substation automation.
CO4. examine operational and technical issues to provide fea ible solutions for substation and distribution automation.
CO5. apply principles of DMS framework to integrate with real time power system.
CO6. apply the conceptual knowledge of real time operation and control of power system in relevance to industry and society.

IV B.Tech. - I Semester
(16BT70206) **POWER SYSTEM RELIABILITY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	--	3

PREREQUISITES: Courses onMulti-variable Calculus & Differential Equations and Transmission & Distribution.
COURSE DESCRIPTION: Overview of Probability theory; Study of network modelling and reliability functions; Assessment of repairable systems; Evaluation of generation system reliability, estimation of distribution system reliability indices.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. demonstrate knowledge on
- elements of probability theory and probability distributions.
- types of failures, reliability block diagram reductions.
- network reduction techniques and Markov modelling.
- loss of generation, frequency and duration techniques.
- distribution system reliability indices.

CO2. analyze
- various probability distributions.
- the network reduction techniques and Markov modelling.
- frequency and duration techniques.
- loss of generation, customer, load and energy oriented indices.

CO3. design component/system for desired life expectancy and reliability.
CO4. investigate various reliability indices and evaluate the power system performance to provide feasible solutions.
CO5. select and apply appropriate mathematical tool for assessment of power system reliability indices.
CO6. apply the conceptual knowledge of reliability engineering and its applications in relevance to industry and society.

IV B.Tech. - I Semester
(16BT70207) **ANALYSIS OF POWER ELECTRONIC CONVERTERS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	--	3

PREREQUISITES: Courses on Electrical Circuits, Electronic Devices & Circuits, Analog Electronics Circuits, Linear and Digital ICs and Power Electronics.
COURSE DESCRIPTION: Advanced Power semiconductor devices; MOSFET and IGBT-Gate and base drive circuits; 3-, 6- and 12- pulse converters; Switching Regulators; Advanced PWM Techniques.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. demonstrate knowledge on the characteristics of various special power switching devices & various triggering methods for MOSFET and IGBT.
CO2. analyze the performance of different power converters subjected to various loads.
CO3. design the suitable switching regulators for appropriate power electronic applications.
CO4. examine various configurations of power electronic circuits to provide feasible solutions.
CO5. select an appropriate power semiconductor device and/ or circuit for real time applications.
CO6. apply the conceptual knowledge of power semiconductor devices and/or circuits in relevance to industry.

IV B.Tech. - I Semester
(16BT70208) **POWER QUALITY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	--	3

PREREQUISITES: Course on Transmission and Distribution
COURSE DESCRIPTION: Power quality terminology, power quality issues, classification; Different sources of power quality disturbances; Harmonic distortion; Principles for controlling harmonics; Power quality measuring equipment; Power quality monitoring standards; Impact of distributed generation on power quality.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. demonstrate knowledge on
- sources of power quality disturbances and issues.
- power quality monitoring and measuring instruments.
- power quality standards.
- effect of distributed generation on power quality.

CO2. analyze various power quality issues.
CO3. design a suitable harmonic filter for commercial and industrial loads.
CO4. investigate various power quality issues and provide fea sible solutions for improvement of power quality.
CO5. Select and use an appropriate equipment for monitoring and measurement of power quality.
CO6. apply the conceptual knowledge of power quality in relevance to industry and society.

IV B.Tech. - I Semester
(16BT70209) **SMART GRID TECHNOLOGY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	--	3

PREREQUISITES: Course on Transmission and Distribution
COURSE DESCRIPTION: Smart grid benefits and requirements; Distribution management systems, smart substations, energy management systems; Smart meters and AMI; Power quality in smart grids; Communication channels and networks.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. demonstrate knowledge on
- smart grid initiatives and technologies
- communication technologies for the smart grid
- sensing, measurement, control and automation.

CO2. analyze different communication channels and networks in smart grid.
CO3. use modern techniques/tools to convert conventional grid to smart grid.
CO4. apply principles of energy management systems to industrial applications.
CO5. follow the protocols and standards for communication technologies.

IV B.Tech. - I Semester
(16BT70210) **SOFT COMPUTING TECHNIQUES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	--	3

PREREQUISITES: Courses on DC Machines and Transmission and Distribution.
COURSE DESCRIPTION: Architectures of artificial neural networks; Learning strategies; Fuzzy set theory; Fuzzy systems design; Applications of neural networks and fuzzy systems; Genetic algorithms and its applications.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. demonstrate knowledge on
- learning rules, strategies and algorithms of artificial neural network.
- fuzzy logic system.
- genetic algorithms.

CO2. analyze
- learning methods and algorithms of neural networks.
- fuzzy& classical sets.
- operators of genetic algorithms.

CO3. design fuzzy systems, neural networks and genetic algorithms for desired specifications.
CO4. evaluate electrical engineering problems using soft com puting techniques to provide feasible solutions.
CO5. select and apply suitable soft computing techniques to solve electrical engineering problems.
CO6. apply the conceptual knowledge of soft computing tech niques in relevance to industry and society.

IV B.Tech. - I Semester
(16BT6HS01) **BANKING AND INSURANCE**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:—
COURSE DESCRIPTION: Origin of Banking; Functions of Banking; Role & Functions of RBI; Bank-Customer Relationship; Deposit and Loan Services of Banks; Banking Procedures; Electronic Payment Mechanisms; Business Models; Concepts of Risk and Uncertainty; Fundamentals of Insurance; Principles of Insurance; Essentials of Insurance Contracts; Insurance players in India.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. demonstrate Knowledge in
- Tools and concepts of Banking and Insurance.
- Basic Principles and concepts of Insurance and Banking.
- e-fund transfers, e-payments and e-business models.

CO2. develop skills in providing solutions for
- Online banking and e – payments...
- Risk Management through insurance benefits the society at large.
- Money management by leveraging on technology, banking and insurance services.

CO3. exhibit conceptual soundness about banking and insurance, this would contribute to More employment opportunities.
CO4. provide life skills for effective utilization of Banking and Insurance facilities.

IV B.Tech. - I Semester
(16BT6HS02) **BUSINESS COMMUNICATION AND CAREER SKILLS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: —
COURSE DESCRIPTION: Nature and scope of communication; Corporate communication; Writing business documents; Careers and resumes; Interviews.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. demonstrate knowledge in
- Corporate Communication
- Main Stages of Writing Messages
- Career Building

CO2. analyze the possibilities and limitations of language in
- Communication Networks
- Crisis Management/Communication

CO3. design and develop the functional skills for professional practice in Business Presentations & Speeches
CO4. apply written and oral communication techniques in preparing and presenting various documents in technical writing.
CO5. function effectively as an individual and as a member in diverse teams.
CO6. communicate effectively with the engineering community and society in formal and informal situations.

IV B.Tech. – I Semester
(16BT6HS03) **COST ACCOUNTING AND FINANCIAL MANAGEMENT**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: —
COURSE DESCRIPTION: Scope, Objectives and Elements ofcost Accounting; Cost Sheet and Tender quotations; Variance Analysis: Material variances, Labor variances; Meaning and Scope, Liquidity, Profitability Ratios: concept of Risk and Return on Investment.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. demonstrate Knowledge in
- Elements of Costing.
- Basic concepts of Financial Management.
- Risk and Return
- Significance of Cost Accountancy
- Behavioral Finance

CO2. develop skills in
- Material, Labor, Overheads control.
- Excellence and ability to minimize the cost of the organization

CO3. develop effective Communication in Cost control and Financial Management.
CO4. provide solutions for effective investment decisions.

IV B.Tech. – ISemester

(16BT6HS04) **ENTREPRENEURSHIP FOR MICRO, SMALL AND MEDIUM ENTERPRISES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: —

COURSE DESCRIPTION:

Introduction to Entrepreneur Development; Idea generation and formation of Business Plan; Micro and Small Enterprises; Institutional Finance and Support to Entrepreneur; Woman Entrepreneurship.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate Knowledge in
- Schemes and institutions encouraging entrepreneurship.
- Basic Principles and concepts of Accountancy.
- Significance of entrepreneurship.

CO2. develop skills in providing solutions for
- Personal excellence through financial and professional freedom.
- Women entrepreneurship serving as contrivance in societal development

CO3. develop critical thinking and evaluation ability.

CO4. widens knowledge and build up attitude towards trouble shooting.

CO5. demonstrate business acumen

IV B. Tech. – I Semester

(16BT6HS05) **FRENCH LANGUAGE (La Langue Francais)**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	0	3

PREREQUISITES:—

COURSE DESCRIPTION: Oral communications; Basic grammar; advancedgrammar; basic writing; Business French (La Francais Commercial)

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. demonstrate knowledge in
- Process of communication
- Modes of listening
- Paralinguistic features
- Skimming and Scanning
- Elements of style in writing

CO2. analyze the possibilities and limitations of language, understanding
- Barriers to Communication
- Barriers to Effective Listening
- Barriers to Speaking
- Formal and metaphorical language

CO3. design and develop language skills for professional practice**.**

CO4. apply basic writing skills in writing Emails and understanding wide range of technical terminologies.

CO5. understand French culture and civilization.

CO6. communicate effectively with the native French in day to day situation**.**

IV B.Tech. - I Semester

(16BT6HS06) **GERMAN LANGUAGE (Deutsch alsFremdsprache)**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:—

COURSE DESCRIPTION: Oral communication; Basic grammar; Advanced grammar; Basic writing; Berufsdeutcsch (Business German)

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. demonstrate knowledge in
- Process of communication
- Modes of listening
- Paralinguistic features
- Skimming and Scanning
- Elements of style in writing

CO2. analyze the possibilities and limitations of language, understanding
- Barriers to Communication
- Barriers to Effective Listening
- Barriers to Speaking
- Formal and metaphorical language

CO3. design and develop language skills for professional practice.

CO4. apply basic writing skills in writing Emails and understanding wide range of technical terminologies.

CO5. understandGerman culture and civilization.

CO6. communicate effectively with the native German in day to day situation.

IV B.Tech. - I Semester

(16BT6HS07) **INDIAN CONSTITUTION**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: —

COURSE DESCRIPTION: Elements, functions and functionaries according to Indian Constitution, understanding forbetter professional practice and good citizenry.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. demonstrate knowledge in
- Parliamentary proceedings, laws, legislature, administration and its philosophy
- Federal system and judiciary of India
- Socials problems and public services like central civil services and state civil services
- Indian and international political aspects and dynamics

CO2. develop etiquette and professional behavior in line with the constitution of India for becoming a responsible citizen

IV B.Tech. - I Semester

(16BT6HS08) **INDIAN ECONOMY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: —

COURSE DESCRIPTION: Introduction; Time Value of Money; Elementary Economic Analysis; Value analysis, Value Engineering; Economic Planning.

COURSE OUTCOMES: On successful completion of the course, the students will be able to

CO1. demonstrate knowledge in
- Micro and Macro Economics.

• Traditional and Modern methods of Capital Budgeting.
• Five year plans and NITI Aayog.

CO2. analyze
• Capital Budgeting.
• Value Analysis and Value Engineering.
• Economic analysis
• Law of supply and demand

CO3. understand the nuances of project management and finance

IV B.Tech. - I Semester
(16BT6HS09) **INDIAN HERITAGE AND CULTURE**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: –
COURSE DESCRIPTION: Basic traits of Indian Culture; Humanistic Reforms under Jainism and Buddhism; Culture in the medieval period; Socio Religious reforms in Indian Culture; Reform movements for harmonious relations.
COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge in
• Human aspirations and values in Vedic culture.
• Cultural aspects of Buddhism and Jainism
• Unification of our country under Mourya's and Gupta's administrations
• Socio Religious aspects of Indian culture
• Reform movements and harmonious relations.

CO2. apply ethical principles and reforms as models for the upliftment of the societal status in the present culturalcontexts

IV B.Tech. - I Semester
(16BT6HS10) **INDIAN HISTORY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: –
COURSE DESCRIPTION: Introduction; Ancient India; Classical and Medieval era; Modern India; India after independence.
COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on evolution and history of India as a nation
CO2. analyze social and political situations of past and current periods
CO3. practice in career or at other social institutions morally and ethically

IV B.Tech. - I Semester
(16BT6HS11) **PERSONALITY DEVELOPMENT**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: –
COURSE DESCRIPTION: Self-esteem & Self-Management; Developing Positive Attitudes; Self-Motivation & Self-Management; Getting Along with the Supervisor; Workplace Success.
COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge in
• Self-Management

• Planning Career

CO2. analyze the situations based on
 • Attitudes
 • Thinking strategies

CO3. design and develop the functional skills for professional practice in

CO4. function effectively as an individual and as a member in diverse teams.

CO5. communicate effectively in public speaking in formal and informal situations.

IV B.Tech. - I Semester

(16BT6HS12) **PHILOSOPHY OF EDUCATION**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: –

COURSE DESCRIPTION: Introduction to Philosophy and Engineering Education; Philosophical methods and their implications in engineering; Philosophical education in India; Values and Engineering education; Outcome based education.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge in
 • Philosophy of Engineering education.
 • Philosophical Methods.
 • Knowledge acquiring methods.
 • Engineering education and responsibilities.

CO2. understand the impact of Outcome Based Education for effective educational outcomes

CO3. apply reasoning to assess societal issues with the contextual knowledge of engineering education and responsibilities.

IV B.Tech. - I Semester

(16BT6HS13) **PUBLIC ADMINISTRATION**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: –

COURSE DESCRIPTION: Introduction; Public Policy; Good Governance; E-Governance; Development Administration.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge in
 • Public Policy.
 • Good Governance.
 • E-governance.
 • Development Administration.

CO2. analyze the possibilities and limitations ofexisting policies through Good Governance perspective.

CO3. design and develop solutions in e-governance modelsto find and provide opportunities in e-governance.

CO4. adopt principles ofe-governance in addressing the existing issues and challenges in e-governance sector.

CO5. understand the significance of Administrative Development in finding professional engineering solutions by probing
 • Bureaucracy.
 • Role of civil society.

IV B.Tech. - I Semester

(16BT60112) **BUILDING MAINTENANCE AND REPAIR**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: –

COURSE DESCRIPTION: Durability of buildings, Failure and repair of buildings, Material Techniques for repair, Maintenance of buildings, Conservation and recycling.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate basic knowledge on durability and serviceability, failures, repair and rehabilitation of buildings.
CO2. analyzefailures, repair and rehabilitation techniques.
CO3. solve complex building maintenance problems through proper investigations and interpretation.
CO4. use modern tools and techniques for various repairs and rehabilitation of structures.
CO5. provide solutions for building maintenance and repair problems considering health and safety.
CO6. consider environmental sustainability in building maintenance and repair.
CO7. maintain ethical standards for quality in repairs and rehabilitation of structures.
CO8. evaluate specifications and perform cost analysis of building components while repair and rehabilitation.

IV B.Tech. - I Semester

(16BT60113) **CONTRACT LAWS AND REGULATIONS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: –

COURSE DESCRIPTION: Construction contracts; Tenders; Arbitration; Legal requirements; Labour regulations.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate basic Knowledge on construction contracts, tenders, arbitration, legalrequirements and labour regulations.
CO2. analyze contracts and tenders.
CO3. address the legal issues in contracts and tenders.
CO4. follow laws and regulations in the preparation of contracts and tenders.
CO5. prepare contract and tender documents as per the standards.
CO6. consider project schedule, cost, quality and risk in the preparation of contracts and tenders.

IV B.Tech. - I Semester

(16BT60114) **DISASTER MITIGATION AND MANAGEMENT**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: –

COURSE DESCRIPTION: Disasters; Earthquakes; Floods; Cyclones; Droughts; Landslides; Disaster management.

COURSE OUTCOMES: On successful completion of course, students will be able to:

CO1. demonstrate knowledge on disasters, their vulnerability and mitigation measures.
CO2. analyze disasters and their vulnerability.
CO3. design strategies for effective disaster mitigation.
CO4. address pre and post disaster issues for better preparedness and mitigation measures, through proper analysis and interpretation.
CO5. use appropriate methods in disaster mitigation and management.

CO6. use historical data of disasters to inform the people over preparedness and mitigation measures.
CO7. solve disaster related issues considering environment.
CO8. consider economical issues in disaster management.

IV B.Tech - I Semester
(16BT60115) **ENVIRONMENTAL POLLUTION AND CONTROL**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: –
COURSE DESCRIPTION: Fundamentals of air pollution; Dispersion of pollutants; Effects and control of air pollution; Water pollution; Soil pollution and control; Municipal solid waste management.
COURSE OUTCOMES: On successful completion of the course,
students will be able to
CO1. Demonstrate knowledge on air, water, soil pollution and their control and solid waste management.
CO2. analyze causes and effects of air, water and soilpollution and their remedial measures.
CO3. recommend suitable solutionsto complex environmental pollution problems.
CO4. use appropriate remedial technique to solve environmental pollution problems.
CO5. understand the effects of environmental pollutionon human health and vegetation.
CO6. encourage sustainable development through implementation of pollution control measures.
CO7. maintain IS Codes for environmental quality control.

IV B.Tech - I Semester
(16BT60116) **PLANNING FOR SUSTAINABLE DEVELOPMENT**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: –
COURSE DESCRIPTION: Sustainable development; Environmental impact;Sustainable Policies; Governance; Theories and strategies; Media and education for sustainability.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. demonstrate the knowledge on sustainable development, environmental impact, sustainable policies, governance, systems and strategies, media and education for sustainability.
CO2. analyze theories, environmental impact, policies, systems and strategies for sustainable development.
CO3. develop suitable methods and systems for sustainable development.
CO4. use appropriate techniquesin solving issues related to sustainable development.
CO5. provide solutions to problems associated with sustainable development considering society.
CO6. consider environment while planning sustainable development.
CO7. communicate effectively on sustainable development issues through media and education.
CO8. consider economical issues while planning for sustainable development.

IV B.Tech. - I Semester
(16BT60117) **PROFESSIONAL ETHICS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: –
COURSE DESCRIPTION: Engineering ethics; Professional ideals and virtues; Engineering as social experimentation; Responsibilities and rights; Global issues.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. demonstrate the principles of ethics, importance of professional values and social responsibility.

CO2. analyze the problems in the implementation of moral autonomy and use ethical theories in resolving moral dilemmas.
CO3. develop suitable strategies to resolve problems arise in practicing professional ethics.
CO4. provide solutions to complex problems associated with professional ethics by proper analysis and interpretation.
CO5. use appropriate theories in resolving issues pertain to professional ethics.
CO6. understand the impact of professional ethics on society and address the limitations of codes of ethics.
CO7. practice engineering with professionalism, accountability and ethics.
CO8. function as a member, consultant, manager, advisor and leader in multi-disciplinary teams.
CO9. write reports without bias and give instructions to follow ethics.

IV B.Tech. - I Semester
(16BT60118) **RURAL TECHNOLOGY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: –
COURSE DESCRIPTION: Rural technology; Non conventionalenergy; Community development; IT in rural development.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. demonstrate the knowledge on technologies for rural development.
CO2. analyze various technologies available which are appropriate for rural development.
CO3. carryout feasibility study on the public and private partnership for rural development.
CO4. develop and use latest technologies for rural development.
CO5. address health and safety issues while choosing technologies for rural development.
CO6. educate the rural populace on the positive impacts of bio-fertilisers and usage of agro machinery in agriculture.

IV B.Tech - I Semester
(16BT60308) **GLOBAL STRATEGY AND TECHNOLOGY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: –
COURSE DESCRIPTION: Introduction to strategic management; Strategic management process; Principles of good strategy; Globalization strategies; Research and Development strategies; Technology Management and Transfer; Elements of Transfer Process; Corporate Governance in the Indian scenario.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. demonstrate the knowledge on Strategic management, Research & development strategies, Technology management and transfer, Globalization and Corporate governance.
CO2. identify and analyze crucial problems in strategic management to improve performance of the organizations.
CO3. develop the products and production process by using research and development strategies.
CO4. conduct investigations on the impact of globalization in current scenario in the context of corporate governance.
CO5. appraise the resources and capabilities of the firm in terms of their ability to confer sustainable development.
CO6. apply ethics in strategic decision making.

IV B.Tech - I Semester

(16BT60309) INTELLECTUAL PROPERTY RIGHTS AND MANAGEMENT

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: —

COURSE DESCRIPTION: Protection of ideas; innovation and artistic endeavors; Acts and procedure related to patents, trademarks, copy right, design registration, trade secrets and cyber laws; Infringement; Commercialization of intellectual property rights; Case studies in each.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on intellectual property rights, patents, trademarks, copyrights, trade secrets and commercialization of intellectual property.
CO2. analyse the commercial significance of discoveries and developments and to assist in bringing these into public use.
CO3. investigate and ensure smooth transition from concept to final product by following National & International Laws of Intellectual Property.
CO4. utilize the various policies and procedures related to patents, trademarks and copyrights relating to IPR.
CO5. safeguard, review and manage the intellectual property so that it may receive adequate and appropriate legal protection against unauthorized use.
CO6. follow ethical standards in capacity building and work as a platform for development, promotion, protection, compliance, and enforcement of intellectual property and knowledge.
CO7. prepare documents and fill applications needed for filing a patent, design, copyright and trade mark.

IV B.Tech. - I Semester

(16BT60310) MANAGING INNOVATION AND ENTREPRENEURSHIP

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:—

COURSE DESCRIPTION: Evolution of entrepreneurship from economic theory Managerial and entrepreneurial competencies; Concepts of Shifting Composition of the Economy Purposeful Innovation & Sources of Innovative Opportunity; The Innovation Process; Innovative Strategies; Entrepreneurial Motivation; Entrepreneurs versus inventors; Ethics and International Entrepreneurship; Strategic Issues in International Entrepreneurship; Problem solving Innovation and Diversification.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate the principles of business innovation and entrepreneurship for establishing industrial ventures.
CO2. analyze business plans for potential investors and stakeholders and effectively answer probabilistic questions on the substance of plan.
CO3. develop a comprehensive and well planned business structure for a new venture.
CO4. conduct investigation on complex problems, towards the development of Project.
CO5. apply modern statistical and mathematical tools to design projects and subsequent work procedures.
CO6. apply ethics in constructive innovation framework.
CO7. exhibit professionalism by employing modern project management and financial tools.

IV B.Tech. - I Semester

(16BT60311) MATERIALS SCIENCE

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:—

COURSE DESCRIPTION: Structure and Bonding in metals; Steels, Cast Irons and Non Ferrous alloys; Material Selection for conductors, Insulators and semiconductors; Strengthening mechanisms of metals; Plastics and Ceramics as Insulators; AC and DC properties of Insulators; Semiconductors and Magnetic materials; Composite materials in Electrical and Electronics engineering; Material Selection and manufacturing of Optical fibers.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate the knowledge on concepts of fundamental science and engineering principles relevant to materials.

CO2. analyze the structures of various types of Ferrous, Non-ferrous alloys influencing various engineering applications.

CO3. conduct investigations to select suitable materials with desired properties for engineering applications.

CO4. use phase diagrams to interpret the data regarding microstructure of materials.

CO5. consider health and safety issues while providing materials to real time applications.

CO6. use composite materials that reduce material waste in design and manufacturing for sustainability.

IV B.Tech. - I Semester
(16BT70412) **GREEN TECHNOLOGIES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: —

COURSE DESCRIPTION: Principles of green engineering; Green communications; Green energy; Green computing; Green construction; Green manufacturing.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. deploy conceptual knowledge in green technologies pertaining toengineering practice.

CO2. analyze various green technologies for engineering practice.

CO3. provide green solutions to engineering problems.

CO4. apply various green techniques in the engineering practice.

CO5. consider health and safety issues while providing green solutions to the society.

CO6. understand issues related to environment sustainability.

CO7. apply ethical standards for environmental sustainability in the engineering practice.

IV B.Tech. - I Semester
(16BT70413) **INTRODUCTION TO NANOSCIENCE AND NANOTECHNOLOGY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:—

COURSE DESCRIPTION: Introduction to the concept ofnano;Description of nanomaterial;Nanostructure characterization tools;Classification of nanomaterials;Fabrication of nanomaterial;Different applications of nanostructures and nanomaterials.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge in
- Nanoscale technology.
- Difference between micro and nanotechnology
- Classification of Nanostructure and Nanomaterial
- Fabrication of various nanomaterials and nanostructures.

CO2. analyze numerical and analytical problems in
- Nanomaterial size by using Scanning Electrons
- Microscope and X-Ray diffraction

CO3. design and fabricate devices based on nanostructures like
- Nano solar cell
- Nano cantilever
- Nano bio-sensor

CO4. synthesize nano particle of different materials to solve the problems related to fabrication of nanostructures.

CO5. select appropriate technique for fabrication of nanostructures and Nano composites.
CO6. apply ethical standards and legal issues while using chemical substances infabrication of new nanostructures.

IV B.Tech. - I Semester
(16BT60505) **ENGINEERING SYSTEM ANALYSIS AND DESIGN**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:–
COURSE DESCRIPTION: Systems Process; Technologies for Systems; System Development Life Cycle; System Analysis and Modeling; Levels of Management; Project Management; Systems Implementation and Importance of UML Prototyping; Maintaining and Managing the Systems Output Process.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. demonstrate knowledge in
- Systems Process and System Design
- Systems Analysis and Modeling
- System Development Life Cycle
- Design Management and Maintenance Tools.

CO2. analyze system Process and estimate the given models by using case tools.
CO3. design and develop a model to the organizational systems.
CO4. solve complex problems related to engineering systems and produce accurate results
CO5. apply object oriented techniques for modeling dynamic systems.
CO6. contribute towards societal issues and responsibilities in designing, modeling and developing of organizational systems.

IV B.Tech.- I Semester
(16BT71011) **MICRO-ELECTRO-MECHANICAL SYSTEMS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:–
COURSE DESCRIPTION: Overview of Micro Electro Mechanical Systems (MEMS); scaling laws; working principles of microsensors and microactuators; materials; microfabrication processes; packaging of Microsystems.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. demonstrate knowledge on MEMS devices, scaling laws, microsensors and microactuators
CO2. analyze the properties of materials and identify its suitability for MEMS devices.
CO3. design MEMS devices that meet desired specifications and requirements.
CO4. analyze and synthesize the information to provide effective solution to engineering problems with MEMS devices.
CO5. use modern techniques in micro manufacturing process.
CO6. develop efficient and cost effective MEMS based products for society.

IV B.Tech. – I Semester
(16BT61205) **CYBER SECURITY AND LAWS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:–
COURSE DESCRIPTION: Cyber Crimes and Indian IT Act; Cyber Offenses; Tools and Methods used in Cyber Crime; Phishing ad Identity Theft; Indian and Global Perspective on Cyber Crimes and Cyber

Security; Organizational Implications on Cyber Security; IPR Issues; Cyber Crime and Terrorism; Cyber Crime Illustrations

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge in Cyber security, Cybercrimes and its related laws in Indian and Global Act.
CO2. analyze the legal perspectives and laws related to cybercrimes in Indian context.
CO3. apply security and privacy methods in development of modern applications and in organizations to protect people and to prevent cybercrimes.
CO4. solve Cyber security issues using privacy policies.
CO5. use antivirus tools to minimize the impact of cyber threats.
CO6. follow security standards for the implementation of Cyber Security and laws.

IV B.Tech. - I Semester

(16BT61505) **BIO-INFORMATICS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: –

COURSE DESCRIPTION: Introduction to Bioinformatics; Biology and Information; Sequence alignment and dynamic programming; Biological Database; Homology Modeling; Structure Prediction; Molecular Dynamics.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge on concepts of biological databases, Genome and proteome.
CO2. analyze biological sequences for Homology Modeling.
CO3. apply clustering methods for Phylogenetic trees.
CO4. solve bio sequencing problems using dynamic programming.
CO5. select and apply appropriate techniques and tools to structure Prediction.

IV B.Tech. - I Semester

(16BT70231) **POWER SYSTEM - II LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: Courses on Matrices and Numerical Methods, Electric Circuits and Transmission & Distribution.

COURSE OUTCOMES: on successful completion of the course, students will be able to

CO1. demonstrate knowledge on
- formation of network matrices and parameters of power system.
- various load flow methods and faults.
- load frequency control and stability of power system.

CO2. analyze
- the formation of power system network matrices.
- the power flow solutions using various load flow techniques.
- various types of power system faults.
- load frequency problem.
- stability for the stable operation of power system.

CO3. design a suitable operating and control strategy to meet the required specifications of power system.
CO4. develop programming skills to solve and simulate power system problems to provide viable solution.
CO5. select and apply appropriate technique for solving complex problems in the power systems.
CO6. apply the conceptual knowledge of power systems in relevance to industry and society.
CO7. commit to ethical principles and standards while exercising the practical investigations on power system.
CO8. work individually or in a group in the field of power systems.
CO9. communicate effectively in verbal and written form in power system domain.

IV B.Tech. - I Semester

(16BT70432) **EMBEDDED SYSTEMS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: Course on Embedded systems.

COURSE DESCRIPTION: IDE for Embedded System Design using MSP430; Interfacing Switch & LED; Timers-WDT, Configuring, Programming; ADC-usage; Power down modes; DAC; PWM Generator; Networking - SPI, Wi-Fi.

COURSE OUTCOMES: On successful completion of this course, the student will be able to:

CO1. demonstrate knowledge in designing complex energy efficient embedded systems.

CO2. analyze usage of various on-chip resources like GPIO, Timers, Interrupts, ADC, DAC, Comparator, SPI.

CO3. design embedded systems to suit market requirements.

CO4. solve engineering problems by proposing potential solu tions using industry choice advanced Microcontrollers.

CO5. apply appropriate techniques, resources, and CCSV6 based IDE for modeling embedded systems with understanding of limitations.

CO6. provide embedded system solutions for societal needs.

CO7. work individually and in a group to develop embedded systems.

CO8. communicate effectively in oral and written form in the field of embedded systems.

IV B.Tech. – I Semester

(16BT70232) **COMPREHENSIVE ASSESSMENT**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
	100	100	-	-	-	2

COURSE DESCRIPTION: Assessment of student learning outcomes in the courses of the program.

COURSE OUTCOMES: Comprehensive Assessment enables a successful student to demonstrate:

CO1. knowledge in the courses of the program.

CO2. analytical ability in the courses of the program.

CO3. design skills in the courses of the program.

CO4. ability to investigate and solve complex engineering problems in the courses of the program.

CO5. ability to apply tools and techniques to complex engineering activities with an understanding of limitations in the courses of the program.

CO6. ability to provide solutions as per societal needs with consideration to health, safety, legal and cultural issues in the courses of the program.

CO7. understanding of the impact of the professional engineering solutions in environmental context and need for sustainable development in the courses of the program.

CO8. ability to apply ethics and norms of the engineering practice in the courses of the program.

CO9. ability to function effectively as an individual in the courses of the program.

CO10. ability to present views cogently and precisely in the courses of the program.

CO11. ability to engage in life-long leaning in the courses of the program.

IV B.Tech. - II Semester

(16BT80231) **PROJECT WORK**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
100	100	200	-	-	-	12

PREREQUISITES: All the courses of the program.

COURSE DESCRIPTION: Identification of topic for the project work; Literature survey; Collection of preliminary data; Identification of implementation tools and methodologies; Performing critical study and analysis of the topic identified; Time and cost analysis; Implementation of the project work; Preparation of thesis and presentation.

COURSE OUTCOMES: Completion of the project work enables a successful student to demonstrate:

CO1. knowledge on the project topic.
CO2. analytical ability exercised in the project work.
CO3. design skills applied on the project topic.
CO4. ability to investigate and solve complex engineering problems faced during the project work.
CO5. ability to apply tools and techniques to complex engineering activities with an understanding of limitations in the project work.
CO6. ability to provide solutions as per societal needs with consideration to health, safety, legal and cultural issues considered in the project work.
CO7. understanding of the impact of the professional engineering solutions in environmental context and need for sustainable development experienced during the project work.
CO8. ability to apply ethics and norms of the engineering practice as applied in the project work.
CO9. ability to function effectively as an individual as experienced during the project work.
CO10. ability to present views cogently and precisely on the project work.
CO11. project management skills as applied in the project work.
CO12. ability to engage in life-long leaning as experience during the project work.

Program: B.Tech. ELECTRONICS AND INSTRUMENTATION ENGINEERING

I B. Tech. - I Semester
(16BT1BS02) **ENGINEERING PHYSICS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Intermediate / senior secondary Physics

COURSE DESCRIPTION: Lasers; optical fibers; principles of quantum mechanics; band theory of solids; semiconductors; dielectric properties of materials; acoustics of buildings; superconductors; crystallography and nanomaterials.

COURSE OUTCOMES: After completion of the course, a successful student will be able to:

CO1: Acquire basic knowledge of lasers, optical fibers, quantum mechanics, dielectrics, semiconductors, and superconductors, acoustic of buildings, crystallography and nanomaterials.

CO2: Analyze the construction and working of various laser systems, semiconductor devices, various types of optical fibers and its communication system and nano materials properties.

CO3: Gain skills in designing lasers, optical fiber cable, semiconductor devices, acoustically good halls and nanomaterials.

CO4: Develop problem solving skills in engineering context.

CO5: Use relevant techniques for assessing ball milling, pulsed laser deposition, p-n junction and Laser

I B. Tech. – I Semester
(16BT1BS03) **MATRICES AND NUMERICAL METHODS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Intermediate /Senior secondary mathematics

COURSE DESCRIPTION: Fundamentals of matrix theory; numerical solutions of equations, curve fitting; interpolation; numerical differentiation and integration; numerical solutions of ordinary differential equations.

COURSE OUTCOMES: After completion of the course a successful student is able to

CO1: Acquire basic **knowledge** in
- (a) Finding the rank of matrices and analyzing them.
- (b) Solving algebraic and transcendental equations by various numerical methods.
- (c) Fitting of various types of curves to the experimental data.
- (d) Estimating the missing data through interpolation methods.
- (e) Identification of errors in the experimental data
- (f) Finding the values of derivatives and integrals through various numerical methods.
- (g) Solving differential equations numerically when analytical methods fail.

CO2: Develop skills in **analyzing** the
- (a) methods of interpolating a given data
- (b) properties of interpolating polynomials and derive conclusions
- (c) properties of curves of best fit to the given data
- (d) algebraic and transcendental equations through their solutions
- (e) properties of functions through numerical differentiation and integration
- (f) properties of numerical solutions of differential equations

CO3: Develop skills in **designing** mathematical models for
- (a) Fitting geometrical curves to the given data
- (b) Solving differential equations
- (c) Constructing polynomials to the given data and drawing inferences.

CO4: Develop numerical skills in **solving the problems** involving
- (a) Systems of linear equations
- (b) Fitting of polynomials and different types of equations to the experimental data
- (c) Derivatives and integrals
- (d) Ordinary differential equations

CO5: Use relevant numerical **techniques** for
- (a) Diagonalising the matrices of quadratic forms

(b) Interpolation of data and fitting interpolation polynomials
(c) Fitting of different types of curves to experimental data
(d) obtaining derivatives of required order for given experimental data
(e) Expressing the functions as sum of partial fractions

I B. Tech. - I Semester
(16BT1BS04) MULTI - VARIABLE CALCULUS AND DIFFERENTIAL EQUATIONS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Intermediate /Senior secondary mathematics
COURSE DESCRIPTION: First order differential equations; higher order linear differential equations; functions of several variables; applications of integration; multiple integrals; vector calculus.
COURSE OUTCOMES: After completion of the course a successful student is able to
CO1: Acquire knowledge in
(a) Higher order Differential equations
(b) Maximum and minimum values for the functions of several variables
(c) Double and triple integrals
(d) Differentiation and integration of vector functions.
(e) Line and surface volume
(f) transforming integrals from three dimensional surfaces and volumes on to plane surfaces
CO2: Develop skills in analyzing the
(a) methods for differential equation for obtaining appropriate solutions,
(b) Properties of oscillatory electrical circuits and heat transfer in engineering systems
(c) The variations in the properties of functions near their stationary values
(d) Flow patterns of fluids, electrical and magnetic flux and related aspects
CO3: Develop skills in designing mathematical models for
(a) R-C and L-R-C oscillatory electrical circuits
(b) Heat transfer and Newton’s law of cooling
(c) Engineering concepts involving lengths of curves and areas of planes, Flux across surfaces
CO4: Develop analytical skills in solving the problems involving
(a) Newton’s law of cooling
(b) non homogeneous linear differential equations
(c) maximum and minimum values for the functions
(d) lengths of curves, areas of surfaces and volumes of solids in engineering
(e) transformation of integrals from three dimensional surfaces and volumes on to plane surfaces
CO5: Use relevant mathematical techniques for evaluating
(a) various types of particular integrals in differential equations
(b) stationary values for multi variable functions
(c) multiple integrals in change of variables
(d) integrations of vector functions.

I B. Tech. - I Semester
(16BT10241) NETWORK ANALYSIS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	4	1	0	

PRE-REQUISITES: --
COURSE DESCRIPTION: Basic concepts of electric circuits; Voltage - Current relationship of basic circuit elements; Mesh and Nodal analysis; Network theorems; AC circuits; Two-port network parameters; Transient analysis.
COURSE OUTCOMES: After successful completion of the course, student will be able to
CO1: Demonstrate knowledge in
- voltage and current relationships for various electric elements.
- network reduction techniques.
- concepts of AC fundamentals and single phase circuits.

- concepts of two-port networks.
- various network theorems.
- transient behavior of the circuits.

CO2: Analyze
- a circuit using conventional, mesh and nodal concepts.
- a two-port network for various network parameters.
- various types of two-port networks.
- the transient behavior of the circuits.

CO3: Design circuits to meet the required specifications

CO4: Evaluate
- electrical circuits for voltage, current and power using conventional circuit analysis methods and network theorems.
- transient response.
- two-port networks.

I B. Tech. - I Semester
(16BT10501) **PROGRAMMING IN C**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: NIL
COURSE DESCRIPTION: Program design; Operators and Expressions; Data Input and Output; Control Statements; Functions; Arrays; Strings; Pointers; Structures & Unions and File handling Techniques;
COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1: Demonstrate knowledge in:
- o Elements of C Language
- o Selection and Repetition statements.
- o Arrays, Strings and Functional statements.
- o Derived data types, Files and Pointers

CO2: Analyze complex engineering problems to develop suitable solutions
CO3: Design algorithms for specified engineering problems
CO4: Use appropriate 'C' language constructs for solving engineering problems
CO5: Write programs using 'C' language to implement algorithms

I B. Tech. I-Semester
(16BT1BS32) **ENGINEERING PHYSICS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Intermediate / senior secondary Physics.
COURSE DESCRIPTION: Characteristics of p-n junction diode, Photodiode, LED, and semiconductor laser diode. Experimental determination of carrier concentration and energy gap of a semiconductor material, wave length of a laser source, size of fine particle, numerical aperture and acceptance angle of optical fiber. Determination of frequency of electrically vibrating tuning fork and A.C source using A.C sonometer, magnetic field along axial line of a current carrying coil and rigidity modulus of material of a wire using torsional pendulum.
COURSE OUTCOMES: After completion of the course, a successful student will be able to:

CO1: Acquire basic knowledge about semiconductor materials, magnetic materials and lasers.
CO2: Acquire analytical skills in the estimation of carrier concentration of semiconductor materials and characterization of p-n junction.
CO3: Develop skills in designing electronic circuits using semiconductor components.
CO4: Acquire skills to use instrumental techniques in A.C sonometer and Melde's experiment.
CO5: Apply diffraction techniques for determination of size of tiny particles and wave length of lasers.

I B. Tech. - I Semester
(16BT10232) **ELECTRICAL AND ELECTRONICS WORKSHOP PRACTICE**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: NIL
COURSE DESCRIPTION: Identification and specifications of various Electric and Electronic devices; analysis of various series, parallel and series-parallel electrical circuits; develop various electrical circuits for domestic and industrial applications.
COURSE OUTCOMES: After successful completion of the course, student will be able to
CO1: Demonstrate knowledge on various Electrical and Electronic Devices.
CO2: Analyze various series and parallel electrical circuits.
CO3: Design and develop various electrical circuits for domestic and industrial applications.
CO4: Function effectively as individual and as a member in a team.
CO5: Communicate effectively both oral and written forms

I B. Tech. - I Semester
(16BT10251) **NETWORK ANALYSIS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: NIL
COURSE DESCRIPTION: Verification of KVL, KCL and network theorems; analysis of AC and DC circuits; determination of resonant frequency in series and parallel RLC circuits; evaluation of transients
COURSE OUTCOMES: After successful completion of the course, student will be able to
CO1: Demonstrate knowledge in
- Identification of various circuit elements and their values.
- Concepts of electric circuits and two-port networks.

CO2: Analyze and relate physical observations and measurements in electric circuits to theoretical perception.
CO3: Design circuit parameters to meet the required specifications.
CO4: Demonstrate skills in evaluating and interpret
- Various circuit parameters using conventional and network theorems
- Network parameters

CO5: Function effectively as individual and as a member in a team.
CO6: Communicate effectively in oral format and prepare laboratory reports.

I B. Tech. - I Semester
(16BT10531) **PROGRAMMING IN C LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES:- ***A course on "Programming in C"***
COURSE DESCRIPTION: Hands on practice in developing and executing simple programs using C Programming constructs– Conditional statements, Loops, Arrays, Strings, Functions, Structures, Pointers and Functions.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1: Demonstrate practical knowledge of using C language constructs:
- Selection and Repetition statements.
- Arrays, Strings and Functional statements.
- Derived data types, Files and Pointers

CO2: Analyze problems to develop suitable algorithmic solutions
CO3: Design Solutions for specified engineering problems

CO4: Use appropriate 'C' language constructs for solving engineering problems
CO5: Implement and execute programs using 'C' language
CO6: Document programs and communicate effectively while conducting Professional transactions.

I B. Tech. - II Semester
(16BT1HS01) **Technical English**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: English at Intermediate level
COURSE DESCRIPTION: Introduction to Communication; Active Listening; Effective Speaking; Reading; and Writing.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1: Demonstrate knowledge in
- ♦ Process of communication
- ♦ Modes of listening
- ♦ Paralinguistic features
- ♦ Skimming and Scanning
- ♦ Elements of style in writing

CO2: Analyze the possibilities and limitations of language for understanding
- ♦ Barriers to Communication
- ♦ Barriers to Effective Listening
- ♦ Barriers to Speaking
- ♦ Formal and metaphorical language

CO3: Design and develop functional skills for professional practice.
CO4: Apply writing skills in preparing and presenting documents
CO5: Function effectively as an individual and as a member in diverse teams.
CO6: Communicate effectively with the engineering community and society in formal and informal situations.

I B. Tech. - II Semester
(16BT1BS01): **ENGINEERING CHEMISTRY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE REQUISITE: Intermediate/Senior Secondary Chemistry
COURSE DESCRIPTION: Water technology, Chemistry of Engineering materials, Nanochemistry, Green Chemistry, Electro chemical cells, Sensors, Corrosion and Lubricants.
COURSE OUTCOMES: After completion of the course, a successful student is able to:

CO1: Acquire basic knowledge in water technology, engineering plastics, conducting polymers, composites, Electro chemical cells, Nano Chemistry, principles of Green Chemistry, corrosion phenomenon and lubricants.
CO2: Develop analytical skills in:
  a. Determination of hardness of water.
  b. Determination of viscosity, flame and fire points, cloud and pour points.
CO3: Develop designing skills in:
  a. Synthesis of engineering plastics.
  b. Chemical methods for the synthesis of Nano materials.
CO4: Develop skills for providing solutions through:
  a. Mitigation of hardness of water.
  b. Newer Nanomaterials and engineering plastics for specific applications
CO5: Acquire awareness to practice engineering in compliance to modern techniques such as:
  a. Nalgonda technique for defluoridation of water
  b. Electroplating technique for control of corrosion.
CO6: Acquire awareness to societal issues on:

a. Quality of water.
b. Bio-diesel
c. Chemical materials utility and their impact.

I B. Tech. - II Semester
(16BT2BS01) TRANSFORMATION TECHNIQUES AND PARTIAL DIFFERENTIAL EQUATIONS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE REQUISITE: Intermediate /Senior secondary mathematics
COURSE DESCRIPTION: Fourier series; Fourier integrals and transforms; Laplace transforms; z – transforms; partial differential equations.
COURSE OUTCOMES: After completion of the course a successful student is able to
CO1: Acquire basic knowledge in
(a) Fourier series and Fourier transforms
(b) Fourier integrals
(c) Laplace transforms and their applications
(d) z- transforms and their applications
(e) solving partial differential equations
CO2: Develop skills in analyzing the
(a) Properties of Fourier series for a given function
(b) Partial differential equations through different evaluation methods
(c) Difference equations through z – transforms
(d) Engineering systems and processes involving wave forms and heat transfer
CO3: Develop skills in designing mathematical models for
(a) Problems involving heat transfer and wave forms
(b) Engineering concepts involving, Fourier transforms, Fourier integrals, Laplace transforms, z-transforms and difference equations
CO4: Develop analytical skills in solving the problems involving
(a) Fourier series and Fourier transforms
(b) Laplace transforms
(c) Z-transforms and difference equations
(d) Heat transfer and wave motion
CO5: Use relevant transformation techniques for
(a) Obtaining Fourier transforms for different types of functions
(b) Laplace transforms
(c) Z- transforms
(d) Partial differential equations

I B. Tech. - II Semester
(16BT20401) ELECTRONIC DEVICES AND CIRCUITS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A Course on Engineering Physics.
COURSE DESCRIPTION: Characteristics of general and special purpose electronic devices; Rectifiers; filters and regulators; Biasing and small signal analysis of BJT and FET.
COURSE OUTCOMES: On successful completion of this course the students will be able to:
CO1: Demonstrate knowledge in
- p-n junction diode and its characteristics
- Zener diode and its characteristics
- Rectifiers, Filters and Regulators
- Characteristics of BJT, FET, MOSFET and special purpose electronic devices.

CO2: Analyze numerical and analytical problems in
- Rectifiers using Filters

- Regulated Power Supplies
- Transistor biasing circuits and stabilization
- Transistor amplifiers
- FET biasing circuits and amplifiers

CO3: Design electronic circuits such as
- Rectifiers with and without filters
- Voltage regulators
- BJT and FET biasing circuits
- BJT and FET amplifiers

CO4: Solve engineering problems and arrive at solutions pertaining to electronic circuits.
CO5*:* Select appropriate technique for transistor modeling.

I B. Tech. - II Semester
(16BT20541) **Foundations of Data Structures**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: ***A course on "Programming in C"***
COURSE DESCRIPTION: Concepts of sorting: sorting by exchange, sorting by distribution, sorting by merging and data structures: stacks, queues, linked lists, trees, graphs, and hash table.
COURSE OUTCOMES: On successful completion of this course the students will be able to:
CO1: Gain knowledge in Sorting techniques, Linear and Non- linear Data Structures.
CO2: Analyze the performance of sorting techniques and their relationship to Data Structures.
CO3: Design appropriate hashing function for a given application and develop programs to implement Linear and Non-Linear data structures
CO4: Apply appropriate data structure to provide solutions for real time problems using C Language.

I B. Tech. - II Semester
(16BT1HS31) **ENGLISH LANGUAGE LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: English at intermediate or equivalent level.
COURSE DESCRIPTION: Phonetics; Vocabulary Building; Functional Grammar; Just a Minute; Elocution/Impromptu; Giving Directions/Conversation Starters; Role Play; Public Speaking; Describing People, Places, Objects and Events; Reading Comprehension; Listening Comprehension; Information Transfer.
COURSE OUTCOMES: On successful completion of this course the students will be able to:
CO1: Demonstrate knowledge in
- Phonetics
- Information Transfer

CO2: Analyze the situations in professional context by using
- Vocabulary
- Grammar

CO3: Design and develop functional skills for professional practice.
CO4: Apply the techniques of Listening and Reading skills to comprehend Listening and Reading comprehension.
CO5: Function effectively as an individual and as a member in diverse teams through
- Extempore talk and
- Role Play

CO6: Communicate effectively in public speaking in formal and informal situations.
CO7: Recognize the need to engage in lifelong learning to upgrade competence of knowledge and communication.

I B. Tech. - II Semester
(16BT1BS31): **ENGINEERING CHEMISTRY LABORATORY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE REQUISITE: Intermediate/Senior Secondary Chemistry

COURSE DESCRIPTION: Estimation of hardness, alkalinity, dissolved oxygen of water samples and estimation of Iron by volumetric methods, determination of effect of P^H on rate of corrosion, measurement of viscosity of lubricants; Instrumental methods like potentiometer, conductivity meter, P^H meter and colorimeter; synthesis of Polymers and Nano materials.

COURSE OUTCOMES: After completion of the course, a successful student is able to:

CO1: Acquire basic Knowledge about the volumetric analysis and synthesis of materials used for engineering applications.

CO2: Acquire analytical skills in the estimation of hardness of water, alkalinity of water, dissolved oxygen in water and estimation of Iron through wet laboratory methods.

CO3: Develop designing skills for the synthesis of polymers and Nanomaterials.

CO4: Acquire skills to use instrumental techniques for the determination of Electrical conductance of electrolytes, EMF of a cell, PH of a solution, determination of viscosity of lubricants and estimation of iron in cement.

CO5: Provide solutions for environmental issues through determination of quality of water.

I B. Tech. - II Semester
(16BT10331) **COMPUTER AIDED ENGINEERING DRAWING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	1	6	3

PRE-REQUISITES: *None*

COURSE DESCRIPTION: Engineering drawing conventions; importance of engineering drawing; fundamental concepts of sketching; computed aided drafting and different types of projections of geometric entities (both 2D and 3D) through computer aided drafting packages.

COURSE OUTCOMES: After completion of the course, a successful student is able to:

CO1: Understand, write and read the language of engineering drawing in industry through International System of Standards.

CO2: Develop the imagination and mental visualization ability for interpreting the geometrical details of engineering objects.

CO3: Produce different views and projection in drawing.

CO4: Use modern CAD software for design and drafting of drawings.

CO5: Create multi-view drawings suitable for presentation to Engineering community.

CO6: Introduce and communicate universally accepted conventions and symbols for their usage in technical drawing.

I B. Tech. - II Semester
(16BT20551) **Foundations of Data Structures Lab**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: ***A course on "Foundations of Data Structures"***

COURSE DESCRIPTION: Hands on programming to implement data structures - Linked lists, Stacks, Queues, Trees, Search trees, Sorting, and Hashing in C Language.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO1: Gain practical knowledge on stacks, queues, trees, graphs and Hashing Techniques

CO2: Identify suitable data structure to solve engineering problems.

CO3: Design solutions for complex engineering problems using linear and non-linear data structures.

CO4: Develop algorithms leading to multiple solutions by conducting investigations of complex problems.
CO5: Apply 'C' language as a tool for implementing linear and non linear data structures
CO6: Communicate effectively by writing Programs and document practical work.

II B. Tech. – I Semester
(16BT3HS01) **ENVIRONMENTAL STUDIES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: A course on Engineering Chemistry
COURSE DESCRIPTION: Multidisciplinary nature of environment; Natural resources; Ecosystems; Biodiversity; Environment pollution and control; Social issues and environment; Human population and environment; Field studies.
COURSE OUTCOMES: On successful completion of the course, students will be able to:
CO1. Acquire knowledge on nature of environment, natural resources, ecosystems, biodiversity, environmental pollution and control, social issues and human population.
CO2. Analyze natural resources, ecosystems, biodiversity, environmental pollution and control, social issues and human population.
CO3. Develop strategies for environmental pollution control and natural resource management.
CO4. Solve environmental problems through proper analysis and interpretation of environmental data.
CO5. Choose appropriate techniques in environmental pollution control and natural resource management.
CO6. Understand the impact of social issues and population on environment.
CO7. Provide solutions to individuals, industries and government for environmental sustainable development.
CO8. Follow environmental protection laws for sustainable development.
CO9. Communicate effectively on environmental issues in the form reports.

II B.Tech. - I semester
(16BT3BS02) **SPECIAL FUNCTIONS AND COMPLEX ANALYSIS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Intermediate/senior secondary Mathematics
COURSE DESCRIPTION: Beta, Gamma functions and their properties; Limits continuity and analyticity of complex functions; Integration, power series, singularities, residues; conformal mapping.
COURSE OUTCOMES: On successful completion of the course, studentswill be able to:
CO1. Acquire knowledge in
- Beta and Gamma functions
- Expressing complex functions in power series
- Differentiation and integration of complex functions
- Conformal mappings and bilinear transformations
- Expressing complex functions in terms of graphs and power series

CO2. Develop skills in analyzing the
- The properties exhibited by complex functions in Argand plane
- Properties of real integrals through complex variable techniques
- The properties of improper integrals through residue theory
- Conformal transformations of complex valued functions for inferences
- The properties of complex functions by expressing them in power series and graphs

CO3. Develop skills in designing mathematical models involving
- Integrals of complex variable functions
- Improper integrals using beta and gamma functions
- Residue theory of complex functions
- Power series expansions of complex variable functions
- Transformations of complex variable functions

- Fluid flow patterns and flux functions.

CO4. Develop analytical skills in providing solutions for problems involving
- Fluid, Electrical and Magnetic Potential functions
- Integration of complex functions
- Improper real integrals

CO5. Use relevant Complex variable techniques for
- Residues and integrals of complex functions.
- Improper real integrals through complex functions
- Techniques of Beta and Gamma functions to improper integrals

II B. Tech. – I Semester
(16BT31001) ELECTRICAL AND ELECTRONIC MEASUREMENTS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Network Analysis, Engineering Physics.
COURSE DESCRIPTION: Construction and principle of operation of Ammeters, Voltmeters, Ohmmeters; Potentiometers; Power meter; Power Factor meter; Energy Meters; Design of Bridges - AC, DC, Frequency and Time measurements.
COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge in construction and Principle of operation of different instruments used for measurement of
- Voltage
- Current and Resistance
- Power
- Power factor
- Energy measurement
- Frequency and time

CO2. Analyze the performance characteristics of various measuring instruments.
CO3. Design instruments and circuits for measurement of Power, Energy, Power factor, Voltage, Current, Resistance, Capacitance and Inductance.
CO4. Interpret and synthesize data obtained from measuring systems to provide valid conclusions.
CO5. Select appropriate technique to measure Power, Energy, Power factor, Voltage, Current, Resistance, Capacitance and Inductance.
CO6. Apply contextual knowledge to develop measuring instruments used in domestic and industries.

II B. Tech. – I Semester
(16BT31002) SENSORS AND TRANSDUCERS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on Engineering Physics.
COURSE DESCRIPTION: Units and standards; Static and dynamic characteristics of transducers; Working principle of resistive, inductive, capacitive, self-generating and other sensors; Applications of sensors.
COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge on principles of sensors and transducers with their characteristics.
CO2. Apply analytical skills to determine the response of sensors for change in physical parameters.
CO3. Solve the problems pertaining to RTD, Thermistors, piezoelectric, capacitive and inductive sensors.
CO4. Select an appropriate sensor to measure the physical parameter for specific application.
CO5. Apply the principles of resistive, inductive, capacitive, self-generating and other sensors for measuring real time physical parameters in industries.
CO6. Follow the ethical standards while using measuring instruments.

II B. Tech. – I Semester

(16BT30403) **SWITCHING THEORY AND LOGIC DESIGN**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Number system and Boolean algebra; Minimization; Analysis and synthesis of digital circuits; Asynchronous Sequential Logic & Programmable Memories.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate the knowledge in
- Conversion of number systems, Binary Codes.
- Basic theorems, properties and postulates of Boolean algebra.
- Minimization of switching functions using Map method and Tabular method.
- Combinational and sequential circuits.
- Realization of Boolean functions using PLDs.

CO2. Analyse combinational and sequential circuits.

CO3. Design and develop various combinational, sequential circuits and PLDs.

CO4. Solve problems and arrive at solutions pertaining to Digital Electronics.

CO5. Apply minimization techniques to asynchronous and syn chronous designs and suggest appropriate design for engineering solutions.

CO6. Apply appropriate logic functions to obtain optimized de signs useful for the society.

II B. Tech. – I Semester

(16BT30241) **ELECTRICAL TECHNOLOGY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Network Analysis, Engineering Physics.

COURSE DESCRIPTION: Analysis of phase & line quantities and measurement of power in three phase system; Constructional details, operation, performance evaluation and applications of DC & AC machines; Testing of DC machines and Transformers; Special machines and single phase transformers.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge on
- Construction and operation of various electrical machines
- Measurement of power in three-phase system
- Applications of various types of electrical machines

CO2. Analyze
- The operation and performance of various electrical machines
- The polyphase circuit for measurement of power

CO3. Design suitable accessories / controllers for various machines to meet the nominal specifications.

CO4. Solve engineering problems pertaining to various machines and provide feasible solutions.

CO5. Select appropriate control techniques for various electrical machines used in domestic and industrial applications.

CO6. Apply the conceptual knowledge of various electrical machines in relevance to industry and society.

II B. Tech. – I Semester

(16BT30431) BASIC ELECTRONICS AND DIGITAL DESIGN LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Courses on Electronic Devices and Circuits, Switching Theory and Logic Design.
COURSE DESCRIPTION: Diode characteristics; Rectifiers; BJT and FET characteristics; UJT and SCR characteristics; BJT Amplifiers; Combinational Circuits; Realization of Flip-flops; Sequential Circuits; Demonstration on VHDL Programme.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Demonstrate knowledge in different electronic devices, analog and digital circuits.
CO2. Analyze the characteristics of different electronic devices and circuits like
- Diodes-PN Junction Diodes, Zener Diodes, SCR
- Transistors-BJT,FET,UJT
- Combinational Circuits-HA, FA
- Flip Flops-JK FF, D FF
- Sequential Circuits -Counters

CO3. Design electronic circuits like FET Amplifiers, Combinational Circuits and Sequential Circuits.
CO4. Solve engineering problems with better Electronic circuits.
CO5. Work individually and also in a group in the area of Analog and Digital circuits.
CO6. Communicate verbally and in written form in the area of Electronic Devices and circuits.

II B. Tech. – I Semester

(16BT31031) MEASUREMENTS AND TRANSDUCERS LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Courses on Sensors and Transducers, Electrical and Electronic Measurements.
COURSE DESCRIPTION: Measurement of parameters like voltage, resistance, inductance, capacitance, displacement, pressure, force, temperature and weight.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Demonstrate knowledge on
- Measuring instruments
- Principles of Sensors and transducers
- AC and DC bridges

CO2. Analyze the operation and performance of measuring instruments and transducers.
CO3. Design circuits for measurement of Voltage, Current, resistance, capacitance and Inductance.
CO4. Interpret and synthesize the data obtained from measurements and provide valid conclusions.
CO5. Select and apply appropriate sensor and measuring technique to measure the physical parameter.
CO6. Understand the working of various sensors and transducers and provide engineering solutions for societal use.
CO7. Follow ethical principles in designing circuits for measurement of physical parameters.
CO8. Do experiments related to measurement of electrical and physical parameters effectively as an individual and as a member in a group.
CO9. Communicate verbally and in written form in the area of measurements and instrumentation.

II B. Tech. – I Semester
(16BT30251) **ELECTRICAL TECHNOLOGY LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: A course on Electrical Technology.
COURSE DESCRIPTION: Construction, operation, types, performance evaluation of DC & AC machines and transformers; Necessity of starter for DC motors; Three phase power measurement.
COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge on
- Construction, operation of DC & AC machines and transformers.
- Starting and speed control of DC motors.
- Testing of DC & AC machines and transformers.
- Characteristics of DC & AC machines and transformers.
- Measurement of three phase power.
- Applications of DC & AC machines and transformers.

CO2. Analyze the operation and performance of DC & AC machines, transformers and three phase system for various operating conditions.
CO3. Design the circuit with suitable accessories / controllers for desired operation conditions of DC & AC machines.
CO4. Interpret and synthesize the data obtained from experimentation on DC & AC machines, transformers and three phase system and provide valid conclusions.
CO5. Select and apply appropriate technique for testing and control of DC & AC machines and transformers useful in industry.
CO6. Apply the conceptual knowledge of electrical machines in relevance to industry and society.
CO7. Commit to ethical principles and standards while exercising the practical investigations on electrical machines.
CO8. Work individually or in a group while exercising practical investigationsin the field of electrical machines.
CO9. Communicate effectively in verbal and written form in relevance to electrical machines.

II B. Tech. – II Semester
(16BT50201) **CONTROL SYSTEMS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Multivariable Calculus and Differential Equations, Transformation Techniques and Partial Differential Equations.
COURSE DESCRIPTION: Concepts of control system; transfer function of various physical systems; time response analysis; frequency response analysis; controller design; state space analysis.
COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge on
- The concepts of open and closed loop control systems.
- Stability analysis in time and frequency domain.
- Controllers and compensators to meet the desired specifications.
- State variable techniques.

CO2. Analyze
- Time and frequency response of second order systems.
- Stability analysis using root-locus, bode and Nyquist plots.
- Controllers and compensators to meet the desired response.
- State space representation from transfer function.

CO3. Design a compensator to meet the design specifications of control system.
CO4. Solve problems pertaining to control systems to provide feasible solutions in real time environment.
CO5. Select appropriate techniques to solve control system problems in relevance to industry.
CO6. Apply the conceptual knowledge of control systems in domestic and industrial applications.

II B. Tech. – II Semester
(16BT30401) ELECTRONIC CIRCUIT ANALYSIS AND DESIGN

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on Electronic Devices and Circuits.
COURSE DESCRIPTION: Single Stage Amplifiers; Multi-Stage amplifiers; Frequency Response; Feedback Amplifiers; Oscillators; Large Signal Amplifiers; Tuned Amplifiers.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Demonstrate knowledge in
- Single Stage Amplifiers
- Multi Stage Amplifiers.
- BJT Frequency Response.
- Feedback Amplifiers.
- Power Amplifiers.
- Tuned Amplifiers.

CO2. Perform analysis of electronic circuits for meeting de fined specifications.
CO3. Design and develop electronic circuits such as Feedback Amplifiers, Oscillators and Poweramplifiers with given specifications.
CO4. Solve problems pertaining to electronic circuit design.
CO5. Select an Amplifier circuit for a specific electronic sub- system.
CO6. Apply course knowledge to assess societal issues and understand the consequent responsibilities relevant to the professional engineering practice using electronic circuits.

II B. Tech. – II Semester
(16BT41001) INDUSTRIAL INSTRUMENTATION - I

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Sensors and Transducers, Electrical and Electronic Measurements.
COURSE DESCRIPTION: Measurement of Force, Weight, Torque, Pressure, Velocity, Acceleration, Sound and Temperature.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Demonstrate knowledge of construction and working principles of different sensors for use in industrial instruments.
CO2. Identify, formulate and analyze different types of sensors for various industrial applications.
CO3. Design suitable sensors for desired parameter measure ment in industry.
CO4. Solve engineering problems pertaining to measurement of Force, Torque, Velocity, Acceleration, Pressure and Temperature to provide feasible solutions.
CO5. Select appropriate sensor and measuring techniques for the measurement of industrial parameters.

II B. Tech. – II Semester
(16BT41002) LINEAR AND DIGITAL ICs

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Electronic Devices and Circuits, Switching Theory and Logic Design.
COURSE DESCRIPTION: Differential Amplifier; Characteristics of Operational Amplifiers; Linear & Non-Linear Applications of Op-Amp; IC 555 timer and phase locked loops; Application of PLL; A-D & D-A Converters; CMOS and Bipolar Logic Interfacing; HDL with combinational and sequential logic design.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Demonstrate knowledge in
- Op-amp operation and applications.

- Timer & PLL circuits.
- A-D & D-A Converters
- CMOS and Bipolar logic Interfacing.
- HDL design and programming.

CO2. Analyze
- Op-amp based circuits.
- Timers for various circuits.
- Different logic families.

CO3. Design
- Circuits using Op-amps.
- Logic gates using CMOS.
- Combinational and sequential circuits.

CO4. Solve problems in
- Evaluating parameters of Op-amp based circuits.
- Programming of various combinational and sequential logic design.

CO5. Apply appropriate modeling technique to suit IC Design.

CO6. Understand the impact of design and use of Linear and Digital ICs in the development of efficient and cost effective products.

II B. Tech. – II Semester
(16BT30402) **SIGNALS AND SYSTEMS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on Transformation Techniques and Partial Differential Equations.

COURSE DESCRIPTION: Analysis of signals and systems; Representation of signals using Fourier series and Fourier transforms; Time-Domain and Frequency-Domain aspects of signals and systems; concept of convolution and correlation; Sampling and types of sampling; Laplace transform of signals; Z-Transform of sequences.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge in
- Representation of signals and systems.
- Fourier series representation of periodic signals
- Fourier transform of signals
- Convolution and correlation of functions
- Laplace transform
- Sampling Process
- Z-Transform

CO2. Analyze various continuous and discrete time signals and systems in time and frequency domains.

CO3. Develop solutions to stable and causal systems.

CO4. Solve problems pertaining to transforms and signal processing.

CO5. Select and apply appropriate transformation techniques for understanding of the frequency content of signals at the input and output of the systems.

II B. Tech. – II Semester
(16BT40406) **PULSE AND DIGITAL CIRCUITS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Electronic Devices and Circuits, Network Analysis.

COURSE DESCRIPTION: Linear and non-linear Wave shaping circuits; Switching characteristics of Diode and Transistor; Design of multivibrators; Sweep circuits; Sampling and logic gates.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Apply the knowledge in
- Responses of High-pass and low-pass RC circuits for different inputs
- Clipping and clamping operations.

- Multivibrators.
- Methods of generating the Time-base waveforms
- Operating Principles of of Sampling gates
- Realization of logic gates using Diodes and Transistors

CO2. Analyze theperformance of Linear and non-linear Wave shaping Circuits.
CO3. Design and develop different Multivibrator Circuits, Sweep circuits, clipper and clamper circuits.
CO4. Solve engineering problems pertaining to pulse and Digital circuits to provide valid conclusions.
CO5. Apply appropriate techniques to obtain optimum solution in the field of pulse and digital circuits.
CO6. Apply contextual knowledge in pulse and digital circuits to assess propagation delay and power dissipation parameters to the Professional engineering practice for societal use.

II B. Tech. – II Semester
(16BT41031) **ANALOG ELECTRONICS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Courses on Electronic Devices and Circuits, Pulse and Digital Circuits, Electronic Circuit Analysis and Design.
COURSE DESCRIPTION: Diode characteristics; Rectifiers; BJT and FET characteristics; UJT and SCR characteristics; BJT Amplifiers; Non-linear and Linear Wave shaping circuits; Feedback Amplifiers; Design of Multi-vibrator circuits; Power Amplifiers.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Apply the knowledge in
- Diodes-PN Junction Diodes, Zener Diodes, SCR
- Transistors-BJT,FET,UJT
- Feedback amplifiers and oscillators
- Clipping and Clamping Circuits
- RC High Pass and Low Pass Circuits
- Multi-vibrators

CO2. Analyze different types of amplifier, oscillator and pulse circuits.
CO3. Design different types of Electronic circuits like feedback amplifiers, Oscillators, Multi - vibrators, Schmitt Trigger.
CO4. Provide solutions through the design and conduct of experiments, analysis and synthesis.
CO5. Apply biasing technique for design of amplifiers.
CO6. Function effectively as an individual and as a member in a group in the area of analog electronic circuits.
CO7. Communicate effectively in oral and written form in the area of analog electronic circuits.

II B. Tech. – II Semester
(16BT41032) **CONTROL SYSTEMS DESIGN LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: A Course on Control Systems.
COURSE DESCRIPTION: Open and closed loop systems; DC and AC servo motor; stability analysis electrical systems; P, I, D parameters.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Demonstrate knowledge on the effect of feedback and different controllers.
CO2. Develop skills to analyze
- The characteristics of servomotors
- The stability of the system using root-locus bode and Nyquist plots
- The time domain and frequency specifications of second or der system

CO3. Design a transfer function of given model.
CO4. Develop programming skills to solve open and closed loop control systems.
CO5. Select and apply modern tools for solving complex problems in control systems.
CO6. Function effectively as individual and as member in team.
CO7. Communicate effectively both oral and written in relevance to control systems.

II B. Tech. – II Semester
(16BT41033) LINEAR AND DIGITAL ICs LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: A course on Linear and Digital ICs.
COURSE DESCRIPTION: Op-Amp characteristics; Applications of Op-Amp; 555 timer; PLL; Digital logic families and interfacing; Digital IC Applications; Programming of digital IC's in HDL.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Demonstrate knowledge on analog and digital circuits.
CO2. Apply analytical skills to determine the op-amp parameters.
CO3. Design of analog and digital circuits for Linear & Non linear applications.
CO4. Provide valid conclusions through analysis and synthesis of analog and digital circuits.
CO5. Apply appropriate simulation tools for programming of analog and digital circuits.
CO6. Work individually and also in a group to develop applications using linear and digital ICs.
CO7. Communicate effectively with engineering community to design analog circuits.

III B. Tech. – I Semester
(16BT3HS02) MANAGERIAL ECONOMICS AND PRINCIPLES OF ACCOUNTANCY

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —
COURSE DESCRIPTION: Managerial Economics; Demand and Elasticity of Demand; Production Functions; Markets and Pricing Policies; Formation of different types of Business Organizations; Basic concepts of Accounting (Journal, Ledger and Trial balance); Trading Account, Profit and Loss Account and Balance sheet with simple adjustments; Computerized Accounting.
COURSE OUTCOMES: On Successful completion of the course, students will be able to
CO1. Acquire Knowledge in
- Tools and concepts of Micro Economics.
- Basic Principles and concepts of Accountancy.
- Provides life skills for effective utilization of scarce resources.
- Financial Accounting.
- Significance of Economics and Accountancy

CO2. Develop skills in managerial decision making of an organization.
CO3. Apply the Economic theories i.e., Demand, Production, Cost, Markets and Price.
CO4. Develop effective communication in Business and Accounting transactions.
CO5. Ascertain the profitability and soundness of an organization.
CO6. Practice Financial Accounting.

III B. Tech. – I Semester
(16BT51001) BIOMEDICAL INSTRUMENTATION

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A Course on Electrical and Electronic Measurements.
COURSE DESCRIPTION: Human Anatomy & Physiology; Bio-signals; Cardiovascular and Neuro-muscular Instrumentation; Therapeutic Equipment; Advanced Imaging techniques.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Demonstrate knowledge on human anatomy and physiology, ECG, EMG and EEG measuring systems, medical imaging and therapeutic equipment.
CO2. Analyze various bio signals like ECG, EMG, EEG.

CO3. Design and develop suitable interfaces for real time applications in the field of biomedical instrumentation.
CO4. Solve problems related to extraction of bio signals.
CO5. Choose appropriate device to solve biomedical engineering problems.
CO6. Apply ethical principles and commit to professional ethics, responsibilities and norms of the biomedical engineering practice.

III B. Tech. – I Semester
(16BT51002) **INDUSTRIAL INSTRUMENTATION – II**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on Industrial Instrumentation - I.
COURSE DESCRIPTION: Measurement of Flow, Level, Moisture, Viscosity, Density; Electrical and intrinsic safety; Design of signal conditioning circuits.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Demonstrate knowledge of construction and working principles of different instruments used in industry.
CO2. Identify, formulate and analyze different types of instruments for various industrial applications.
CO3. Design suitable sensors and signal conditioning circuits for desired parameter measurement in industrial applications.
CO4. Solve engineering problems pertaining to measurement of Density, Viscosity, Moisture, Flow, Level and signal conditioning circuits to provide feasible solutions.
CO5. Select appropriate sensor and measuring technique for the measurement of industrial parameters.
CO6. Apply the knowledge of safety issues while designing measuring instruments used in industries.

III B. Tech. – I Semester
(16BT51003) **PRINCIPLES OF COMMUNICATIONS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on Signals and Systems**.**
COURSE DESCRIPTION: Fundamentals of Communications; Analog and digital communications - modulation and Demodulation Techniques; Information theory and coding.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Demonstrate fundamental knowledge in
- Elements of communication systems.
- Amplitude, Frequency, and Phase Modulators and Demodulators.
- Data transmission and detection of digital signals.
- Information theory and coding techniques.

CO2. Perform analysis of different modulation techniques and calculate various performance parameters
CO3. Design and develop modulators and demodulators for communication systems.
CO4. Solve engineering problems for feasibility and provide optimal solutions in the area of Analog and Digital Communication Systems.
CO5. Select the appropriate modulation and demodulation techniques for transmission and reception of signals.
CO6. Follow standards while developing the communication systems.

III B. Tech. – I Semester
(16BT60402) DIGITAL SIGNAL PROCESSING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on Signals and Systems.
COURSE DESCRIPTION: Continuous and discrete signals and sequences; systems; DFT and FFT algorithms for the analysis of discrete sequences; design and realization of Digital IIR and FIR filters; DSP processors and architectures.
COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Apply the knowledge of fundamentals in
- Frequency analysis of signals and systems.
- DFT and FFT transforms.
- Analog & Digital Filter Design.
- Digital Filter Realization.
- DSP Processors.

CO2. Analyze numerical and analytical problems of discrete time signals and systems in frequency domain using Transforms.
CO3. Design and develop digital filters to optimize system performance and their realization.
CO4. Interpret and synthesize the response of Digital filters to validate their characteristics.
CO5. Apply appropriate techniques and algorithms to design digital signal processing systems with an understanding of limitations.

III B. Tech. – I Semester
(16BT51004) COMPUTER ORGANIZATION AND ARCHITECTURE

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on Switching Theory and Logic Design.
COURSE DESCRIPTION: Basic structure of computers; computer arithmetic operations; register transfer and organization; 8085 architecture, programming and interfacing of 8085 microprocessor; Concepts of micro programmed control, pipelining and memory system.
COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge on
- Internal organization of a computer.
- Various memories and hierarchy in a computer.
- Architecture, instruction set and addressing modes of 8085 microprocessor.

CO2. Analyze the performance of a computer.
CO3. Design microprocessor based systems for real time applications.
CO4. Solve engineering problems and arrive at solutions by developing embedded products.
CO5. Choose appropriate hardware, algorithm and program using suitable IDE.
CO6. Practice professional engineering to deliver efficient and cost effective embedded based products for society.

III B. Tech. – I Semester
(16BT51241) OBJECT ORIENTED PROGRAMMING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —
COURSE DESCRIPTION: Introduction of Java, Classes and Objects; Inheritance, Packages, Interfaces; Exception handling, Multithreading; Event handling, AWT, Collection Classes; Applets, Servlets.
COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge on:
- Object Oriented Programming concepts - classes, objects, inheritance, polymorphism, encapsulation and abstraction.

- Packages, interfaces, multithreading, exception handling, event handling.

CO2. Analyze complex engineering problems using object oriented concepts.
CO3. Design and develop reusable code to provide effective solutions for real world problems using inheritance and polymorphism.
CO4. Apply AWT and Applets to create interactive Graphical User Interfaces.
CO5. Use advanced programming languages to develop web applica tions.
CO6. Build Java Applications suitable for societal requirements.

III B. Tech. – I Semester
(16BT31501) OPERATING SYSTEMS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —
COURSE DESCRIPTION: Operating systems operations, scheduling; Critical section problem, deadlocks; Paging, segmentation; File Concept, Disk scheduling; I/O interface; concepts of protection.
COURSE OUTCOMES: On Successful completion of the course, students will be able to

CO1. Demonstrate knowledge on Operating system operations, services, file management, disk management, I/O management and protection.
CO2. Identify the functionality involved in process management concepts like scheduling and synchronization.
CO3. Design models for handling deadlock and perform memory management.
CO4. Synthesize and apply programming API's to perform Process management.
CO5. Use appropriate protection tools to provide access control to Operating system users.

III B. Tech. – I Semester
(16BT60502) SOFT COMPUTING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —
COURSE DESCRIPTION: Concepts on Soft Computing Techniques; Artificial Neural Networks; Supervised Learning; Unsupervised Learning; Fuzzy logic; Genetic Algorithms.
COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge in
- Artificial Neural Networks
- Supervised Learning Networks
- Unsupervised Learning Networks
- Fuzzy sets, relations and measures
- Genetic Operators

CO2. Analyze neural network architectures, Fuzzy systems and Genetic algorithms.
CO3. Design soft computing solutions for real life computational problems.
CO4. Use soft computing techniques to solve complex computational problems.
CO5. Create algorithms using soft computing techniques.
CO6. Apply contextual knowledge to solve problems related to societal issues like Business Intelligence, Forecasting.

III B. Tech. – I Semester
(16BT51031) INDUSTRIAL INSTRUMENTATION LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: A Course on Industrial Instrumentation -II.
COURSE DESCRIPTION: Measurement of Force, Torque, Velocity, Acceleration, Pressure, Temperature, Flow Level, Moisture, Viscosity, Density; Electrical and intrinsic safety.

COURSE OUTCOME: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge for measurement of different industrial process parameters.

CO2. Analyze the functionality of different types of instruments used for various industrial applications.

CO3. Design suitable signal conditioning circuits for measuring instruments.

CO4. Solve engineering problems pertaining to measurement of industrial process parameters to provide feasible solutions.

CO5. Select appropriate sensor and measuring technique for the measurement of industrial parameters.

CO6. Practice professionalism in engineering and deliver efficient & cost effective, maintainable products by understanding the needs of society, safety for sustainable development.

CO7. Follow ethics while developing industrial instruments.

CO8. Function effectively as an individual and work as part of a group in developing industrial instruments.

CO9. Communicate effectively among people about the effects of materials, mechanical design on electrical parameters and vice versa.

III B. Tech. – I Semester
(16BT51032) SIGNAL PROCESSING LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: A course on Digital Signal Processing.

COURSE DESCRIPTION: Basics of programming using any simulation software; Operations on Signals & sequences; Convolution and correlation; Pole-zero mapping; Power Spectral Density; Filter designing; Study architecture of DSP processor kits and performing basic operations on it; Real-time signal processing like digital filter design (FIR, IIR) and FFT implementation using DSP processor kits.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate fundamental Knowledge in simulation of basic concepts and algorithms such as convolution, Correlation, Digital filters, pole-zero mapping, DFT and FFT in signal processing.

CO2. Analyze signals and Sequences using various processing techniques like Gaussian noise generation, DFT and FFT implementation.

CO3. Design and simulation of IIR and FIR filters.

CO4. Analyze various filter characteristics and interpret data from signal processing systems to provide valid conclusions.

CO5. Use appropriate simulation and hardware tools to solve the complex engineering problems in the domain of signal processing.

CO6. Function effectively as individual and as member in a team to perform operations on signals and design filters.

CO7. Communicate effectively in verbal and written forms while processing signals and designing filters.

III B. Tech. – I Semester
(16BT4HS31) SOFT SKILLS LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: A course on English Language Lab.

COURSE DESCRIPTION: This course covers Body Language; Assertiveness; Goal Setting; Creative Thinking; Interpersonal Skills; Team Work; Conflict Management; Etiquette; Report Writing; Group Discussions; Interviewing Skills.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Acquire knowledge in

- Goal Setting
- Creative Thinking
- Leadership Skills and
- Team Work

CO2. Analyse the situations and develop skills for
- Body Language
- Personality Development and
- Stress Management

CO3. Apply the techniques of soft skills in a problem situation enhanced through multimedia software.
CO4. Function effectively as an individual and as a member in diverse teams.
CO5. Communicate effectively in public speaking in formal and informal forums.

III B. Tech. –II Semester
(16BT5HS01) MANAGEMENT SCIENCE

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:—
COURSE DESCRIPTION: Concepts of Management; Environmental Scanning; Concepts Related to Organization; Operations Management; Work Study; Statistical Quality Control; Inventory Management; Marketing; Human Resource Management; Project Management; Project Crashing; Entrepreneurship; Contemporary Management Practices.
COURSE OUTCOMES: On successful completion of the course, students will be able to:
CO1. Demonstrate the concepts of operations management, human resources management, project management and contemporary management practices in managerial context.
CO2. Identify and analyse management problems in the business organizations reaching substantiated conclusions using principles of management.
CO3. Design appropriate organization structure for meeting the needs of the organization with consideration of the employees of the organization.
CO4. Competently employ broad based analytical tools for decision making, system design, analysis and performance.
CO5. Provide solution to organizations for sustainable development.
CO6. Apply knowledge of engineering and management principles to manage the projects in multidisciplinary environments.

III B. Tech. – II Semester
(16BT61001) ARM PROCESSORS AND PIC MICROCONTROLLERS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on Switching Theory and Logic Design.
COURSE DESCRIPTION: ARM Processors architecture, Programming, PIC microcontroller architecture, Interrupts and timers of PIC microcontroller, Interfacing.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Demonstrate knowledge in ARM Processors architecture, PIC architecture, Pin out, Instruction set.
CO2. Analyze various design issues regarding usage of on chip resources and Low power modes.
CO3. Design embedded systems using ARM Processors and PIC microcontrollers to suit market requirements.
CO4. Solve engineering problems and arrive at solutions in designing embedded Systems.
CO5. Use on-chip resources to design embedded systems with an understanding of limitations.
CO6. Practice professional engineering to deliver efficient and cost effective microcontroller based products.

III B. Tech. –II Semester

(16BT61002) **PROCESS CONTROL INSTRUMENTATION**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Control Systems, Sensors and Transducers.
COURSE DESCRIPTION: Mathematical modeling of processes; different types of controllers; characteristics of controllers; design of controllers; tuning of controllers; characteristics of control valves; multi loop controllers.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Demonstrate knowledge on process control terminology and understand about Single loop and multi loop control systems.
CO2. Analyze the dynamic behavior of a process by developing the mathematical model.
CO3. Design and tune the PID controllers.
CO4. Solve the problems by interpreting the data of a process control system.
CO5. Select and suggest to use appropriate final control elements for different process industries.
CO6. Apply the process control concepts to real time industrial and domestic applications.

III B. Tech. – II Semester

(16BT60305) **HYDRAULICS AND PNEUMATICS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on Industrial Instrumentation - II.
COURSE DESCRIPTION: Basic fluid power system; Hydraulic components and its use; Hydraulic circuits and its application; Fundamentals of pneumatics; Pneumatic components and its use; Pneumatic circuits; application; Design of hydraulic and pneumatic systems for various applications; Electro Pneumatics; Logic gates.
COURSE OUTCOMES: On successful completion of this course, students will be able to
CO1. Demonstrate the basic mechanism of fluid power systems and automation.
CO2. Identify and analyze engineering problems in automated environment.
CO3. Design the pneumatic and hydraulic circuits for domestic and industrial problems.
CO4. Investigate the issues related to the design and manufacture of pneumatic and hydraulic systems.
CO5. Use modern tools available in automation to enhance the productivity.
CO6. Deploy the best way of implementing the automation to have eco-friendly environment and sustainable development.

III B. Tech. – II Semester

(16B50308) **MECHATRONICS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on Industrial Instrumentation – II.
COURSE DESCRIPTION: Mechatronics system; Sensors; Transducers; Actuating systems; DC Motors; Micro controller; Signal Conditioning; Programmable Logic Controllers; Programmable Motion Controllers; Design Approach; Case Studies.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Demonstrate the knowledge on integrative nature of Mechatronics and different components of mechatronics systems.
CO2. Select the appropriate sensors and actuators required for a system by identifying and analyzing real life engineering problems thoroughly.
CO3. Design signal conditioning circuits for mechatronics systems and establish the controlling methods required for that system to meet the specified needs.
CO4. Select, and apply appropriate programmable motion con troller techniques and adaptive controllers to complex mechatronics systems with an understanding of the limitations.

CO5. Exhibit the knowledge on design approach, keeping in view of environmental contexts, to reflect the sustainable devel opment.
CO6. Perform under a standard of professional behavior that requires adherence to the highest principles of ethical conduct.

III B. Tech. –II Semester
(16BT60341) **THERMODYNAMICS AND FLUID MECHANICS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A Course on Engineering Physics.
COURSE DESCRIPTION: Thermodynamic system; Energy interactions; Work transfer and Heat Transfer in flow and non- flow systems; Laws of thermodynamics; Entropy; Air cycles; Refrigeration; Properties of Fluids; Pressure Measurements; Types of flow; One-dimensional steady flow energy & momentum Equations; Flow measurements; Hydraulic turbines and its performance; Pumps.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Demonstrate the knowledge on the concepts of thermodynamic, Heat transfer, refrigeration and fluid flow systems.
CO2. Identify, formulate and analyze various processes in thermodynamic, Heat transfer, refrigeration and fluid flow systems.
CO3. Design the thermodynamic and fluid flow systems to achieve the required physical process parameters.
CO4. Conduct investigations and address the complex problems on thermodynamics and fluid flow systems.
CO5. Use dimensional analysis tool to develop empirical formulae for the fluid flow and heat transfer systems.
CO6. Use standard engineering norms and practices in developing thermodynamic and fluid systems for societal requirements.

III B. Tech. – II Semester
(16BT61003) **INSTRUMENTATION SYSTEM DESIGN**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on Industrial Instrumentation - II.
COURSE DESCRIPTION: Field instruments; Switches, Pushbuttons, Keyboards; Control valves: application and selection; Pumps and control elements; Reliability.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Demonstrate knowledge on
- Field Instruments
- Switches and Pushbuttons
- Control valves
- Pumps and control elements
- Flow regulators

CO2. Analyze the functionality of field instruments, control elements & regulators.
CO3. Design field Instruments such as Orifice, Rotameter, Bourdon tube, PID controllers and measuring circuits for RTD, Thermocouple, D/P transmitters.
CO4. Provide solution to problems & design requirements related to instrumentation systems.
CO5. Select appropriate field instrument to furnish an Instrumentation system.
CO6. Provide optimal instrumentation solution for societal and indus trial use.

III B. Tech. – II Semester
(16BT70309) **INDUSTRIAL ROBOTICS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A Course on Matrices and Numerical Methods.
COURSE DESCRIPTION: Introduction of Robots classifications; Components; Robot drive mechanisms; Mechanical transmission methods aided in functioning of robots; Forward kinematics; inverse kinematics; Manipulator dynamics; Trajectory planning and avoidance of obstacles; Robot programming; Robot Application in Industry; Future Application and Challenges and Case Studies.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Demonstrate the knowledge on concepts of robot, Kinematics and dynamics, Trajectory planning and programming of robot.
CO2. Identify, analyze and interpret various methods and review the contemporary problems of robotics.
CO3. Optimize various robotic configuration parameters to analyze the reverse and forward kinematics.
CO4. Investigate the performance parameters on the complex robotic designs.
CO5. Apply appropriate functional techniques, resources, and programming tools to robotic engineering activities.
CO6. Consider safety issues in designing robots for societal applications.

III B. Tech. – II Semester
(16BT70404) **ADVANCED DIGITAL SIGNAL PROCESSING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A Course on Digital Signal Processing
COURSE DESCRIPTION: Digital filter banks; Parametric and Non-Parametric Power Spectrum Estimation methods; Computationally efficient algorithms; Applications of DSP.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Apply knowledge in
- Filter banks and Wavelets
- Linear Prediction
- Efficient power Spectral Estimation Techniques.
- Applications of Multirate signal processing

CO2. Analyze complex engineering problems in the Power Spectrum Estimation, Sampling rate conversion and Linear Prediction.
CO3. Design optimum filters, multirate DSP systems and computationally efficient DSP algorithms.
CO4. Solve Engineering problems pertaining to Digital Signal Processing.
CO5. Apply DSP Algorithms, and algorithms related to Forward and Backward Predictionin digital system design with an understanding of the limitations.
CO6. Apply computationally efficient DSP Algorithms, Optimum Filters and perfect reconstruction filters to address societal issues in multirate signal processing and communications.

III B. Tech. – II Semester
(16BT61004) **ELECTROMAGNETIC THEORY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Multi-Variable Calculus and Differential Equations, Engineering Physics.
COURSE DESCRIPTION: Vector - calculus; Static Electric and Magnetic fields; time varying electromagnetic Fields; Maxwell's equations; Wave equations and wave propagation characteristics; electromagnetic interference and compatibility.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge on
- Coulomb's Law, Gauss's Law, Biot-Savart's Law and Ampere's Law
- Static electric and magnetic fields
- EM Wave equations and propagation characteristics.
- Polarization of wave, Reflection and Refraction of Plane Waves
- Electromagnetic Interference and Compatability in the field of Electromagnetics

CO2. Analyze the electric and magnetic fields in different distributions.

CO3. Design and develop solutions for different boundary condition problems in electromagnetics.

CO4. Solve engineering problems pertaining to Electrostatics, magnetostatics, electromagnetic wave theory, interference and compatability to provide valid conclusions.

CO5. Apply appropriate techniques, resources to complex engineering activities for modeling electrostatic discharge, grounding, and earthing and electromagnetic compatability based systemswith understanding of limitations.

CO6. Apply course knowledge to assess societal issues and understand the consequent responsibilities relevant to the EMI and EMC standards.

III B. Tech. –II Semester
(16BT61005) OPTO-ELECTRONICS AND LASER INSTRUMENTATION

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on Industrial Instrumentation-II.

COURSE DESCRIPTION: Optical fiber; components of optical fiber; fiber optic Sensors; Industrial and medical applications of laser.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge about
- Types of optical fiber, components of optical fiber.
- Measurement of temperature, pressure, strain using fiber optic sensors.
- Operation of laser, Industrial and biomedical applications of laser.
- Holography and optoelectronic modulators.

CO2. Analyze the optical parameters of various types of fibers and their characteristics.

CO3. Design fiber optic sensors for measurement of pressure, temperature, level and velocity.

CO4. Apply different Lasers and optical fibers for real time medical and weather forecasting.

CO5. Use advanced lasers in the field of material processing and biomedical.

CO6. Provides engineering solutions by using lasers and optical fibers to the society.

III B. Tech. II Semester
(16BT60207) ADVANCED CONTROL SYSTEMS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on Control systems.

COURSE DESCRIPTION: Design of compensators and controllers, state space, canonical forms, controllability and observability, describing function, phase plane analysis, Lyapunov's stability analysis, Full order observer and reduced order observer.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge on
- State space analysis.
- Various compensators and controllers.
- Stability in the sense of Lyapunov.
- Full and reduced order observers in state space analysis.

CO2. Analyze the stability of nonlinear system using
- Describing function approach.
- Phase plane analysis.
- Lyapunov's method.

CO3. Design suitable compensator and controllers using root locus and bode plot.

CO4. Evaluate stability of systems using pole placement and Lyopunov method to provide valid solutions.
CO5. Select appropriate techniques for analyzing the stability of the system.
CO6. Apply the conceptual knowledge of advanced control systems in relevance to industry and society.

III B. Tech. II Semester
(16BT50403) **VLSI DESIGN**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Switching Theory and Logic Design, Linear and Digital ICs.
COURSE DESCRIPTION: CMOS Technology; Stick Diagrams and Layouts; Subsystem design; Programmable Interconnect structures; Synthesis and Test Principles.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Demonstrate knowledge in
- Understanding the Fabrication Process of MOS Transistors
- Electrical properties of CMOS Circuits
- Designing Static Combinational and Sequential logic at transistor level, including Mask layout.
- Estimating and optimizing combinational RC Circuit delay using RC delay models and logical effort.
- Design methodology and tools.
- Test Principles.

CO2. Analyze characteristics and performance of CMOS circuits.
CO3. Design solutions for subsystems to compensate tradeoff between area, speed and power requirements.
CO4. Synthesize and extract information from designs and layouts for optimum solutions.
CO5. Select and apply appropriate designs to overcome the limitations of CMOS devices for high speed applications.
CO6. Assess test strategies for design and development of Integrated Circuits for societal needs.

III B. Tech. II Semester
(16BT61006) **AIRCRAFT INSTRUMENTATION**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITE: A Course on Industrial Instrumentation-II.
COURSE DESCRIPTION: Aircraft Instruments; Air Data Instruments; Gyroscopic Instruments; Engine Instruments and Electronic Flight Instrumentation System.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Demonstrate knowledge about
- Aircraft instruments
- Air data instruments
- Gyroscopes
- Engine instruments
- Electronic Flight Instrumentation system

CO2. Analyze the parameters measured in aircraft system.
CO3. Design measurement systems pertaining to various parameters measurement in aircraft.
CO4. Solve Engineering problems pertaining to various parameters measurement in aircraft.
CO5. Select appropriate technique for measurement of parameters in the aircraft.

III B. Tech. II Semester
(16BT61007) **TELEMETRY AND TELECONTROL**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A Course on Principles of Communications.
COURSE DESCRIPTION: Different Telemetry Principles; Frequency and Time-division Multiplexed Systems; Satellite Telemetry; Optical Telemetry and Telecontrol Methods.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Demonstrate knowledge on different Telemetry Principles, Satellite Telemetry and Optical Telemetry.
CO2. Critically analyze the Telecontrol requirements to meet the specifications.
CO3. Design transmitter and receiver circuits for data transmission.
CO4. Analyze and solve errors during transmission.
CO5. Apply appropriate telemetry principles for data transmission in real time.

III B. Tech. II Semester
(16BT61031) **ARM PROCESSORS AND PIC MICROCONTROLLERS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: A course on ARM Processors and PIC Microcontrollers.
COURSE DESCRIPTION: Assembly language Programming using ARM processors; Interfacing standard peripherals & Programming-DAC, Stepper Motor, ADC, DAC, Keyboard, Seven Segment Display.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Demonstrate knowledge on instruction set, addressing modes, of ARM processors and PIC microcontrollers.
CO2. Analyze various programming alternatives, interfacing methods & usage of various on-chip resources like Timers, Interrupts, ADC, DAC, and Stepper Motor to build stand alone systems.
CO3. Design and develop microcomputer and microcontroller based system to suit market requirements.
CO4. Solve engineering problems and arrive at solutions in designing embedded Systems.
CO5. Apply resources, and tools for modeling microcomputer and microcontroller based systems with understanding of limitations.
CO6. Follow professional ethics in the design of embedded products.
CO7. Function effectively as an individual, and as a member in developing embedded products.
CO8. Communicate effectively in both written and verbal form in the area of processors and microcontrollers.

III B. Tech. II Semester
(16BT61032) **PROCESS CONTROL LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: A course on Process Control Instrumentation.
COURSE DESCRIPTION: Tuning methods, Characteristics of control valve, Response of controllers for different processes like flow, temperature, level etc., Design of controllers.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Demonstrate knowledge on process equipments.
CO2. Develop the transfer function of the process and analyze the performance of the process in terms of time domain specifications.
CO3. Design electronic PID controller and tune its controller parameters using various tuning methods.
CO4. Give valid conclusions by analyzing the response of flow, temperature, level process.

CO5. Use appropriate hardware/software tools to conduct the process control experiments to measure process parameters.
CO6. Apply concepts of process control for solving real-time issues.
CO7. Execute the experiment individually or in a team in the area of process control.
CO8. Communicate effectively in verbal and written forms in the field of process control.

III B. Tech. II Semester
(16BT61033) **SEMINAR**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
	100	100	-	-	-	2

PRE-REQUISITES: —
COURSE DESCRIPTION: Identification of topic for the seminar; Literature survey; Performing critical study and analysis of the topic identified; Preparation of report and presentation.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Demonstrate in-depth knowledge on the seminar topic.
CO2. Analyze critically, the concepts relevant to the seminar topic.
CO3. Undertake investigation of issues related to seminar topic providing valid conclusions.
CO4. Apply techniques to consolidate the solutions relevant to the seminar topic.
CO5. Comprehend societal issues in the context of seminar topic.
CO6. Understand environmental issues in the context of seminar topic.
CO7. Understand ethical issues in the context of seminar topic.
CO8. Function effectively as individual on the chosen seminar topic.
CO9. Develop communication skills, both in oral and written form, for preparing and presenting seminar report.
CO10. Engage in lifelong learning to improve knowledge and competence in the chosen area of seminar.

IV B. Tech. – I Semester
(16BT71001) **ANALYTICAL INSTRUMENTATION**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Engineering Chemistry, Engineering Physics, Sensors and Transducers, Electrical and Electronic Measurements.
COURSE DESCRIPTION: Different types of Liquid and Gas analyzers, Spectroscopic techniques, chromatography, environmental pollution and nuclear radiation detectors.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Demonstrate knowledge of gas/liquid analyzers, radia tion detectors, different Chromatography Techniques, environmental pollution and nuclear radiation detectors.
CO2. Analyze the sample by using various analytical instruments.
CO3. Provide valid conclusions by analyzing the different chemical samples using spectrophotometer and chromatography.
CO4. Use appropriate method of analyzer and spectrometer to evaluate the sample.
CO5. Use various analytical instruments like analyzers, spectrophotometer and chromatography to measure the elements of a compound for industrial applications.
CO6. Use environmental pollution monitoring devices to compliance with environmental issues.

IV B. Tech. – I Semester
(16BT71002) **BIOMEDICAL SIGNAL PROCESSING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Digital Signal Processing, Biomedical Instrumentation.
COURSE DESCRIPTION: Analysis of Non Stationary signals, noise & artifact removal, Advanced Signal processing techniques, Event Detection, Spectral Analysis.
COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate an understanding of biomedical signals and identify the need for Biomedical signal analysis.
CO2. Identify physiological interferences and artifacts affecting the biomedical signals and apply various filtering mechanisms for the enhancement of signals.
CO3. Apply advanced signal processing techniques for the analysis of biomedical signals
CO4. To analyze and detect various events and waveform complexities involved in EEG & ECG signals
CO5. Choose appropriate hardware and IT tools to program the devices to solve Biomedical Engineering Problems.
CO6. Perform the spectral analysis of biomedical signals as per societal needs.

IV B. Tech. – I Semester
(16BT71003) **INDUSTRIAL AUTOMATION**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on Switching Theory and Logical Design.
COURSE DESCRIPTION: Basics of Programmable Logic Controller (PLC); PLC Programming Languages; PLC intermediate Functions ; Concepts of SCADA; Concepts of DCS; Communication networks for DCS; Industrial Data Networks.
COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge on Programmable Logic Controller Architecture, DCS and SCADA.
CO2. Analyze various methods of developing algorithms for PLC, SCADA and DCS.
CO3. Design suitable accessories in process automation.
CO4. Analyze the information to provide effective solution for real time problems in automation of process industries.
CO5. Select appropriate techniques/tools for providing Automation.
CO6. To follow ethics while selecting the standards and protocols in industrial automation.

IV B. Tech. – I Semester
(16BT50501) **COMPUTER NETWORKS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —
COURSE DESCRIPTION: Introduction to Computer Networks; The Physical Layer; The Data Link Layer; The Medium Access Control Sublayer; The Network Layer; The Transport Layer; The Application Layer.
COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge on:
- Functionalities of Various OSI and TCP/IP layers
- 3G Mobile phone networks, 802.11
- TCP,UDP and SMTP

CO2. Analyze the issues related to data link, medium access and transport layers by using channel allocation and connection management schemes.
CO3. Design and compute subnet masks and addresses for networking requirements.
CO4. Solve problems related to Flow control, Error control, congestion control and Network Routing.

CO5. Apply Network Standards - 802.3 and 802.11 for developing computer Networks.
CO6. Assess the impact of wired and wireless Networks in the context of societal applications like VoIP, Multi-user Network Games, Internet of Things.

IV B. Tech. – I Semester
(16BT71004) **AUTOMOTIVE INSTRUMENTATION**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A Course on Industrial Instrumentation-II.
COURSE DESCRIPTION: Automobile engines; Combustion process in engines; Sensors in automotive systems; Safety, Comfort and convenience systems.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Demonstrate knowledge about
- Operation of automotive Engine systems.
- Combustion process of automotive engine systems
- Automotive sensors
- Safety, Comfort and Convenience systems

CO2. Analyze various parameters measured using automotive sensors.
CO3. Design measurement systems pertaining to various parameters of automotive systems.
CO4. Solve Engineering problems pertaining to parameters measurement using automotive sensors to provide valid conclusions.
CO5. Select appropriate technique for the measurement of parameters of an automotive system.

CO6. Apply contextual knowledge to ensure safety, comfort and convenient automotive systems to meet societal needs.

IV B. Tech. – I Semester
(16BT71005) **COMPUTER CONTROL OF PROCESS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on Process Control Instrumentation.
COURSE DESCRIPTION: Analysis of discrete state variable system identification techniques; direct discrete design techniques; advanced control strategies used in industries; Adaptive Control.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Demonstrate knowledge on Z – Transform and modified Z - Transform of Sampled Data system.
CO2. Analyze various control strategies and identify mathematical model for various systems.
CO3. Design suitable accessories to make control strategies used in Industries.
CO4. Analyze the information to provide effective solution for real time problems of adaptive control methods.
CO5. Select appropriate techniques/tools for validation between continuous and discrete system.
CO6. Follow standards and protocols while designing various models in industries.

IV B. Tech. – I Semester
(16BT71006) **INDUSTRIAL ELECTRONICS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on Electronic Devices and Circuits.
COURSE DESCRIPTION: Silicon controlled rectifier (SCR) and its applications in power control; Electronic timers; Welding; High frequency heating; Ultrasonic generation and applications; Computer Numeric Control.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge in
- SCR operation and characteristics
- Electronic timers
- Electric welding
- Dielectric heating
- Ultrasonic wave generation

CO2. Analyze the performance of power supplies and power control circuits.
CO3. Design power control circuits and power supplies using SCRs and ICs.
CO4. Solve power control and power supply problems.
CO5. Apply appropriate techniques for switching the power supplies to get the desired output and use modern tools for automation.
CO6. Use SCRs for power control, and design power supplies for societal needs.

IV B. Tech. – I Semester
(16BT71007) INSTRUMENTATION IN PETROCHEMICAL INDUSTRIES

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Process control Instrumentation, Engineering Chemistry.
COURSE DESCRIPTION: Petroleum Processing; Measurement and unit operations; Control Loops of Petroleum Industry and Chemicals from Petroleum Industry.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Demonstrate knowledge on different oil recovery methods, oil gas separation and its Processing.
CO2. Analyze different extracts from petroleum refineries.
CO3. Provide valid conclusions of different real time petroleum products by interpreting data from various distillation techniques.
CO4. Use modern instruments for analysis and processing of petro chemical products.
CO5. Practice petrochemical Engineering in such a way to protect environment from Pollution.
CO6. Follow ethical procedures while practicing petrochemical engineering.

IV B. Tech. – I Semester
(16BT71008) INTELLIGENT CONTROL

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:—
COURSE DESCRIPTION: Neural Networks for Modeling and Control; ANN Structures and Online Training Algorithms; Fuzzy Logic for Modeling and Control; Hybrid Control Schemes; Applications of intelligent systems.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Demonstrate knowledge on the Computer simulation of intelligent control systems to evaluate the performance.
CO2. Analyze neural network, fuzzy logic and hybrid control schemes.
CO3. Design neural network, fuzzy logic and hybrid control for engineering applications.
CO4. Solve the problems pertaining to neural network, fuzzy logic and hybrid control schemes and provide valid conclusions for real time applications.
CO5. Select appropriate neural network and fuzzy logic control techniques for modeling real time applications with an understanding of the limitations.
CO6. Follow ethical standards while using the algorithms to train the systems for industries.

IV B. Tech. – I Semester
(16BT71009) **POWER PLANT INSTRUMENTATION**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A Course on Industrial Instrumentation-II.
COURSE DESCRIPTION: Different methods of power generation; Instrumentation and control in water and air-fuel circuit; Turbine monitoring and control; Power plant maintenance.
COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge about
- Different methods of power generation.
- Measurement and control in water and air-fuel circuit
- Turbine monitoring and Control
- Power plant management

CO2. Analyze the various parameters like temperature, pressure, level measured in power plant.
CO3. Design measurement system for the measurement of process parameters in power plant.
CO4. Solve Engineering problems pertaining to process parameters measurement and control circuits in power plant to provide valid conclusions.
CO5. Select appropriate technique for the measurement of process parameters in the power plant.
CO6. Apply safety measures during calibration and maintenance of instruments in power plant to meet societal needs.

IV B. Tech. – I Semester
(16BT71010) **SYSTEM DESIGN USING MICROCONTROLLERS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on ARM Processors and PIC Microcontrollers.
COURSE DESCRIPTION: System design approaches; MSP430 Architecture; Instruction Set; Programming; Communication interfaces, Arduino, Interfacing using Arduino.
COURSE OUTCOMES: On successful completion of this course, students will be able to

CO1. Demonstrate knowledge in Arduino, MSP430 Architecture, Pin out, Instruction set.
CO2. Analyze various design issues regarding usage of on chip resources, Low power modes.
CO3. Design embedded systems using Arduino microcontrollers to suit market requirements.
CO4. Solve engineering problems and arrive at solutions in designing Embedded Systems to support interconnectivity.
CO5. Use on-chip resources and appropriate software tools to design networked embedded systems with an understanding of limitations.
CO6. Follow ethics by applying standards and protocols in embedded product development.

IV B. Tech. – I Semester
(16BT6HS01) **BANKING AND INSURANCE**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE- REQUISITES: —
COURSE DESCRIPTION: Origin of Banking; Functions of Banking; Role & Functions of RBI; Bank-Customer Relationship; Deposit and Loan Services of Banks; Banking Procedures; Electronic Payment Mechanisms; Business Models; Concepts of Risk and Uncertainty; Fundamentals of Insurance; Principles of Insurance; Essentials of Insurance Contracts; Insurance players in India.
COURSE OUTCOMES: On Successful completion of the course, students will be able to

CO1. Demonstrate Knowledge in
- Tools and concepts of Banking and Insurance.
- Basic Principles and concepts of Insurance and Banking.
- e-fund transfers, e-payments and e-business models.

CO2. Develop skills in providing solutions for
- Online banking and e – payments.
- Risk Management through insurance benefits the society at large.
- Money management by leveraging on technology, banking and insurance services.

CO3. Exhibit conceptual soundness about banking and insurance, this would contribute to more employment opportunities.

CO4. Provide life skills for effective utilization of Banking and Insurance facilities.

IV B. Tech. – I Semester
(16BT6HS02) BUSINESS COMMUNICATION AND CAREER SKILLS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on Technical English.

COURSE DESCRIPTION: Nature and Scope of Communication; Corporate Communication; Writing Business Documents; Careers and Resumes; Interviews.

COURSE OUTCOMES: On Successful completion of the course, students will be able to

CO1. Demonstrate knowledge in
- Corporate Communication
- Main Stages of Writing Messages
- Career Building

CO2. Analyze the possibilities and limitations of language in
- Communication Networks
- Crisis Management/Communication

CO3. Design and develop the functional skills for professional practice in
- Business Presentations & Speeches

CO4. Apply written and oral communication techniques in preparing and presenting various documents in technical writing.

CO5. Function effectively as an individual and as a member in diverse teams.

CO6. Communicate effectively with the engineering community and society in formal and informal situations.

IV B. Tech. – I Semester
(16BT6HS03) COST ACCOUNTING AND FINANCIAL MANAGEMENT

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Scope, Objectives and Elements of cost Accounting; Cost Sheet and Tender quotations; Variance Analysis: Material variances, Labor variances; Meaning and Scope, Liquidity, Profitability Ratios: concept of Risk and Return on Investment.

COURSE OUTCOMES: On Successful completion of the course, students will be able to

CO1. Acquire Knowledge in
- Elements of Costing.
- Basic concepts of Financial Management.
- Risk and Return
- Significance of Cost Accountancy
- Behavioral Finance

CO2. Develop skills in
- Material, Labor, Overheads control.
- Excellence and ability to minimize the cost of the organization

C03. Develop effective Communication in Cost control and Financial Management.

CO4. Provide solutions for effective investment decisions.

IV B. Tech. – I Semester

(16BT6HS04) ENTREPRENEURSHIP FOR MICRO, SMALL AND MEDIUM ENTERPRISES

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Introduction to Entrepreneur Development; Idea generation and formation of Business Plan; Micro and Small Enterprises; Institutional Finance and Support to Entrepreneur; Woman Entrepreneurship.

COURSE OUTCOMES: On Successful completion of the course, students will be able to

CO1. Acquire Knowledge in
- Schemes and institutions encouraging entrepreneurship.
- Basic Principles and concepts of Accountancy.
- Significance of entrepreneurship.

CO2. Develop skills in providing solutions for
- Personal excellence through financial and professional freedom.
- Women entrepreneurship serving as contrivance in societal development

CO3. Develop Critical thinking and evaluation ability.

CO4. Widens knowledge and build up attitude towards trouble shooting.

CO5. Demonstrate business acumen.

IV B. Tech. – I Semester

(16BT6HS05) FRENCH LANGUAGE (La Langue Francais)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Oral communications; Basic grammar; advanced grammar; basic writing; Business French (La Francais Commercial)

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge in
- Process of communication
- Modes of listening
- Paralinguistic features
- Skimming and Scanning
- Elements of style in writing

CO2. Analyze the possibilities and limitations of language, understanding
- Barriers to Communication
- Barriers to Effective Listening
- Barriers to Speaking
- Formal and metaphorical language

CO3. Design and develop language skills for professional practice.

CO4. Apply basic writing skills in writing Emails and understanding wide range of technical terminologies.

CO5. Understand French culture and civilization.

CO6. Communicate effectively with the native French in day to day situation.

IV B. Tech. – I Semester
(16BT6HS06) **GERMAN LANGUAGE (Deutsch alsFremdsprache)**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —
COURSE DESCRIPTION: Oral communication; Basic grammar; Advanced grammar; Basic writing; Berufsdeutcsch (Business German)
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Demonstrate knowledge in
- Process of communication
- Modes of listening
- Paralinguistic features
- Skimming and Scanning
- Elements of style in writing

CO2. Analyze the possibilities and limitations of language, understanding
- Barriers to Communication
- Barriers to Effective Listening
- Barriers to Speaking
- Formal and metaphorical language

CO3. Design and develop language skills for professional practice.
CO4. Apply basic writing skills in writing Emails and understanding wide range of technical terminologies.
CO5. Understand German culture and civilization.
CO6. Communicate effectively with the native German in day to day situation**.**

IV B. Tech. – I Semester
(16BT6HS07) **INDIAN CONSTITUTION**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —-
COURSE DESCRIPTION: Elements, functions and functionaries according to Indian Constitution, understanding for better professional practice and good citizenry.
COURSE OUTCOMES: On Successful completion of the course, students will be able to
CO1. Gain knowledge in
- Parliamentary proceedings, laws, legislature, administration and its philosophy
- Federal system and judiciary of India
- Socials problems and public services like central civil services and state civil services
- Indian and international political aspects and dynamics

CO2. Develop etiquette and professional behavior in line with the constitution of India for becoming a responsible citizen

IV B. Tech. – I Semester
(16BT6HS08) **INDIAN ECONOMY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —
COURSE DESCRIPTION: Introduction; Time Value of Money; Elementary Economic Analysis; Value Analysis, Value Engineering; Economic Planning.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1.Acquire the knowledge in
- Micro and Macro Economics.

- Traditional and Modern methods of Capital Budgeting.
- Five year plans and NITI Aayog.

CO2. Analyze

- Capital Budgeting.
- Value Analysis and Value Engineering.
- Economic analysis
- Law of supply and demand

CO3. Understand the nuances of project management and finance

IV B. Tech. – I Semester
(16BT6HS09) INDIAN HERITAGE AND CULTURE

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —-

COURSE DESCRIPTION: Basic traits of Indian Culture; Humanistic Reforms under Jainism and Buddhism; Culture in the medieval period; Socio Religious reforms in Indian Culture; Reform movements for harmonious relations.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Acquaint knowledge in

- Human aspirations and values in Vedic culture.
- Cultural aspects of Buddhism and Jainism
- Unification of our country under Mourya's and Gupta's administrations
- Socio Religious aspects of Indian culture
- Reform movements and harmonious relations

CO2. Apply ethical principles and reforms as models for the upliftment of the societal status in the present cultural contexts

IV B. Tech. – I Semester
(16BT6HS10) INDIAN HISTORY

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Introduction; Ancient India; Classical and Medieval era; Modern India; India after independence.

COURSE OUTCOMES: On Successful completion of the course, students will be able to

CO1. Gain knowledge on evolution and history of India as a nation.

CO2. Analyze social and political situations of past and current periods.

CO3. Practice in career or at other social institutions morally and ethically.

IV B. Tech. – I Semester
(16BT6HS11) PERSONALITY DEVELOPMENT

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Soft Skills Lab.

COURSE DESCRIPTION: Self-esteem & Self-Management; Developing Positive Attitudes; Self-Motivation & Self-Management; Getting Along with the Supervisor; Workplace Success.

COURSE OUTCOMES: On Successful completion of the course, students will be able to

CO1. Demonstrate knowledge in

- Self-Management
- Planning Career

CO2. Analyze the situations based on
- Attitudes
- Thinking strategies

CO3. Design and develop the functional skills for professional practice in
CO4. Function effectively as an individual and as a member in diverse teams.
CO5. Communicate effectively in public speaking in formal and informal situations.

IV B. Tech. – I Semester
(16BT6HS12) PHILOSOPHY OF EDUCATION

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —
COURSE DESCRIPTION: Introduction to Philosophy and Engineering Education; Philosophical methods and their implications in engineering; Philosophical education in India; Values and Engineering education; Outcome based education.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Acquire knowledge in
- Philosophy of Engineering education.
- Philosophical Methods.
- Knowledge acquiring methods.
- Engineering education and responsibilities.

CO2. Understand the impact of Outcome Based Education for effective educational outcomes.
CO3. Apply reasoning to assess societal issues with the con textual knowledge of engineering education and responsibilities.

IV B. Tech. – I Semester
(16BT6HS13) PUBLIC ADMINISTRATION

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —
COURSE DESCRIPTION: Introduction; Public Policy; Good Governance; E-Governance; Development Administration.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Acquireknowledge in
- Public Policy.
- Good Governance.
- E-governance.
- Development Administration.

CO2. Analyze the possibilities and limitations ofexisting policies through Good Governance perspective.
CO3. Design and develop solutions in e-governance modelsto find and provide opportunities in e-governance.
CO4. Adopt principles ofe-governance in addressing the ex isting issues and challenges in e-governance sector.
CO5. Understand the significance of Administrative Development in finding professional engineering solutions by probing
- Bureaucracy.
- Role of civil society.

IV B. Tech. – I Semester
(16BT60112) **BUILDING MAINTENANCE AND REPAIR**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —
COURSE DESCRIPTION: Durability of buildings, Failure and repair of buildings, MaterialTechniques for repair, Maintenance of buildings, Conservation and recycling.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Acquire basic knowledge on durability and serviceability, failures, repair and rehabilitation of buildings.
CO2. Analyze failures, repair and rehabilitation techniques.
CO3. Solve complex building maintenance problems through proper investigations and interpretation.
CO4. Use modern tools and techniques for various repairs and rehabilitation of structures.
CO5. Provide solutions for building maintenance and repair problems considering health and safety.
CO6. Consider environmental sustainability in building maintenance and repair.
CO7. Maintain ethical standards for quality in repairs and rehabilitation of structures.
CO8. Evaluate specifications and perform cost analysis of building components while repair and rehabilitation.

IV B. Tech. – I Semester
(16BT60113) **CONTRACT LAWS AND REGULATIONS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Construction contracts; Tenders; Arbitration; Legal requirements; Labour regulations.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Demonstrate basic Knowledge on construction contracts, tenders, arbitration, legal requirements and labour regulations.
CO2. Analyze contracts and tenders.
CO3. Address the legal issues in contracts and tenders.
CO4. Follow laws and regulations in the preparation of contracts and tenders.
CO5. Prepare contract and tender documents as per the standards.
CO6. Consider project schedule, cost, quality and risk in the preparation of contracts and tenders.

IV B. Tech. – I Semester
(16BT60114) **DISASTER MITIGATION AND MANAGEMENT**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —
COURSE DESCRIPTION: Disasters; Earthquakes; Floods; Cyclones; Droughts; Landslides; Disaster management.
COURSE OUTCOMES: On successful completion of course, students will be able to
CO1. Demonstrate knowledge on disasters, their vulnerability and mitigation measures.
CO2. Analyze disasters and their vulnerability.
CO3. Design strategies for effective disaster mitigation.
CO4. Address pre and post disaster issues for better preparedness and mitigation measures, through proper analysis and interpretation.
CO5. Use appropriate methods in disaster mitigation and management.
CO6. Use historical data of disasters to inform the people over preparedness and mitigation measures.
CO7. Solve disaster related issues considering environment.
CO8. Consider economical issues in disaster management.

IV B. Tech. – I Semester
(16BT60115) **ENVIROMENTAL POLLUTION AND CONTROL**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —
COURSE DESCRIPTION: Fundamentals of air pollution; Dispersion of pollutants; Effects and control of air pollution; Water pollution; Soil pollution and control; Municipal solid waste management.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Demonstrate knowledge on air, water, soil pollution and their control and solid waste management.
CO2. Analyze causes and effects of air, water and soil pollution and their remedial measures.
CO3. Recommend suitable solutions to complex environmental pollution problems.
CO4. Use appropriate remedial technique to solve environmental pollution problems.
CO5. Understand the effects of environmental pollutionon human health and vegetation.
CO6. Encourage sustainable development through implementation of pollution control measures.
CO7. Maintain IS Codes for environmental quality control.

IV B. Tech. – I Semester
(16BT60116) **PLANNING FOR SUSTAINABLE DEVELOPMENT**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:—
COURSE DESCRIPTION: Sustainable development; Environmental impact; Sustainable Policies; Governance; Theories and strategies; Media and education for sustainability.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Demonstrate the knowledge on sustainable development, environmental impact, sustainable policies, governance, systems and strategies, media and education for sustainability.
CO2. Analyze theories, environmental impact, policies, systems and strategies for sustainable development.
CO3. Develop suitable methods and systems for sustainable development.
CO4. Use appropriate techniques in solving issues related to sustainable development.
CO5. Provide solutions to problems associated with sustainable development considering society.
CO6. Consider environment while planning sustainable development.
CO7. Communicate effectively on sustainable development issues through media and education.
CO8. Consider economical issues while planning for sustainable development.

IV B. Tech. – I Semester
(16BT60117) **PROFESSIONAL ETHICS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Engineering ethics; Professional ideals and virtues; Engineering as social experimentation; Responsibilities and rights; Global issues.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Demonstrate the principles of ethics, importance of professional values and social responsibility.
CO2. Analyze the problems in the implementation of moral autonomy and use ethical theories in resolving moral dilemmas.
CO3. Develop suitable strategies to resolve problems arise in practicing professional ethics.
CO4. Provide solutions to complex problems associated with professional ethics by proper analysis and interpretation.
CO5. Use appropriate theories in resolving issues pertain to professional ethics.

CO6. Understand the impact of professional ethics on society and address the limitations of codes of ethics.
CO7. Practice engineering with professionalism, accountability and ethics.
CO8. Function as a member, consultant, manager, advisor and leader in multi-disciplinary teams.
CO9. Write reports without bias and give instructions to follow ethics.

IV B. Tech. – I Semester
(16BT60118) RURAL TECHNOLOGY

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Rural technology; Non conventional energy; Community development; IT in rural development.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Demonstrate the knowledge on technologies for rural development.
CO2. Analyze various technologies available which are appropriate for rural development.
CO3. Carryout feasibility study on the public and private partnership for rural development.
CO4. Develop and use latest technologies for rural development.
CO5. Address health and safety issues while choosing technologies for rural development.
CO6. Educate the rural populace on the positive impacts of biofertilisers and usage of agromachinery in agriculture.

IV B. Tech. – I Semester
(16BT60308) GLOBAL STRATEGY AND TECHNOLOGY

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —
COURSE DESCRIPTION: Introduction to strategic management; Strategic management process; Principles of good strategy; Globalization strategies; Research and Development strategies; Technology Management and Transfer; Elements of Transfer Process; Corporate Governance in the Indian scenario.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Demonstrate the knowledge on Strategic management, Research & development strategies, Technology management and transfer, Globalization and Corporate governance.
CO2. Indentify and analyze crucial problems in strategic management to improve performance of the organizations.
CO3. Develop the products and production process by using research and development strategies.
CO4. Conduct investigations on the impact of globalization in current scenario in the context of corporate governance.
CO5. Appraise the resources and capabilities of the firm in terms of their ability to confer sustainable development.
CO6. Apply ethics in strategic decision making.

IV B. Tech. – I Semester
(16BT60309) INTELLECTUAL PROPERTY RIGHTS AND MANAGEMENT

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —
COURSE DESCRIPTION: Protection of ideas; innovation and artistic endeavors; Acts and procedure related to patents, trademarks, copy right, design registration, trade secrets and cyber laws; Infringement; Commercialization of intellectual property rights; Case studies in each.

COURSE OUTCOMES: On Successful completion of the course, students will be able to

CO1. Demonstrate knowledge on intellectual property rights, patents, trademarks, copyrights, trade secrets and commercialization of intellectual property.

CO2. Analyse the commercial significance of discoveries and developments and to assist in bringing these into public use.

CO3. Investigate and ensure smooth transition from concept to final product by following National & International Laws of Intellectual Property.

CO4. Utilize the various policies and procedures related to patents, trademarks and copyrights relating to IPR.

CO5. Safeguard, review and manage the intellectual property so that it may receive adequate and appropriate legal protection against unauthorized use.

CO6. Follow ethical standards in capacity building and work as a platform for development, promotion, protection, compliance, and enforcement of intellectual property and knowledge.

CO7. Prepare documents and fill applications needed for filing a patent, design, copyright and trade mark.

IV B. Tech. – I Semester
(16BT60310) MANAGING INNOVATION AND ENTREPRENEURSHIP

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:—

COURSE DESCRIPTION: Evolution of entrepreneurship from economic theory Managerial and entrepreneurial competencies; Concepts of Shifting Composition of the Economy Purposeful Innovation & Sources of Innovative Opportunity; The Innovation Process; Innovative Strategies; Entrepreneurial Motivation; Entrepreneurs versus inventors; Ethics and International Entrepreneurship; Strategic Issues in International Entrepreneurship; Problem solving Innovation and Diversification.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate the principles of business innovation and entrepreneurship for establishing industrial ventures.

CO2. Analyze business plans for potential investors and stakeholders and effectively answer probabilistic questions on the substance of plan.

CO3. Develop a comprehensive and well planned business structure for a new venture.

CO4. Conduct investigation on complex problems, towards the development of Project.

CO5. Apply modern statistical and mathematical tools to design projects and subsequent work procedures.

CO6. Apply ethics in constructive innovation framework.

CO7. Exhibit professionalism by employing modern project management and financial tools.

IV B. Tech. – I Semester
(16BT60311) MATERIALS SCIENCE

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Structure and Bonding in metals; Steels, Cast Irons and Non Ferrous alloys; Material Selection for conductors, Insulators and semi conductors; Strengthening mechanisms of metals; Plastics and Ceramics as Insulators; AC and DC properties of Insulators; Semiconductors and Magnetic materials; Composite materials in Electrical and Electronics engineering; Material Selection and manufacturing of Optical fibers.

COURSE OUTCOMES: On Successful completion of the course, students will be able to

CO1. Demonstrate the knowledge on concepts of fundamental science and engineering principles relevant to materials.

CO2. Analyze the structures of various types of Ferrous, Non ferrous alloys influencing various engineering applications.

CO3. Conduct investigations to select suitable materials with desired properties for engineering applications.

CO4. Use phase diagrams to interpret the data regarding microstruc ture of materials.
CO5. Consider health and safety issues while providing materials to real time applications.
CO6. Use composite materials that reduce material waste in design and manufacturing for sustainability.

IV B. Tech. – I Semester
(16BT70412) **GREEN TECHNOLOGIES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —
COURSE DESCRIPTION: Principles of green engineering; Green communications; Green energy; Green computing; Green construction; Green manufacturing.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Deploy conceptual knowledge in green technologies pertaining to engineering practice.
CO2. Analyze various green technologies for engineering practice.
CO3. Provide green solutions to engineering problems.
CO4. Apply various green techniques in the engineering practice.
CO5. Consider health and safety issues while providing green solutions to the society.
CO6. Understand issues related to environment sustainability.
CO7. Apply ethical standards for environmental sustainability in the engineering practice.

IV B. Tech. – I Semester
(16BT70413) **INTRODUCTION TO NANOSCIENCE AND TECHNOLOGY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —
COURSE DESCRIPTION: Introduction to the concept of nano; Description of nanomaterial; Nanostructure characterization tools; Classification of nanomaterials; Fabrication of nanomaterial; Different applications of nanostructures and nanomaterials.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Demonstrate knowledge in
- Nanoscale technology.
- Difference between micro and nanotechnology
- Classification of Nanostructure and Nanomaterial
- Fabrication of various nanomaterials and nanostructures.

CO2. Analyze numerical and analytical problems in
- Nanomaterial size by using Scanning Electron Microscope and X-Ray diffraction

CO3. Design and fabricate devices based on nanostructures like
- Nano solar cell
- Nano cantilever
- Nano bio-sensor

CO4. Synthesize nano particle of different materials to solve the problems related to fabrication of nanostructures.
CO5. Select appropriate technique for fabrication of nanostructures and nanocomposites.
CO6. Apply ethical standards and legal issues while using chemical substances in fabrication of new nanostructures.

IV B. Tech. – I Semester
(16BT60505) ENGINEERING SYSTEM ANALYSIS AND DESIGN

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Systems Process; Technologies for Systems; System Development Life Cycle; System Analysis and Modeling; Levels of Management; Project Management; Systems Implementation and Importance of UML Prototyping; Maintaining and Managing the Systems Output Process.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge in
- Systems Process and System Design
- Systems Analysis and Modeling
- System Development Life Cycle
- Design Management and Maintenance Tools.

CO2. Analyze System Process and estimate the given models by using case tools.
CO3. Design and Develop a model to the organizational systems.
CO4. Solve complex problems related to engineering systems and produce accurate results.
CO5. Apply object oriented techniques for modeling dynamic systems.
CO6. Contribute towards societal issues and responsibilities in designing, modeling and developing of organizational systems.

IV B. Tech. – I Semester
(16BT71011) MICRO-ELECTRO-MECHANICAL SYSTEMS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:—

COURSE DESCRIPTION: Overview of Micro Electro Mechanical Systems (MEMS); scaling laws; working principles of microsensors and microactuators; materials; microfabrication processes; packaging of Microsystems.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge on MEMS devices, scaling laws, microsensors and microactuators.
CO2. Analyze the properties of materials and identify its suitability for MEMS device.
CO3. Design MEMS devices that meet desired specifications and requirements.
CO4. Analyze and synthesize the information to provide effective solution to engineering problems with MEMS devices.
CO5. Use modern techniques in micro manufacturing process.
CO6. Develop efficient and cost effective MEMS based products for society.

IV B. Tech. – I Semester
(16BT61205) CYBER SECURITY AND LAWS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Cyber Crimes and Indian IT Act; Cyber Offenses; Tools and Methods used in Cyber Crime; Phishing ad Identity Theft; Indian and Global Perspective on Cyber Crimes and Cyber Security; Organizational Implications on Cyber Security; IPR Issues; Cyber Crime and Terrorism; Cyber Crime Illustrations.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge in Cyber security, Cyber crimes and its related laws in Indian and Global Act.
CO2. Analyze the legal perspectives and laws related to cyber crimes in Indian context.

CO3. Apply security and privacy methods in development of modern applications and in organizations to protect people and to prevent cyber crimes.
CO4. Solve Cyber security issues using privacy policies.
CO5. Use antivirus tools to minimize the impact of cyber threats.
CO6. Follow security standards for the implementation of Cyber Security and laws.

IV B. Tech. – I Semester
(16BT61505) BIOINFORMATICS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: —
COURSE DESCRIPTION: Introduction to Bioinformatics; Biology and Information; Sequence alignment and dynamic programming; Biological Database; Homology Modeling; Structure Prediction; Molecular Dynamics
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Demonstrate knowledge on concepts of biological databases, Genome and proteome.
CO2. Analyze biological sequences for Homology Modeling.
CO3. Apply clustering methods for Phylogenetic trees.
CO4. Solve bio sequencing problems using dynamic programming.
CO5. Select and apply appropriate techniques and tools to structure Prediction

IV B. Tech. – I Semester
(16BT71031) ANALYTICAL AND BIOMEDICAL INSTRUMENTATION LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Courses on Analytical Instrumentation, Biomedical Instrumentation.
COURSE DESCRIPTION: Measurements of parameters: calorific value, blood pressure, respiration rate and heart sounds; characteristics of spectrometer; gas chromatography, and flame photometer.
COURSE OUTCOMES: On Successful completion of the course, students will be able to
CO1. Demonstrate knowledge on measurement of heart sounds, respiration rate, pH Value and calorific value.
CO2. Analyze the performance of spectrometers, flame photometer, gas chromatography and Geiger Muller counters.
CO3. Design the Instrumentation Amplifier for bio-signals.
CO4. Conduct the analytical and biomedical experiments to provide valid conclusions.
CO5. Use appropriate hardware and software tools to conduct the analytical and biomedical experiments.
CO6. Commit to ethical principles in the usage of biomedical equipments.
CO7. Do experiments related to analytical and biomedical instruments effectively as an individual and as a member in a group.
CO8. Communicate effectively in verbal and written forms in the area of analytical and biomedical instrumentation.

IV B. Tech. – I Semester
(16BT71032) **INDUSTRIAL AUTOMATION LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Courses on Process Control Instrumentation, Industrial Automation.
COURSE DESCRIPTION: Automatic control of motors; liquid level; temperature; pressure; processes using PLC based control systems and SCADA systems. P&I diagram of Feedback Control system, Cascade control system and Ratio control system.
COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge on
- P& I diagrams
- PLC and SCADA
- Pneumatic and Hydraulic

CO2. Analyze operation and performance of automation process made for Level Process, Bottle filling sys tem, Temperature and DC motor speed control.
CO3. Design an algorithm to automate Level Process, Bottle filling system, Temperature and DC motor speed control.
CO4. Interpret and synthesis the data obtained from various industrial processes to provide valid conclusions.
CO5. Select and apply appropriate techniques to make industrial process automation.
CO6. Follow professional ethics and practices to provide automation solutions for the society.
CO7. Commit to ethical principle in the design of process and algorithms.
CO8. Function effectively as individual and as member in team in the field of industriala utomation.
CO9. Communicate effectively both oral and written forms in the area of industrial automation.

IV B. Tech. – I Semester
(16BT71033) **COMPREHENSIVE ASSESSMENT**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
	100	100	-	-	-	2

PRE-REQUISITES: All the technical courses of the program up to IV B. Tech. – I Semester.
COURSE DESCRIPTION: Assessment of student learning outcomes in the courses of the program.
COURSE OUTCOMES: Comprehensive Assessment enables a successful student to:

CO1. Demonstrate knowledge in the courses of the Electronics and Instrumentation
CO2. Analyze problems in the courses of the Electronics and Instrumentation.
CO3. Design solutions for the problems in the courses of the Electronics and Instrumentation.
CO4. Solve complex engineering problems in the courses of the Electronics and Instrumentation.
CO5. Apply tools and techniques to complex engineering activities with an understanding of limitations in the courses of the Electronics and Instrumentation.
CO6. Provide solutions as per societal needs with consideration to health, safety, legaland cultural issues in the domain of Electronics and Instrumentation.
CO7. Understand the impact of the professional engineering solutions in environmental context and need for sustainable development in the domain of Electronics and Instrumentation.
CO8. Apply ethics and norms of the engineering practice in the courses of the Electronics and Instrumentation.
CO9. Function effectively as an individual in the domain of Electronics and Instrumentation.
CO10. Present views cogently and precisely in the domain of Electronics and Instrumentation.
CO11. Engage in life-long learning in the domain of Electronics and Instrumentation.

IV B. Tech. – II Semester

(16BT81031) **PROJECT WORK**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
100	100	200	-	-	-	12

PRE-REQUISITES: All technical courses of the program up to IV B. Tech. – I Semester.

COURSE DESCRIPTION: Identification of topic for the project work; Literature survey; Collection of preliminary data; Identification of implementation tools and methodologies; Performing critical study and analysis of the topic identified; Time and cost analysis; Implementation of the project work; Preparation of thesis and presentation.

COURSE OUTCOMES: On successful completion of project work, students will be able to

CO1. Demonstrate in-depth knowledge on the project topic.
CO2. Identify, analyze and formulate complex problem chosen for project work to attain substantiated conclusions.
CO3. Design solutions to the chosen project problem.
CO4. Undertake investigation of project problem to provide valid conclusions.
CO5. Use the appropriate techniques, resources and modern engineering tools necessary for project work.
CO6. Understand societal issues in the context of the project work.
CO7. Understand environmental issues while executing the project work.
CO8. Understand professional and ethical responsibilities while executing the project work.
CO9. Function effectively as individual and a member in the project team.
CO10. Develop communication skills, both oral and written form, for preparing and presenting project report.
CO11. Demonstrate knowledge and understanding of cost and time analysis required for carrying out the project.
CO12. Engage in lifelong learning to improve knowledge and competence in the chosen area of the project.

Program: B.Tech. COMPUTER SCIENCE AND ENGINEERING

I B. Tech. - I Semester
(16BT1HS01) **Technical English**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: ***English at Intermediate level***
COURSE DESCRIPTION: Introduction to Communication; Active Listening; Effective Speaking; Reading; and Writing.
COURSE OUTCOMES: On successful completion of this course, the students will be able to
CO1: Demonstrate knowledge in
- ☐ Process of communication
- ☐ Modes of listening
- ☐ Paralinguistic features
- ☐ Skimming and Scanning
- ☐ Elements of style in writing

CO2: Analyze the possibilities and limitations of language for understanding
- ☐ Barriers to Communication
- ☐ Barriers to Effective Listening
- ☐ Barriers to Speaking
- ☐ Formal and metaphorical language

CO3: Design and develop functional skills for professional practice.
CO4: Apply writing skills in preparing and presenting documents
CO5: Function effectively as an individual and as a member in diverse teams.
CO6*:* Communicate effectively with the engineering community and society in formal and informal situations.

I B. Tech - I Semester
(16BT1BS01) **ENGINEERING CHEMISTRY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE REQUISITE: Intermediate/Senior Secondary Chemistry
COURSE DESCRIPTION: Water technology, Chemistry of Engineering materials, Nanochemistry, Green Chemistry, Electro chemical cells, Sensors, Corrosion and Lubricants.
COURSE OUTCOMES:
After completion of the course, a successful student is able to:
CO1: Acquire basic knowledge in water technology, engineering plastics, conducting polymers, composites, Electro chemical cells, Nano Chemistry, principles of Green Chemistry, corrosion phenomenon and lubricants.
CO2: Develop analytical skills in:
   a. Determination of hardness of water.
   b. Determination of viscosity, flame and fire points, cloud and pour points.

CO3: Develop designing skills in:
   a. Synthesis of engineering plastics.
   b. Chemical methods for the synthesis of Nano materials.

CO4: Develop skills for providing solutions through:
   a. Mitigation of hardness of water.
   b. Newer Nanomaterials and engineering plastics for specific applications

CO5: Acquire awareness to practice engineering in compliance to modern techniques such as:
   a. Nalgonda technique for defluoridation of water
   b. Electroplating technique for control of corrosion.

CO6: Acquire awareness to societal issues on:
   a. Quality of water.
   b. Bio-diesel
   c. Chemical materials utility and their impact.

I B. Tech. - I Semester
(16BT1BS03) **MATRICES AND NUMERICAL METHODS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Intermediate /Senior secondary mathematics
COURSE DESCRIPTION: Fundamentals of matrix theory; numerical solutions of equations, curve fitting; interpolation; numerical differentiation and integration; numerical solutions of ordinary differential equations.
COURSE OUTCOMES: After completion of the course a successful student is able to
CO1: Acquire basic **knowledge** in
(a) Finding the rank of matrices and analyzing them.
(b) Solving algebraic and transcendental equations by various numerical methods.
(c) Fitting of various types of curves to the experimental data.
(d) Estimating the missing data through interpolation methods.
(e) Identification of errors in the experimental data
(f) Finding the values of derivatives and integrals through various numerical methods.
(g) Solving differential equations numerically when analytical methods fail.
CO2: Develop skills in **analyzing** the
(a) methods of interpolating a given data
(b) properties of interpolating polynomials and derive conclusions
(c) properties of curves of best fit to the given data
(d) algebraic and transcendental equations through their solutions
(e) properties of functions through numerical differentiation and integration
(f) properties of numerical solutions of differential equations
CO3: Develop skills in **designing** mathematical models for
(a) Fitting geometrical curves to the given data
(b) Solving differential equations
(c) Constructing polynomials to the given data and drawing inferences.
CO4: Develop numerical skills in **solving the problems** involving
(a) Systems of linear equations
(b) Fitting of polynomials and different types of equations to the experimental data
(c) Derivatives and integrals
(d) Ordinary differential equations
CO5: Use relevant numerical **techniques** for
(a) Diagonalising the matrices of quadratic forms
(b) Interpolation of data and fitting interpolation polynomials
(c) Fitting of different types of curves to experimental data
(d) obtaining derivatives of required order for given experimental data
(e) Expressing the functions as sum of partial fractions

I B. Tech. - I Semester
(16BT1BS04) **MULTI - VARIABLE CALCULUS AND DIFFERENTIAL EQUATIONS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Intermediate /Senior secondary mathematics
COURSE DESCRIPTION: First order differential equations; higher order linear differential equations; functions of several variables; applications of integration; multiple integrals; vector calculus.
COURSE OUTCOMES: After completion of the course a successful student is able to
CO1: Acquire knowledge in
(a) Higher order Differential equations
(b) Maximum and minimum values for the functions of several variables
(c) Double and triple integrals
(d) Differentiation and integration of vector functions.
(e) Line and surface volume
(f) transforming integrals from three dimensional surfaces and volumes on to plane surfaces
CO2: Develop skills in analyzing the
(a) methods for differential equation for obtaining appropriate solutions,
(b) Properties of oscillatory electrical circuits and heat transfer in engineering systems
(c) The variations in the properties of functions near their stationary values
(d) Flow patterns of fluids, electrical and magnetic flux and related aspects
CO3: Develop skills in designing mathematical models for
(a) R-C and L-R-C oscillatory electrical circuits
(b) Heat transfer and Newton’s law of cooling
(c) Engineering concepts involving lengths of curves and areas of planes, Flux across surfaces

CO4: Develop analytical skills in solving the problems involving
(a) Newton's law of cooling
(b) non homogeneous linear differential equations
(c) maximum and minimum values for the functions
(d) lengths of curves, areas of surfaces and volumes of solids in engineering
(e) transformation of integrals from three dimensional surfaces and volumes on to plane surfaces

CO5: Use relevant mathematical techniques for evaluating
(a) various types of particular integrals in differential equations
(b) stationary values for multi variable functions
(c) multiple integrals in change of variables
(d) integrations of vector functions.

I B. Tech. - I Semester
(16BT10501) **PROGRAMMING IN C**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: NIL
COURSE DESCRIPTION:
Program design; Operators and Expressions; Data Input and Output; Control Statements; Functions; Arrays; Strings; Pointers; Structures & Unions and File handling Techniques;
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
CO1: Demonstrate knowledge in:
- o Elements of C Language
- o Selection and Repetition statements.
- o Arrays, Strings and Functional statements.
- o Derived data types, Files and Pointers

CO2: Analyze complex engineering problems to develop suitable solutions
CO3: Design algorithms for specified engineering problems
CO4: Use appropriate 'C' language constructs for solving engineering problems
CO5: Write programs using 'C' language to implement algorithms

I B. Tech. - I Semester
(16BT1HS31) **ENGLISH LANGUAGE LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: English at intermediate or equivalent level.
COURSE DESCRIPTION: Phonetics; Vocabulary Building; Functional Grammar; Just a Minute; Elocution/Impromptu; Giving Directions/Conversation Starters; Role Play; Public Speaking; Describing People, Places, Objects and Events; Reading Comprehension; Listening Comprehension; Information Transfer.
COURSE OUTCOMES: On successful completion of this course the students will be able to
CO1: Demonstrate knowledge in
- ☐ Phonetics
- ☐ Information Transfer

CO2: Analyze the situations in professional context by using
- ☐ Vocabulary
- ☐ Grammar

CO3: Design and develop functional skills for professional practice.
CO4: Apply the techniques of Listening and Reading skills to comprehend Listening and Reading comprehension.
CO5: Function effectively as an individual and as a member in diverse teams through
- ☐ Extempore talk and
- ☐☐ ☐ Role Play

CO6: Communicate effectively in public speaking in formal and informal situations.
CO7: Recognize the need to engage in lifelong learning to upgrade competence of knowledge and communication.

I-B. Tech - I Semester
16BT1BS31: **ENGINEERING CHEMISTRY LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE REQUISITE: Intermediate/Senior Secondary Chemistry
COURSE DESCRIPTION: Estimation of hardness, alkalinity, dissolved oxygen of water samples and estimation of Iron by volumetric methods, determination of effect of P^H on rate of corrosion, measurement of viscosity of lubricants; Instrumental methods like potentiometer, conductivity meter, P^H meter and colorimeter; synthesis of Polymers and Nano materials.
COURSE OUTCOMES:
After completion of the course, a successful student is able to:
CO1: Acquire basic Knowledge about the volumetric analysis and synthesis of materials used for engineering applications.
CO2: Acquire analytical skills in the estimation of hardness of water, alkalinity of water, dissolved oxygen in water and estimation of Iron through wet laboratory methods.
CO3: Develop designing skills for the synthesis of polymers and Nanomaterials.
CO4: Acquire skills to use instrumental techniques for the determination of Electrical conductance of electrolytes, EMF of a cell, PH of a solution, determination of viscosity of lubricants and estimation of iron in cement.
CO5: Provide solutions for environmental issues through determination of quality of water.

I B. Tech. I Semester
16BT10331: **COMPUTER AIDED ENGINEERING DRAWING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	1	6	3

PRE-REQUISITES: *None*
COURSE DESCRIPTION:
Engineering drawing conventions; importance of engineering drawing; fundamental concepts of sketching; computed aided drafting and different types of projections of geometric entities (both 2D and 3D) through computer aided drafting packages.
COURSE OUTCOMES:
After completion of the course, a successful student is able to:
CO1: Understand, write and read the language of engineering drawing in industry through International System of Standards.
CO2: Develop the imagination and mental visualization ability for interpreting the geometrical details of engineering objects.
CO3: Produce different views and projection in drawing.
CO4: Use modern CAD software for design and drafting of drawings.
CO5: Create multi-view drawings suitable for presentation to Engineering community.
CO6: Introduce and communicate universally accepted conventions and symbols for their usage in technical drawing.

I B. Tech. - I Semester
16BT10531: **PROGRAMMING IN C LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES:-
A course on "Programming in C"
COURSE DESCRIPTION:
Hands on practice in developing and executing simple programs using C Programming constructs– Conditional statements, Loops, Arrays, Strings, Functions, Structures, Pointers and Functions.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
CO1: Demonstrate practical knowledge of using C language constructs:
- Selection and Repetition statements.
- Arrays, Strings and Functional statements.
- Derived data types, Files and Pointers

CO2: Analyze problems to develop suitable algorithmic solutions
***CO3*:** Design Solutions for specified engineering problems
***CO4*:** Use appropriate 'C' language constructs for solving engineering problems

***CO5*:** Implement and execute programs using 'C' language
CO6: Document programs and communicate effectively while conducting Professional transactions.

I B.Tech. - II Semester
16BT1BS02: **ENGINEERING PHYSICS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Intermediate / senior secondary Physics
COURSE DESCRIPTION:
Lasers; optical fibers; principles of quantum mechanics; band theory of solids; semiconductors; dielectric properties of materials; acoustics of buildings; superconductors; crystallography and nanomaterials.
COURSE OUTCOMES:
After completion of the course, a successful student will be able to:
CO1: Acquire basic knowledge of lasers, optical fibers, quantum mechanics, dielectrics, semiconductors, and superconductors, acoustic of buildings, crystallography and nanomaterials.
CO2: Analyze the construction and working of various laser systems, semiconductor devices, various types of optical fibers and its communication system and nano materials properties.
CO3: Gain skills in designing lasers, optical fiber cable, semiconductor devices, acoustically good halls and nanomaterials.
CO4: Develop problem solving skills in engineering context.
CO5: Use relevant techniques for assessing ball milling, pulsed laser deposition, p-n junction and Laser.

I B. Tech. - II Semester
16BT2BS01: **TRANSFORMATION TECHNIQUES AND PARTIAL DIFFERENTIAL EQUATIONS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE REQUISITE: Intermediate /Senior secondary mathematics
COURSE DESCRIPTION: Fourier series; Fourier integrals and transforms; Laplace transforms; z –transforms; partial differential equations.
COURSE OUTCOMES:
After completion of the course a successful student is able to
CO1: Acquire basic knowledge in
- (a) Fourier series and Fourier transforms
- (b) Fourier integrals
- (c) Laplace transforms and their applications
- (d) z- transforms and their applications
- (e) solving partial differential equations

CO2: Develop skills in analyzing the
- (a) Properties of Fourier series for a given function
- (b) Partial differential equations through different evaluation methods
- (c) Difference equations through z – transforms
- (d) Engineering systems and processes involving wave forms and heat transfer

CO3: Develop skills in designing mathematical models for
- (a) Problems involving heat transfer and wave forms
- (b) Engineering concepts involving, Fourier transforms, Fourier integrals, Laplace transforms, z-transforms and difference equations

CO4: Develop analytical skills in solving the problems involving
- (a) Fourier series and Fourier transforms
- (b) Laplace transforms
- (c) Z-transforms and difference equations
- (d) Heat transfer and wave motion

CO5: Use relevant transformation techniques for
- (a) Obtaining Fourier transforms for different types of functions
- (b) Laplace transforms
- (c) Z- transforms
- (d) Partial differential equations

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I B.Tech. - II Semester
16BT20441: **BASIC ELECTRONIC DEVICES AND CIRCUITS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: A course on Engineering Physics.
COURSE DESCRIPTION:
Characteristics of general and special purpose electronic devices; Rectifiers; Biasing of BJT; FET, Feedback Amplifiers, Oscillator.
COURSE OUTCOMES: On successful completion of this course the students will be able to
CO1: Gain in-depth knowledge in
- *p-n* junction diode and its characteristics
- Zener diode and its characteristics
- Rectifiers and Filters
- Characteristics of BJT, FET, MOSFET and special purpose electronic devices.
- FET amplifiers
- Feedback amplifiers and Oscillators

CO2: Analyze numerical and analytical problems in
- Rectifiers using Filters
- Transistor biasing circuits
- FET biasing circuits and amplifiers
- Feedback amplifiers and oscillators

CO3: Design electronic circuits such as
- Rectifiers with and without filters
- BJT and FET biasing circuits
- FET amplifiers
- Feedback amplifiers and oscillators

CO4: Solve engineering problems and arrive at solutions pertaining to electronic circuits.
CO5: Select appropriate technique for transistor biasing.

I B.Tech. - II Semester
16BT21201: **OBJECT ORIENTED PROGRAMMING THROUGH C++**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	4	1	-	4

PREREQUISITES: A Course on "Programming in C".
COURSE DESCRIPTION:
Introduction to Object Oriented concepts and Fundamental Concepts of C^{++}; Decision Making Statements, Looping Statements and Functions; Arrays, Pointers & References and Strings; Classes & Objects and Overloading Operators; Composition & Inheritance, Templates, Iterators & Generics and File Handling;
COURSE OUTCOMES:
On successful completion of this course, the students will be able to:
CO1: Demonstrate knowledge on object oriented programming concepts - Object, Class, Inheritance, Polymorphism, Encapsulation, Abstraction and Message passing.
CO2: Identify object oriented concepts for code reusability and optimization.
CO3: Design and develop solutions for given specifications.
CO4: Demonstrate problem solving skills to provide software solutions to real world problems.
CO5: Develop C^{++} programming to provide solutions to complex engineering problems using object oriented concepts.

I B.Tech. - II Semester
16BT21501: **DIGITAL LOGIC DESIGN**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -NIL-
COURSE DESCRIPTION: Introduction to number systems; logic gates; Boolean Algebra; simplification of Boolean functions; Design of combinational circuits; Design of sequential circuits, Memory and Programmable Logic
COURSE OUTCOMES:
On Successful completion of this course student will be able to:
CO1. Demonstrate knowledge on Boolean algebra, Minimization of Boolean functions using Map Reduce method.
CO2. Identify appropriate simplification techniques for Boolean functions.

CO3. Design combinational and sequential logic circuits, memory and programmable logic for digital systems.
CO4. Select and Apply Boolean algebra and gate level minimization techniques for designing combinational and sequential logic circuits.
CO5. Learn independently new concepts, new techniques and advanced subject knowledge in the area of combinational and sequential logic circuits.

I B. Tech. - II Semester
16BT1BS32: **ENGINEERING PHYSICS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Intermediate / senior secondary Physics.
COURSE DESCRIPTION:
Characteristics of p-n junction diode, Photodiode, LED, and semiconductor laser diode. Experimental determination of carrier concentration and energy gap of a semiconductor material, wave length of a laser source, size of fine particle, numerical aperture and acceptance angle of optical fiber. Determination of frequency of electrically vibrating tuning fork and A.C source using A.C sonometer, magnetic field along axial line of a current carrying coil and rigidity modulus of material of a wire using torsional pendulum.
COURSE OUTCOMES:
After completion of the course, a successful student will be able to:
CO1: Acquire basic knowledge about semiconductor materials, magnetic materials and lasers.
CO2: Acquire analytical skills in the estimation of carrier concentration of semiconductor materials and characterization of p-n junction.
CO3: Develop skills in designing electronic circuits using semiconductor components.
CO4: Acquire skills to use instrumental techniques in A.C sonometer and Melde's experiment.
CO5: Apply diffraction techniques for determination of size of tiny particles and wave length of lasers.

I B.Tech. - II Semester
16BT20451: **ANALOG AND DIGITAL ELECTRONICS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: Courses on "Basic Electronic Devices & Circuits and Digital Logic Design"
COURSE DESCRIPTION: Identification and testing of active and passive components; RPS, DMM, Function Generator, CRO; Diode characteristics; Rectifiers; BJT and FET characteristics; UJT and SCR characteristics; BJT Amplifiers; Realization of FFs, Combinational Circuits, sequential Circuits; Demonstration on VHDL Programme.
COURSE OUTCOMES: On successful completion of this course, the student will be able to:
CO1. Demonstrate knowledge in different electronic devices, analog and digital circuits
CO2. Analyze the characteristics of different electronic devices and circuits like
- ☐☐Diodes p-n Junction Diodes, Zener Diodes, SCR
- ☐ Transistors-BJT,FET,UJT
- ☐ Flip Flops-JK FF, D FF
- ☐ Combinational Circuits-HA, FA
- ☐ Sequential Circuits -Counters

CO3. Design electronic circuits like FET Amplifiers, Feedback amplifiers, Oscillators, Combinational Circuits and Sequential Circuits.
CO4. Solve engineering problems by proposing potential solutions through Design of better electronic circuits.
CO5. Model an electronic circuit which fulfil the needs of the society.
CO6: Function effectively as an individual and as a member in a group
CO7: Communicate effectively in verbal and written form.

I B. Tech. - II Semester
16BT20531: **Workshop in Computer Science**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: *NIL*
COURSE DESCRIPTION:
Hands on practice sessions on PC hardware, Internet, World Wide Web, MS-Word, Excel, Power Point, Publisher, MS Access and MS NetMeeting; Demonstration on installation of system software - Linux OS and device drivers; protecting personal computer from viruses and other cyber attacks.

COURSE OUTCOMES:
After the completion of the course the student will be able to:
CO1. Gain Knowledge on:
- Identification of functional parts of PC
- Internet and World Wide Web.
- Computer security issues and preventive measures.

CO2. Design documents and presentations effectively.
CO3. Apply modern tools to develop IT based applications and acquire skills in PC maintenance and Office automation tools.
CO4: Develop effective professional communication through IT Tools.
CO5: Acquire attitude for lifelong learning of advances in computer science.

I B.Tech - II semester
16BT21232: OBJECT ORIENTED PROGRAMMING LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: A Course on "OOPS through C++".
COURSE DESCRIPTION:
Hands-on experience on creating Virtual machines on Windows and Linux platforms, Development of Service based web applications & their deployment and Mobile app development.
COURSE OUTCOMES:
On successful completion of this course, the students will be able to:
CO1: Demonstrate practical knowledge on Object oriented programming concepts - Object, Class, Inheritance, Polymorphism, encapsulation, Abstraction, message passing.
CO2: Apply object oriented programming concepts to develop real world applications.
CO3: Demonstrate Problem solving skills using basic and advanced concepts of C++.
CO4: Work individually and in teams collaboratively in implementing the applications.
CO5: Demonstrate communication skills both oral and written for preparing and presenting reports

II B. Tech. I-Semester
(16BT3BS01) **PROBABILITY DISTRIBUTIONS AND STATISTICAL METHODS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE REQUISITES:
Intermediate/senior secondary mathematics
COURSE DESCRIPTION:
Random variables; mathematical expectations; probability distributions; correlation and regressions; statistical quality control; sampling distributions; tests for small and large samples and their significances.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1: Acquire basic knowledge in
- probability distributions, correlation and regressions
- statistical quality control and testing of hypotheses
- Simple linear regression
- Tests of significance for small and large samples

CO2: Develop skills for analyzing the data with
- mathematical expectations for realistic results
- probability distributions for practical situations.
- control charts of statistical quality control
- correlation and regression concepts
- suitable tests of significance for practical situations.

CO3: Develop skills in designing
- probability distributions
- limitations of statistical quality control
- control charts,
- X, R, np, and c charts

CO4: Develop analytical skills for solving problems involving
- Probability distributions, means, variances and standard deviations
- Statistical techniques employed for quality
- Sampling techniques for decision making
- Tests of significances for small and large samples

CO5: Use relevant probability and statistical techniques for
- Mathematical expectations of desired results
- Fitting probability distributions for experimental data.
- Quality control and testing of hypothesis.

II B. Tech. I-Semester
(16BT30501) **COMPUTER ORGANIZATION**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:
A Course on "Digital Logic Design"
COURSE DESCRIPTION:
Basic structure and operation of a digital computer; Organization and functional principles of the arithmetic and logic unit, control unit, memory unit and I/O unit; Concepts of pipelining and parallel processing techniques;
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge on:
- Computer Arithmetic units
- Register Transfer and Computer Instructions
- Design of Control Unit
- Input Output Organization and Memory system
- Pipelining and Multiprocessing.

CO2. Analyze the functional units of a digital computer.
CO3. Design the functional modules in a digital computer - Arithmetic Units, Memory and I/O.
CO4. Investigate the performance of memory, I/O, and pipelined processors.
CO5. Select appropriate techniques of I/O, Pipelining and Multiprocessing to solve computing problems.
CO6. Apply contextual knowledge of computer systems development to societal applications.

II B. Tech. – I Semester
(16BT30502) **DATA STRUCTURES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:
A Course on "Programming in C"
COURSE DESCRIPTION:
Linked Lists; Type of lists; Operations and Applications; Stacks and Queues; Operations and Applications; Trees, Search trees and Heaps; Multiway Trees and Graphs; Searching and Hashing.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge on
- Principles of Data Structures.
- Linear and Non-linear Data Structures.
- Sorting and hashing techniques.

CO2. Analyze and Identify suitable data structure for computational problem solving
CO3. Design solutions for complex engineering problems using linear and non-linear data structures.
CO4. Develop solutions for Complex computational problems by conducting explorative analysis.
CO5. Apply appropriate data structure to provide solutions for real time problems by using C Language.
CO6. Apply contextual knowledge of data structures to design applications for societal applications like payroll systems, web applications, banking and financial systems.

II B. Tech. - I Semester
(16BT31201) **DISCRETE MATHEMATICAL STRUCTURES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Multivariable Calculus and Differential Equations".
COURSE DESCRIPTION:
Mathematical Logic; Predicates; Functions and Relations; Algebra Structures; Mathematical Reasoning; Recurrence Relations; Graphs; Graph Theory and its Applications.

COURSE OUTCOMES:
On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on mathematical logic, algebraic structures, relations, recurrence relations and mathematical reasoning.
CO2. Analyze and prove given statement by contradiction and automatic theorem.
CO3. Design network applications using Prim's and Kruskal's algorithms.
CO4. Solve tree traversal problems using Graph Theory.
CO5. Apply permutation, combinations, counting principle, Lagrange's theorem and graph theory in solving real-time problems.

II B. Tech. – I Semester
(16BT30503) **PYTHON PROGRAMMING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:
A Course on "Object Oriented Programming through C++"
COURSE DESCRIPTION:
Data types and Expressions; Control Statements; Strings; Text Files; Lists; Dictionaries; Functions; Objects and their use; Exception Handling; Design with Classes; Graphical User Interface;
COURSE OUTCOMES:
On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge in:
- Data Types, Variables, Expressions
- Control statements, Strings and Text files.
- Lists, Dictionaries and Functions.
- Objects and Design with classes
- Exception Handling and GUI

CO2. Analyze complex computational problems.
CO3. Design solutions for real life computational problems
CO4. Solve complex problems using python scripting constructs.
CO5. Implement python scripts using Integrated Development Environment.
CO6. Apply Python programming knowledge to solve problems related to societal applications like Medical and Weather Forecasting.

II B. Tech. - I Semester
(16BT31501) **OPERATING SYSTEMS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: —
COURSE DESCRIPTION:
Operating systems operations, scheduling; Critical section problem, deadlocks; Paging, segmentation; File Concept, Disk scheduling; I/O interface; concepts of protection.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on Operating system operations, services, file management, disk management, I/O management and protection.
CO2. Identify the functionality involved in process management concepts like scheduling and synchronization.
CO3. Design models for handling deadlock and perform memory management.
CO4. Synthesize and apply programming API's to perform Process management.
CO5. Use appropriate protection tools to provide access control to Operating system users.

II B. Tech. – I Semester
(16BT30531) **DATA STRUCTURES LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES:
A Course on "Data Structures"
COURSE DESCRIPTION:
Hands on practice on Linked Lists; Type of lists; Stacks and Queues; Trees and Search trees; Graphs; Searching and Hashing.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate practical knowledge on Stacks, Queues, Linked lists, Trees Sorting and Hashing Techniques.

CO2. Analyze suitable data structure to solve real world computing problems.

CO3. Design solutions for complex computational problems using linear and non-linear data structures.

CO4. Solve for Complex computational problems by conducting explorative analysis.

CO5. Use C language for implementing linear and non-linear data structures.

CO6. Apply contextual knowledge of data structures to design applications for societal requirements.

CO7. Communicate effectively using data structures with engineering community, being able to comprehend and write effective programs and Prepare Reports.

II B. Tech. – I Semester

(16BT30532) **PYTHON PROGRAMMING LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES:

A Course on “Python Programming”

COURSE DESCRIPTION:

Hands on practice – Scripting using Python Programming constructs; Conditional statements; Loops; Text Files; Lists; Dictionaries; Strings; Functions; GUI.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate practical knowledge of using python scripting constructs:

- Selection and Repetition statements.
- Lists, Dictionaries, Strings and Functions.
- Text Files and GUI.

CO2. Analyze the complexity of computer hardware.

CO3. Design solutions for specified computational problems using Object Oriented Programming concepts

CO4. Use appropriate python scripts and functions for solving complex problems.

CO5. Create window based applications using tkinter package

CO6. Apply contextual knowledge to computational problems related to societal applications like Medical and Weather Forecasting.

CO7.Work effectively to contribute individually to solve real world problems.

CO8. Communicate effectively in both oral and written to develop Python scripts.

II B. Tech. - I Semester

(16BT31531) **OPERATING SYSTEMS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITE: A Course on “Operating Systems”

COURSE DESCRIPTION: Hands on practice in simulating algorithms for CPU Scheduling, Memory Management, I/O Management, Deadlock Handling mechanisms; Implementing Synchronization problems; practice on UNIX commands.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge of the following algorithms to solve problems:

☐ CPU Scheduling

☐ Memory Management

☐ I/O Management

CO2. Formulate and analyze solutions to problems pertaining to Memory and I/O.

CO3. Designing models for deadlock handling mechanisms.

CO4. Develop skills in basic UNIX commands.

CO5. Use appropriate APIs’ available in modern operating systems (such as threads, system calls, semaphores, etc…) for software development.

CO6. Communicate effectively on complex operating system problems with implication to User-friendliness.

CO7. Develop and demonstrate user defined libraries to communicate with the kernel for effective implementation of projects across multidisciplinary environments.

II B. Tech - II semester
(16BT3HS01) **ENVIRONMENTAL STUDIES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: A Course on "Engineering Chemistry"
COURSE DESCRIPTION:
Multidisciplinary nature of environment; Natural resources; Ecosystems; Biodiversity; Environment pollution and control; Social issues and environment; Human population and environment; Field studies.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Acquire knowledge on nature of environment, natural resources, ecosystems, biodiversity, environmental pollution and control, social issues and human population.
CO2. Analyze natural resources, ecosystems, biodiversity, environmental pollution and control, social issues and human population.
CO3. Develop strategies for environmental pollution control and natural resource management.
CO4. Solve environmental problems through proper analysis and interpretation of environmental data.
CO5. Choose appropriate techniques in environmental pollution control and natural resource management.
CO6. Understand the impact of social issues and population on environment.
CO7. Provide solutions to individuals, industries and government for environmental sustainable development.
CO8. Follow environmental protection laws for sustainable development.
CO9. Communicate effectively on environmental issues in the form reports.

II B. Tech. – II Semester
(16BT40501) **COMPUTER GRAPHICS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:
Courses on "Matrices and Numerical Methods" and "Programming in C"
COURSE DESCRIPTION:
Introduction to Computer Graphics; Output Primitives; 2-D Geometric Transformations and Viewing; 3-D Geometric Transformations and Viewing; 3-D Object Representation; Visible Surface Detection Methods and Rendering Methods.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge on
- ☐ Graphical interactive devices
- ☐ Viewing transformations
- ☐ 2-D & 3-D object representations and
- ☐ Surface detection methods

CO2. Analyze Transformations and Clipping algorithms for 2-D and 3-D objects.
CO3. Design algorithms to generate points, lines, and polygons for 2-D and 3-D objects.
CO4. Develop innovative methods and techniques for 2-D and 3-D modeling.
CO5. Apply appropriate techniques and tools for surface detection and rendering methods.
CO6. Use contextual knowledge to develop interactive user interfaces and animations related to societal applications.

II B. Tech. – II Semester
(16BT40502) **DATABASE MANAGEMENT SYSTEMS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —
COURSE DESCRIPTION:
Database Systems; Database Design; Relational Model; SQL Queries, Constraints and Triggers; Schema Refinement and Normal Forms; Transaction Management; Concurrency Control; Overview of Storage and Indexing.

COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge on
- ☐ Data models and Database Languages
- ☐ Database design
- ☐ Normal forms
- ☐ Storage and Indexing

CO2. Analyze databases using normal forms to provide solutions for real time applications.
CO3. Design solutions for database problems using database design, views design and framing queries.

CO4. Use database techniques for designing databases, managing databases and its security.
CO5. Select SQL, Hash based Indexing and Tree based Indexing to manage data in databases.
CO6. Apply contextual knowledge to develop database applications related to societal applications like Information Retrieval Systems, Banking and Financial systems.

II B. Tech. – II Semester
(16BT41201) **DESIGN AND ANALYSIS OF ALGORITHMS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Data Structures".
COURSE DESCRIPTION:
Introduction to Algorithms and Asymptotic Notations; Disjoint Sets and Graphs; Divide and Conquer, Greedy Method; Dynamic Programming, Back Tracking; Branch and Bound.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge on:
- ☐ Algorithm Complexities and Asymptotic notations.
- ☐ Algorithm Design techniques-Divide and Conquer, Greedy Method, dynamic programming, Back tracking, Branch and Bound.

CO2. Analyze the performance of algorithms with respect to Time and Space complexities.
CO3. Design the algorithms for solving real world problems.
CO4. Solve sorting and searching problems using Divide and Conquer method.
CO5. Use dynamic programming and backtracking in finding shortest paths.

II B. Tech. – II Semester
(16BT41202) **JAVA PROGRAMMING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Object Oriented Programming through C++".
COURSE DESCRIPTION: Introduction of Java, Classes and Objects; Inheritance, Packages, Interfaces; Exception handling, Multithreading; Event handling, AWT, Collection Classes; Applets, Servlets.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge on:
- ☐ Object Oriented Programming concepts - classes, objects, inheritance, polymorphism, encapsulation and abstraction.
- ☐ Packages, interfaces, multithreading, exception handling, event handling.

CO2. Analyze complex engineering problems using object oriented concepts.
CO3. Design and develop reusable code to provide effective solutions for real world problems using inheritance and polymorphism.
CO4. Apply AWT and Applets to create interactive Graphical User Interfaces.
CO5. Use advanced programming languages to develop web applications.
CO6. Build Java Applications suitable for societal requirements.

II B. Tech. – II Semester
(16BT41203) **SOFTWARE ENGINEERING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —
COURSE DESCRIPTION: Concepts of Software Engineering; Software Process Models; Conventional and Agile Process Models; Software Requirements Engineering Process; System Analysis; Architectural Design; User Interface Design and Re-engineering; Software Testing; Risk and Quality Management.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge on:
- ☐ Fundamental concepts of software engineering.
- ☐ Process models.
- ☐ Software development life cycle.

CO2. Analyze software requirements and process models required to develop a software system.
CO3. Design and develop a quality software product using design engineering principles.
CO4. Develop software product as per user and societal requirements.
CO5. Follow standards for software development and quality management.
CO6. Demonstrate skills in applying risk and quality management principles for effective management of software projects.

II B. Tech. II Semester
(16BT40531) **DATABASE MANAGEMENT SYSTEMS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES:
A course on "Database Management Systems"
COURSE DESCRIPTION:
Hands on experience on - DDL, DML commands; Query processing using operators; Joins, Views, Single Row functions, Group Functions and SET functions; PL/SQL concepts - Basic Programs, Triggers, Functions, Cursors and Stored Procedures.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate practical knowledge on creation and alteration of tables, insertion and Querying of data.
CO2. Analyze and evaluate the databases using SQL DML/DDL commands.
CO3. Design database schemas for the sales database, customer database and product database.
CO4. Develop solutions for database problems using stored procedures, stored functions, cursors and triggers.
CO5.Implement DDL and DML commands in SQL and PL/SQL, ORACLE to manage data in databases.
CO6.Apply contextual knowledge to develop database applications related to societal applications like Information Retrieval Systems, Banking and Financial systems.
CO7.Demonstrate communication skills, both oral and written for preparing and presenting reports on databases.

II B. Tech. – II Semester
(16BT31231) **JAVA PROGRAMMING LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: A course on "Java Programming".
COURSE DESCRIPTION: Hands on experience on Polymorphism; Inheritance and Interfaces; Exception Handling; Multithreading; Event Handling; AWT; Applets; Servlets.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge on basic concepts of Java programming.
CO2. Design and develop efficient programs with multitasking ability and handle exceptions.
CO3. Demonstrate independent problem solving skills in developing interactive applications.
CO4. Apply object oriented approach to develop user friendly interface and learn how to communicate with systems over the network.
CO5. Build Java applications suitable for societal requirements.
CO6. Work effectively as an individual and as a member in team for case studies implementation.
CO7. Demonstrate communication skills, both oral and written for preparing and presenting reports.

II B. Tech. – II Semester
(16BT4HS31) **SOFT SKILLS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES:
English Language Laboratory in I B.Tech. or English Laboratory at Diploma Level.
COURSE DESCRIPTION:
This course covers Body Language; Assertiveness; Goal Setting; Creative Thinking; Interpersonal Skills; Team Work; Conflict Management; Etiquette; Report Writing; Group Discussions; Interviewing Skills.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1: Acquire knowledge in
- Goal Setting
- Creative Thinking
- Leadership Skills and
- Team Work

CO2: Analyse the situations and develop skills for
- Body Language
- Personality Development and
- Stress Management

CO3: Apply the techniques of soft skills in a problem situation enhanced through multimedia software
CO4: Function effectively as an individual and as a member in diverse teams
CO5: Communicate effectively in public speaking in formal and informal forums.

III B. Tech. I-Semester
(16BT5HS01) **MANAGEMENT SCIENCE**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —
COURSE DESCRIPTION:
Concepts of Management; Environmental Scanning; Concepts Related to Organization; Operations Management; Work Study; Statistical Quality Control; Inventory Management; Marketing; Human Resource Management; Project Management; Project Crashing; Entrepreneurship; Contemporary Management Practices.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1: Demonstrate the concepts of operations management, human resources management, project management and contemporary management practices in managerial context.
CO2: Identify and analyse management problems in the business organizations reaching substantiated conclusions using principles of management.
CO3: Design appropriate organization structure for meeting the needs of the organization with consideration of the employees of the organization.
CO4: Competently employ broad based analytical tools for decision making, system design, analysis and performance.
CO5: Provide solution to organizations for sustainable development.
CO6: Apply knowledge of engineering and management principles to manage the projects in multidisciplinary environments.

III B. Tech. – I Semester
(16BT50501) **COMPUTER NETWORKS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:
Courses on "Computer Organization" and "Operating Systems"
COURSE DESCRIPTION:
Introduction to Computer Networks; The Physical Layer; The Data Link Layer; The Medium Access Control Sub layer; The Network Layer; The Transport Layer; The Application Layer.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge on:
- Functionalities of Various OSI and TCP/IP layers

- ☐ 3G Mobile phone networks, 802.11
- ☐ TCP,UDP and SMTP

CO2. Analyze the issues related to data link, medium access and transport layers by using channel allocation and connection management schemes.
CO3. Design and compute subnet masks and addresses for networking requirements.
CO4. Solve problems related to Flow control, Error control, congestion control and Network Routing.
CO5. Apply Network Standards - 802.3 and 802.11 for developing computer Networks.
CO6. Assess the impact of wired and wireless Networks in the context of societal applications like VoIP, Multi-user Network Games, Internet of Things.

III B. Tech. – I Semester
(16BT50502) **LINUX PROGRAMMING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:
A Course on "Operating Systems"
COURSE DESCRIPTION:
Concepts on Linux Programming; Shell Programming; Process, Signals and File System Structure; Inter process Communications and Socket Programming for Client-Server Interaction.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge on
- ☐ Shell programming
- ☐ File Structure and System Calls
- ☐ Processes management and handling signals,
- ☐ IPC and Sockets

CO2. Analyze shell scripts and system calls related to Linux Environment.
CO3. Design shell scripts and system calls for specified computational problems
CO4. Use appropriate shell scripts and system calls for solving complex problems.
CO5. Provide appropriate Linux solutions for real time applications
CO6. Apply contextual knowledge to solve problems related to societal issues.

III B. Tech. – I Semester
(16BT51202) **OBJECT ORIENTED ANALYSIS AND DESIGN**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on "Software Engineering" and "Object Oriented Programming through C++".
COURSE DESCRIPTION: Introduction to UML, Basic structural modeling; Advanced structural modeling, Class and object diagrams; Basic behavioral modeling; Advanced behavioral modeling; Architectural modeling.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge on principles of object oriented analysis and design through UML Diagrams.
CO2. Analyze user requirements and identify suitable structural and behavioral modeling components.
CO3. Design and develop UML models for real time software applications.
CO4. Solve real world problems by applying structural and behavioral modeling techniques.
CO5. Use unified modeling language in preparing blue prints for software solutions.
CO6. Design and develop UML models to solve societal problems.

III B. Tech. - I Semester
(16BT41204) **THEORY OF COMPUTATION**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Discrete Mathematical Structures".
COURSE DESCRIPTION: Fundamentals of Computation; Finite State Automaton; Regular Expressions; Grammars; Push Down Automaton; Turing Machine.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge on Formal languages and automata.
CO2. Analyze the classification of languages, automata's and their computing power.

CO3. Design grammars and automata (recognizers) for regular expressions and formal languages.
CO4. Solve computational problems using automata.
CO5. Apply theorems to translate automata's and identify the class of languages.

III B. Tech. – I Semester
(16BT50442) **MICROPROCESSORS AND INTERFACING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on 'Digital Logic Design' and 'Computer Organization'.
COURSE DESCRIPTION: INTEL 8086 & 8051- Architectures; Instruction set; Programmable Interfacing Concepts; ADC, DAC, 8255, 8257,8259 ,8279,8251, Advanced peripheral Interfacing; Applications.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1: Demonstrate knowledge in:
- ☐ Internal Hardware details of Intel 8086, 8051 & programming devices like 8255, 8257, 8259, 8279 and 8251.
- ☐ Interfacing various peripherals to build standalone systems

CO2: Analyze various peripherals and interfacing techniques.
CO3: Design application based Microcomputer system using 8086 and 8051.
CO4: Solve problems by providing microcomputer-based real time solutions.
CO5: Apply programming tools, appropriate techniques and resources to complex engineering activities for microprocessor and microcontroller based systems with understanding of limitations.
C06: Solving societal problems by applying concepts of microprocessors and microcontrollers.

III B. Tech. I-Semester
(16BT50503) **COMPUTER VISION**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:
A course on "Computer Graphics"
COURSE DESCRIPTION:
Introduction to Computer Vision; Geometric Camera Models, Light, Color, Texture; Stereopsis; Segmentation by Clustering, Classification; Detection of Objects; Object Recognition and Information Retrieval.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge on geometric camera models, light, color, texture, stereopsis, segmentation, and classification, detection of objects, object recognition and information retrieval procedures.
CO2. Analyze the digital image by Texture and Stereopsis methods.
CO3. Design solutions for image analysis problems by segmentation and classification techniques.
CO4. Develop novel techniques and efficient algorithms for image synthesis.
CO5. Apply clustering, classification, object recognition and information retrieval techniques for image analysis.
CO6. Use Contextual knowledge to solve problems related to societal issues.

III B. Tech. – I Semester
(16BT50504) **DATA COMMUNICATIONS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:
Courses on "Digital Logic Design" and "Basic Electronic Devices and Circuits"
COURSE DESCRIPTION:
Concepts of Data Communication; Transmission Media-metallic and optical fiber, Digitization techniques–PCM; Multiplexing, Wireless Communication Systems; Telephone and Cellular Concepts; Data Communication Equipment
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge on
- Data communication and networking
- Digital transmission and multiplexing
- Telephone and cellular concepts
- Data communication codes and equipment

CO2. Analyze various types of modulation and multiplexing techniques.
CO3. Design wireless communication equipment to fulfill networking requirements.
CO4. Solve problems pertaining to analog or digital communication system in terms of complexity of the transmitters and receivers.
CO5. Use Data communication hardware and equipment for data communication.
CO6. Contribute towards societal issues and responsibilities in designing and developing sustainable networks.

III B. Tech. - I Semester
(16BT51541) **MODELING AND SIMULATION**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:
A Course on "Probability Distributions and Statistical Methods"
COURSE DESCRIPTION:
Discrete event simulation; Useful statistical models; Queueing systems; Properties of random numbers, Test for random numbers; Data collection, Types of simulations with respect to output analysis.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge on functional modeling of system design.
CO2. Analyze the performance of queueing systems in real world applications.
CO3. Design dynamic system operations using simulation results.
CO4. Apply mathematical foundations and computer science theory in modeling and designing of experiments for real time systems.
CO5. Select suitable simulation software tools for solving problems related to computer based systems.
CO6. Relate appropriate professional principles and norms of engineering practice for designing the simulation models.

III B. Tech. – I Semester
(16BT50531) **COMPUTER NETWORKS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES:
A Course on "Computer Networks"
COURSE DESCRIPTION:
Hands on Practice on Data Link Layer Framing Methods; Routing Algorithms; Congestion Control Algorithms; Connection Management in Transport Layer;
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate Knowledge on:
- ☐ Framing methods for data link layer,
- ☐ Shortest path using Dijkstra's routing algorithms

CO2. Identify suitable algorithm to find shortest path in a given network
CO3. Design and compute subnet masks and addresses for networking Requirements.
CO4. Solve problems related to Flow control, Error control, congestion control and Network Routing.
CO5. Apply Latest software tools and technologies for designing simple to complex applications in computer networks.
CO6. Assess the impact of wired and wireless Networks in the context of societal applications like VoIP, Multi-user Network Games, Internet of Things.
CO7. Work effectively as an individual to implement mini-project.
CO8. Demonstrate communication skills both oral and written for preparing and generating reports.

III B. Tech. – I Semester
(16BT50532) **LINUX PROGRAMMING LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES:
A Course on "Linux Programming"
COURSE DESCRIPTION:
Hands on Practice with - Shell Programs; System Calls; Environment Variables; Inter Process Communication; File System and Socket Programming.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate practical knowledge on
- ☐ Shell programming
- ☐ File Structure and System Calls
- ☐ Processes management and handling signals,
- ☐ IPC and Sockets

CO2. Analyze shell scripts and system calls in Linux operating system.
CO3. Design shell scripts for specified computational problems.
CO4. Use appropriate shell scripts and system calls for solving complex problems
CO5. Create shell scripts and system calls for real time Linux applications.
CO6. Apply contextual knowledge to solve problems related to societal issues.
CO7. Communicate effectively using Linux with engineering community being able to comprehend and write effective programs and prepare reports.

III B. Tech. – I Semester
(16BT50533) **OBJECT ORIENTED ANALYSIS AND DESIGN LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES:
A Course on "Object Oriented Analysis and Design"
COURSE DESCRIPTION:
Hands on Practice to Design and Implement - Automated Teller Machine, Library Information System, Online Ticket Reservation System, Point of Sales, Airport Simulation, Course Registration System, Home Appliance Control System and Hospital Management System using Object-Oriented Language.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate practical knowledge on principles of object oriented analysis and design through UML diagrams.
CO2. Analyze user requirements and identify suitable structural and behavioral modeling components.
CO3. Design and develop UML models for real time applications.
CO4. Solve real world problems by applying structural and behavioral modeling techniques.
CO5. Use UML to design the software system.
CO6. Apply contextual knowledge of UML models to assess societal issues.
CO7. Involve as individual to solve case studies.
CO8. Develop a model for complex computational activities by preparing and presenting reports through effective communication.

III B.Tech. – II Semester
(16BT3HS02) **MANAGERIAL ECONOMICS AND PRINCIPLES OF ACCOUNTANCY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

Prerequisite: —
COURSE DESCRIPTION:
Managerial Economics; Demand and Elasticity of Demand; Production Functions; Markets and Pricing Policies; Formation of different types of Business Organizations; Basic concepts of Accounting (Journal, Ledger and Trial balance); Trading Account, Profit and Loss Account and Balance sheet with simple adjustments; Computerized Accounting.
Course outcomes:
On successful completion of the course, students will be able to:
CO1: Acquire Knowledge in
- ☐ Tools and concepts of Micro Economics.
- ☐ Basic Principles and concepts of Accountancy.

- ☐ Provides life skills for effective utilization of scarce resources.
- ☐ Financial Accounting.
- ☐ Significance of Economics and Accountancy

CO2: Develop skills in managerial decision making of an organization.
CO3: Apply the Economic theories i.e., Demand, Production, Cost, Markets and Price.
CO4: Develop effective communication in Business and Accounting transactions.
CO5: Ascertain the profitability and soundness of an organization.
CO6: Practice Financial Accounting

III B. Tech. – II Semester
(16BT61501) **DATA WAREHOUSING AND DATA MINING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: A Course on "Database Management Systems"
COURSE DESCRIPTION: Data Mining Fundamentals; Data Preprocessing; Operational Database Systems and Data Warehouses; Mining Frequent Patterns; Classification and Prediction; Clustering; New Trends and Research Frontiers.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge on Concepts of data warehousing and data mining.
CO2. Analyze using data mining techniques to find useful and potential Knowledge.
CO3. Design of Data Warehouse for OLAP applications and deployment.
CO4. Evaluate the usage of association mining techniques on complex data objects.
CO5. Select appropriate techniques to measure the interesting patterns from heterogeneous databases.
CO6. Apply appropriate evolutionary data mining algorithms to find solutions of Real time Applications.

III B. Tech. – II Semester
(16BT60501) **SOFTWARE TESTING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:
A course on "Software Engineering"
COURSE DESCRIPTION:
Software Testing Basics: Goals, Defects, Terminology, Methodology, STLC in SDLC, Verification & Validation; Software Testing Techniques: White box testing, Black Box Testing, Regression testing; Test Management: Test Planning, Design & Specifications; Test Automation: Tool selection & Guidelines.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge on
- ☐ Software Testing Life Cycle.
- ☐ Testing Techniques.
- ☐ Test Management & Metrics.
- ☐ Regression Testing
- ☐ Test Automation

CO2. Analyze testing circumstances and their resultants in software development.
CO3. Design and develop the appropriate test cases in accordance to the software development model.
CO4. Use problem solving skills to control and monitor the testing process
CO5. Apply testing tools for testing the software quality.
CO6. Apply contextual knowledge to perform testing on software related to societal applications

III B. Tech. II Semester
(16BT70402) **EMBEDDED SYSTEMS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on 'Digital Logic Design' and 'Computer Organization'
COURSE DESCRIPTION:
Embedded system design approaches; MSP430 Architecture; Instruction Set; On-Chip Resources; Programming; Communication with peripherals; Internet of Things related Issues.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Apply knowledge in
- ☐ MSP430 Architecture, Pin out, Instruction set
- ☐ High level programming
- ☐ Usage of On-chip resources like ADC, DAC, Timers
- ☐ Internet of Things related issues

CO2. Analyze various design issues regarding
- ☐ Usage of on chip resources
- ☐ Low power modes
- ☐ Communication support

CO3. Design embedded systems using MSP430 series microcontrollers to suit market requirements.

CO4. Solve engineering problems and arrive at solutions in designing embedded systems to support interconnectivity.

CO5. Apply techniques, program skills, On-Chip resources to design networked embedded systems with an understanding of limitations.

CO6. Reason out and practice professional engineering to deliver efficient and cost effective embedded based products to society.

III B. Tech. – II Semester

(16BT50341) **OPTIMIZATION TECHNIQUES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:

A course on "Multi variable calculus and differential equations"

COURSE DESCRIPTION:

Introduction to optimization; classical optimization techniques; classification of optimization problems; linear programming; transportation and assignment problem; non-linear programming; un-constrained non-linear programming; constrained non-linear programming; dynamic programming.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate the knowledge on Optimization techniques for Linear, Non linear and Dynamic programming problems.

CO2. Analyze and quantify a system architecture or product design problem for selecting appropriate objective function, design variables, parameters and constraints.

CO3. Develop mathematical models for real time optimization problems.

CO4. Conduct investigations on complex problems and make recommendations based on solutions, analysis and limitations of models.

CO5. Use optimization techniques for solving complex problems of real time applications.

CO6. Optimize the resources in organizations for sustainable development.

III B. Tech. II Semester

(16BT60502) **SOFT COMPUTING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION:

Concepts on Soft Computing Techniques; Artificial Neural Networks; Supervised Learning; Unsupervised Learning; Fuzzy logic; Genetic Algorithms.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge in
- ☐ Artificial Neural Networks
- ☐ Supervised Learning Networks
- ☐ Unsupervised Learning Networks
- ☐ Fuzzy sets, relations and measures
- ☐ Genetic Operators

CO2. Analyze neural network architectures, Fuzzy systems and Genetic algorithms.

CO3. Design soft computing solutions for real life computational problems.

CO4. Use soft computing techniques to solve complex computational problems.

CO5. Create algorithms using soft computing techniques.

CO6. Apply contextual knowledge to solve problems related to societal issues like Business Intelligence, Forecasting.

III B. Tech. – II Semester
(16BT60503) **WIRELESS NETWORKS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A Course on "Computer Networks"
COURSE DESCRIPTION:
Generations of Wireless Networks; Voice and Data Processing; Wireless Network Topology; GSM; TDMA; CDMA; Wireless LANs; Wireless WANs; Wireless PAN;
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge on
- ☐ Wireless Medium Access methods.
- ☐ Network Topology
- ☐ Wireless LAN, HIPERLAN
- ☐ GSM, CDMA, GPRS

CO2. Analyze the network topologies in Wireless Networks
CO3. Design solutions for network communications at physical and transport layers
CO4. Solve complex problems related to network communications and wireless networks
CO5. Apply GSM, CDMA, GPRS and Bluetooth to create Home Access Networks and wireless Personal Area Network.
CO6. Apply contextual knowledge to solve problems using societal applications like health care devices, Internet of Things.

III B. Tech. – II Semester
(16BT71210) **HIGH PERFORMANCE COMPUTING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Computer Organization"
COURSE DESCRIPTION: Cache-based Microprocessor Architecture; Memory Hierarchies; Multithreaded Processors; Common Sense Optimizations; The Role of Compilers; Data Access Optimization; Shared-memory Computers; Parallel Scalability; Introduction to OpenMP; Parallel Jacobi Algorithm; Introduction to MPI; MPI Performance Tools; MPI Parallelization of Jacobi Solver.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge on:
- ☐ Modern Processors and code Optimization.
- ☐ Parallel computing paradigms.

CO2. Analyze computation problems and identify the suitable parallel processing approaches to achieve optimum computation.
CO3. Design Parallel processing algorithms for achieving high performance computing.
CO4. Solve shared memory problems using Parallel Programming.
CO5. Use OpenMP and MPI tools in Parallel Programming.

III B. Tech. – II Semester
(16BT71202) **MOBILE APPLICATION DEVELOPMENT**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on 'Java Programming' and 'Web Technologies'.
COURSE DESCRIPTION: Mobile platforms; Mobile User Interface and tools; Introduction to Android; Activities; Views; Menus; Database Storage; SMS; e-mail; Displaying Maps; Building a Location Tracker Web Services Using HTTP; Sockets Programming; Communication between a Service and an Activity; Introduction to iOS.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge on:
- ☐ Mobile platforms and Mobile User Interface
- ☐ Android Activities and Intents
- ☐ Messaging, Networking, Location based Services, Android Services
- ☐ Basics of iOS

CO2. Analyze the context of complex problems and identify user interface design requirements.

CO3. Design and develop solutions for real world problems with android mobile applications.
CO4. Demonstrate problem solving skills to create applications for mobile devices.
CO5. Apply Android studio and iOS tools to develop mobile applications
CO6. Create mobile applications as per societal needs.

III B. Tech. – II Semester
(16BT71204) **MOBILE COMPUTING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Computer Networks"
COURSE DESCRIPTION: Introduction to Mobile Computing, GSM; Medium Access Control, Wireless LAN; Mobile Network and Transport Layers; Data Dissemination; Mobile Ad-Hoc Networks (MANETs), Wireless Application Protocol (WAP).
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge on:
- GSM, GPRS, 3G, 4G, Wireless LAN, MANETs.
- Protocols in Data Link, Network, Transport and Application layer.

CO2. Analyze the issues related to database design and data retrieval in mobile applications.
CO3. Apply routing algorithms for finding shortest path in MANETs
CO4. Use protocols of Wireless Technologies for security implementation in mobile computing.
CO5. Follow standards in the usage of mobile communications.

III B. Tech. – II Semester
(16BT60504) **PRINCIPLES OF PROGRAMMING LANGUAGES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —
COURSE DESCRIPTION:
Concepts of Programming Languages, Paradigms; Different Data Types; Arithmetic and Boolean Expressions, Programming Statements; Fundamental of Subprograms; Data Abstraction; Exception Handlers; Logic and Functional Programming Languages;
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Gain knowledge on
- Data types,
- Expressions, statements,
- Subprograms and abstract data types,
- Exceptional handling in object oriented programming languages

CO2. Analyze the constructs of procedural, object-oriented, functional and logic programming languages.
CO3. Design functional forms, structures, control flow, list and predicate functions for the development of interpreted functional languages.
CO4. Use appropriate programming language to develop software applications.
CO5. Select appropriate technique in logic and functional based programming languages to develop effective programs.
CO6. Apply Contextual knowledge in programming languages for societal issues.

III B.Tech. – II Semester
(16BT6HS01) **BANKING AND INSURANCE**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE REQUISITES: -
COURSE DESCRIPTION: Origin of Banking; Functions of Banking; Role & Functions of RBI; Bank-Customer Relationship; Deposit and Loan Services of Banks; Banking Procedures; Electronic Payment Mechanisms; Business Models; Concepts of Risk and Uncertainty; Fundamentals of Insurance; Principles of Insurance; Essentials of Insurance Contracts; Insurance players in India.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate Knowledge in
a) Tools and concepts of Banking and Insurance.
b) Basic Principles and concepts of Insurance and Banking.

c) e-fund transfers, e-payments and e-business models.

CO2. Develop skills in providing solutions for
- a) Online banking and e – payments.
- b) Risk Management through insurance benefits the society at large.
- c) Money management by leveraging on technology, banking and insurance services.

CO3. Exhibit conceptual soundness about banking and insurance, this would contribute to more employment opportunities.

CO4. Provide life skills for effective utilization of Banking and Insurance facilities.

III B. Tech. – II Semester

(16BT6HS02) **BUSINESS COMMUNICATION AND CAREER SKILLS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Technical English or English at Diploma level

COURSE DESCRIPTION: Nature and Scope of Communication; Corporate Communication; Writing Business Documents; Careers and Resumes; Interviews.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Demonstrate knowledge in
- a) Corporate Communication
- b) Main Stages of Writing Messages
- c) Career Building

CO2. Analyze the possibilities and limitations of language in
- a) Communication Networks
- b) Crisis Management/Communication

CO3. Design and develop the functional skills for professional practice in
- a) Business Presentations & Speeches

CO4. Apply written and oral communication techniques in preparing and presenting various documents in technical writing.

CO5. Function effectively as an individual and as a member in diverse teams.

CO6. Communicate effectively with the engineering community and society in formal and informal situations.

III B.Tech. – II Semester

(16BT6HS03) **COST ACCOUNTING AND FINANCIAL MANAGEMENT**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE REQUISITES: -

COURSE DESCRIPTION: Scope, Objectives and Elements of Cost Accounting; Cost Sheet and Tender Quotations; Variance Analysis: Material variances, Labor variances; Meaning and Scope, Liquidity, Profitability Ratios: Concept of Risk and Return on Investment.

Course outcomes: On successful completion of this course, the students will be able to:

CO1. Acquire Knowledge in
- a) Elements of Costing.
- b) Basic concepts of Financial Management.
- c) Risk and Return
- d) Significance of Cost Accountancy
- e) Behavioral Finance

CO2. Develop skills in

a) Material, Labor, Overheads control.
- b) Excellence and ability to minimize the cost of the organization

CO3. Develop effective Communication in Cost control and Financial Management.

CO4. Provide solutions for effective investment decisions.

III B.Tech. – II Semester

(16BT6HS04) **ENTREPRENEURSHIP FOR MICRO, SMALL AND MEDIUM ENTERPRISES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE REQUISITE: -

COURSE DESCRIPTION: Introduction to Entrepreneur Development; Idea generation and formation of Business Plan; Micro and Small Enterprises; Institutional Finance and Support to Entrepreneur; Woman Entrepreneurship.

Course outcomes: On successful completion of this course, the students will be able to:

CO1. Acquire Knowledge in
- a) Schemes and institutions encouraging entrepreneurship
- b) Basic Principles and concepts of Accountancy
- c) Significance of entrepreneurship

CO2. Develop skills in providing solutions for
- a) Personal excellence through financial and professional freedom
- b) Women entrepreneurship serving as contrivance in societal development

CO3. Develop Critical thinking and evaluation ability.

CO4. Widens knowledge and build up attitude towards trouble shooting.

CO5. Demonstrate business acumen.

III B.Tech. – II Semester

(16BT6HS05) **FRENCH LANGUAGE (La Langue Francais)**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -

COURSE DESCRIPTION: Oral communications; Basic grmmar; Advanced grammar; Basic writing; Business French (La Francais Commercial).

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Demonstrate knowledge in
- a) Process of communication
- b) Modes of listening
- c) Paralinguistic features
- d) Skimming and Scanning
- e) Elements of style in writing

CO2. Analyze the possibilities and limitations of language, understanding
- a) Barriers to Communication
- b) Barriers to Effective Listening
- c) Barriers to Speaking
- d) Formal and metaphorical language

CO3. Design and develop language skills for professional practice**.**

CO4. Apply basic writing skills in writing Emails and understanding wide range of technical terminologies.

CO5. Understand French culture and civilization.

CO6. Communicate effectively with the native French in day to day situation

III B.Tech. – II Semester

(16BT6HS06) **GERMAN LANGUAGE (Deutsch alsFremdsprache)**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -

COURSE DESCRIPTION: Oral communication; Basic grammar; Advanced grammar; Basic writing; Berufsdeutcsch (Business German)

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Demonstrate knowledge in
- a) Process of communication
- b) Modes of listening
- c) Paralinguistic features
- d) Skimming and Scanning
- e) Elements of style in writing

CO2. Analyze the possibilities and limitations of language, understanding
- a) Barriers to Communication
- b) Barriers to Effective Listening

c) Barriers to Speaking
d) Formal and metaphorical language

CO3. Design and develop language skills for professional practice**.**
CO4. Apply basic writing skills in writing Emails and understanding wide range of technical terminologies.
CO5. UnderstandGerman culture and civilization.
CO6. Communicate effectively with the native German in day to day situation**.**

III B.Tech. – II Semester
(16BT6HS07) **INDIAN CONSTITUTION**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Elements, functions and functionaries according to Indian Constitution, Understanding for better professional practice and good citizenry.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Gain knowledge in
a) parliamentary proceedings, laws, legislature, administration and its philosophy
b) federal system and judiciary of India
c) socials problems and public services like central civil services and state civil services
d) Indian and international political aspects and dynamics

CO2. Develop etiquette and professional behavior in line with the constitution of India for becoming a responsible citizen.

III B.Tech. – II Semester
(16BT6HS08) **INDIAN ECONOMY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Introduction; Time Value of Money; Elementary Economic Analysis; Value analysis, Value Engineering; Economic Planning.
COURSE OUTCOMES: On successful completion of this course, the students will be able to
CO1. Acquire the knowledge in
a) Micro and Macro Economics.
b) Traditional and Modern methods of Capital Budgeting.
c) Five year plans and NITI Aayog.

CO2. Analyze
a) Capital Budgeting.
b) Value Analysis and Value Engineering.
c) Economic analysis
d) Law of supply and demand

CO3. Understand the nuances of project management and finance.

III B.Tech. - II Semester
(16BT6HS09) **INDIAN HERITAGE AND CULTURE**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Basic traits of Indian Culture; Humanistic Reforms under Jainism and Buddhism; Culture in the medieval period; Socio Religious reforms in Indian Culture; Reform movements for harmonious relations.
COURSE OUTCOMES: On successful completion of this course, the students will be able to
CO1. Acquaint knowledge in
a) human aspirations and values in Vedic culture.
b) cultural aspects of Buddhism and Jainism
c) unification of our country under Mourya's and Gupta's administrations
d) socio Religious aspects of Indian culture
e) reform movements and harmonious relations.

CO2. Apply ethical principles and reforms as models for the upliftment of the societal status in the present cultural contexts.

III B.Tech. – II Semester
(16BT6HS10) **INDIAN HISTORY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Introduction; Ancient India; Classical and Medieval era; Modern India; India after independence.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Gain knowledge on evolution and history of India as a nation.
CO2. Analyze social and political situations of past and current periods.
CO3. Practice in career or at other social institutions morally and ethically.

III B.Tech. – II Semester
(16BT6HS11) **PERSONALITY DEVELOPMENT**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Soft Skills Lab
COURSE DESCRIPTION: Self-esteem & Self-improvement; Developing Positive Attitudes; Self-Motivation & Self-Management; Getting Along with the Supervisor; Workplace Success.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate knowledge in
  a) Self-Management
  b) Planning Career
CO2. Analyze the situations based on
  a) Attitudes
  b) Thinking strategies
CO3. Design and develop the functional skills for professional practice in
CO4. Function effectively as an individual and as a member in diverse teams.
CO5. Communicate effectively in public speaking in formal and informal situations.

III B.Tech. – II Semester
(16BT6HS12) **PHILOSOPHY OF EDUCATION**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Introduction to Philosophy and Engineering Education; Philosophical methods and their implications in engineering; Philosophical education in India; Values and Engineering education; Outcome based education.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Acquire knowledge in
  a) Philosophy of engineering education.
  b) Philosophical methods.
  c) Knowledge acquiring methods.
  d) Engineering education and responsibilities.
CO2. Understand the impact of Outcome Based Education for effective educational Outcomes.
CO3. Apply reasoning to assess societal issues with the contextual knowledge of engineering education and responsibilities.

III B.Tech. – II Semester
(16BT6HS13) **PUBLIC ADMINISTRATION**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Introduction; Public Policy; Good Governance; E-Governance; Development Administration.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Acquire knowledge in

a) Public Policy.
b) Good Governance.
c) E-governance.
d) Development Administration.

CO2. Analyze the possibilities and limitations ofexisting policies through Good Governance perspective.
CO3. Design and develop solutions in e-governance modelsto find and provide opportunities in e-governance.
CO4. Adopt principles of e-governance in addressing the existing issues and challenges in e-governance sector.
CO5. Understand the significance of Administrative Development in finding professional engineering solutions by probing

a) Bureaucracy.
b) Role of civil society.

III B.Tech. – II Semester
(16BT60112) **BUILDING MAINTENANCE AND REPAIR**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Durability of buildings, Failure and repair of buildings, MaterialTechniques for repair, Maintenance of buildings, Conservation and recycling.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Acquire basic knowledge on durability and serviceability, failures, repair and rehabilitation of buildings.
CO2. Analyze failures, repair and rehabilitation techniques.
CO3. Solve complex building maintenance problems through proper investigations and interpretation.
CO4. Use modern tools and techniques for various repairs and rehabilitation of structures.
CO5. Provide solutions for building maintenance and repair problems considering health and safety.
CO6. Consider environmental sustainability in building maintenance and repair.
CO7. Maintain ethical standards for quality in repairs and rehabilitation of structures.
CO8. Evaluate specifications and perform cost analysis of building components while repair and rehabilitation.

III B.Tech. – II Semester
(16BT60113) **CONTRACT LAWS AND REGULATIONS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Construction contracts; Tenders; Arbitration; Legal requirements; Labour regulations.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate basic Knowledge on construction contracts, tenders, arbitration, legal requirements and labour regulations.
CO2.Analyze contracts and tenders.
CO3.Address the legal issues in contracts and tenders.
CO4.Follow laws and regulations in the preparation of contracts and tenders.
CO5.Prepare contract and tender documents as per the standards.
CO6.Consider project schedule, cost, quality and risk in the preparation of contracts and tenders.

III B.Tech. - II Semester
(16BT60114) **DISASTER MITIGATION AND MANAGEMENT**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:
COURSE DESCRIPTION: Disasters; Earthquakes; Floods; Cyclones; Droughts; Landslides; Disaster management.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate knowledge on disasters, their vulnerability and mitigation measures.
CO2. Analyze disasters and their vulnerability.
CO3. Design strategies for effective disaster mitigation.
CO4. Address pre and post disaster issues for better preparedness and mitigation measures, through proper analysis and interpretation.
CO5. Use appropriate methods in disaster mitigation and management.
CO6. Use historical data of disasters to inform the people over preparedness and mitigation measures.
CO7. Solve disaster related issues considering environment.
CO8. Consider economical issues in disaster management.

III B.Tech - II Semester
(16BT60115) **ENVIRONMENTAL POLLUTION AND CONTROL**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Fundamentals of air pollution; Dispersion of pollutants; Effects and control of air pollution; Water pollution; Soil pollution and control; Municipal solid waste management.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate knowledge on air, water, soil pollution and their control and solid waste management.
CO2. Analyze causes and effects of air, water and soil pollution and their remedial measures.
CO3. Recommend suitable solutions to complex environmental pollution problems.
CO4. Use appropriate remedial technique to solve environmental pollution problems.
CO5. Understand the effects of environmental pollution on human health and vegetation.
CO6. Encourage sustainable development through implementation of pollution control measures.
CO7. Maintain IS Codes for environmental quality control.

III B.Tech - II Semester
(16BT60116) **PLANNING FOR SUSTAINABLE DEVELOPMENT**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:-
COURSE DESCRIPTION: Sustainable development; Environmental impact; Sustainable Policies; Governance; Theories and strategies; Media and education for sustainability.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate the knowledge on sustainable development, environmental impact, sustainable policies, governance, systems and strategies, media and education for sustainability.
CO2. Analyze theories, environmental impact, policies, systems and strategies for sustainable development.
CO3. Develop suitable methods and systems for sustainable development.
CO4. Use appropriate techniques in solving issues related to sustainable development.
CO5. Provide solutions to problems associated with sustainable development considering society.
CO6. Consider environment while planning sustainable development.
CO7. Communicate effectively on sustainable development issues through media and education.
CO8. Consider economical issues while planning for sustainable development.

III B.Tech. – II Semester
(16BT60117) **PROFESSIONAL ETHICS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Engineering ethics; Professional ideals and virtues; Engineering as social experimentation; Responsibilities and rights; Global issues.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate the principles of ethics, importance of professional values and social responsibility.
CO2. Analyze the problems in the implementation of moral autonomy and use ethical theories in resolving moral dilemmas.
CO3. Develop suitable strategies to resolve problems arise in practicing professional ethics.
CO4. Provide solutions to complex problems associated with professional ethics by proper analysis and interpretation.
CO5. Use appropriate theories in resolving issues pertain to professional ethics.
CO6. Understand the impact of professional ethics on society and address the limitations of codes of ethics.
CO7. Practice engineering with professionalism, accountability and ethics.
CO8. Function as a member, consultant, manager, advisor and leader in multi-disciplinary teams.
CO9. Write reports without bias and give instructions to follow ethics.

III B.Tech. - II Semester
(16BT60118) **RURAL TECHNOLOGY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: -
COURSE DESCRIPTION: Rural technology; Non conventional energy; Technologies for rural development; Community development; IT in rural development.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate the knowledge on technologies for rural development.
CO2. Analyze various technologies available which are appropriate for rural development.
CO3. Carryout feasibility study on the public and private partnership for rural development.
CO4. Develop and use latest technologies for rural development.
CO5. Address health and safety issues while choosing technologies for rural development.
CO6. Educate the rural populace on the positive impacts of biofertilisers and usage of agromachinery in agriculture.

III B.Tech - II Semester
(16BT60308) **GLOBAL STRATEGY AND TECHNOLOGY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: -
COURSE DESCRIPTION: Introduction to strategic management; Strategic management process; Principles of good strategy; Globalization strategies; Research and Development strategies; Technology Management and Transfer; Elements of Transfer Process; Corporate Governance in the Indian scenario.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate the knowledge on Strategic management, Research & Development strategies, Technology management and transfer, Globalization and Corporate governance.
CO2. Indentify and analyze crucial problems in strategic management to improve performance of the organizations.
CO3. Develop the products and production process by using research and development strategies.
CO4. Conduct investigations on the impact of globalization in current scenario in the context of corporate governance.
CO5. Appraise the resources and capabilities of the firm in terms of their ability to confer sustainable development.
CO6. Apply ethics in strategic decision making.

III B.Tech - II Semester
(16BT60309) **INTELLECTUAL PROPERTY RIGHTS AND MANAGEMENT**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION:
Protection of ideas; innovation and artistic endeavors; Acts and procedure related to patents, trademarks, copy right, design registration, trade secrets and cyber laws; Infringement; Commercialization of intellectual property rights; Case studies in each.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate knowledge on intellectual property rights, patents, trademarks, copyrights, trade secrets and commercialization of intellectual property.
CO2. Analyse the commercial significance of discoveries and developments and to assist in bringing these into public use.
CO3. Investigate and ensure smooth transition from concept to final product by following National & International Laws of Intellectual Property.
CO4. Utilize the various policies and procedures related to patents, trademarks and copyrights relating to IPR.
CO5. Safeguard, review and manage the intellectual property so that it may receive adequate and appropriate legal protection against unauthorized use.
CO6. Follow ethical standards in capacity building and work as a platform for development, promotion, protection, compliance, and enforcement of intellectual property and knowledge.
CO7. Prepare documents and fill applications needed for filing a patent, design, copyright and trade mark.

III B.Tech – II Semester
(16BT60310) **MANAGING INNOVATION AND ENTREPRENEURSHIP**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Evolution of entrepreneurship from economic theory Managerial and entrepreneurial competencies; Concepts of Shifting Composition of the Economy Purposeful Innovation & Sources of Innovative Opportunity; The Innovation Process; Innovative Strategies; Entrepreneurial Motivation; Entrepreneurs versus inventors; Ethics and International Entrepreneurship; Strategic Issues in International Entrepreneurship; Problem solving Innovation and Diversification.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1: Demonstrate the principles of business innovation and entrepreneurship for establishing industrial ventures.
CO2: Analyze business plans for potential investors and stakeholders and effectively answer probabilistic questions on the substance of plan.
CO3: Develop a comprehensive and well planned business structure for a new venture.
CO4: Conduct investigation on complex problems, towards the development of Project.
CO5: Apply modern statistical and mathematical tools to design projects and subsequent work procedures.
CO6: Apply ethics in constructive innovation framework.
CO7: Exhibit professionalism by employing modern project management and financial tools.

III B. Tech – II Semester
(16BT60311) **MATERIALS SCIENCE**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Structure and Bonding in metals; Steels, Cast Irons and Non Ferrous alloys; Material Selection for conductors, Insulators and semi conductors; Strengthening mechanisms of metals; Plastics and Ceramics as Insulators; AC and DC properties of Insulators; Semiconductors and Magnetic materials; Composite materials in Electrical and Electronics engineering; Material Selection and manufacturing of Optical fibers.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate the knowledge on concepts of fundamental science and Engineering principles relevant to materials.
CO2. Analyze the structures of various types of Ferrous, Non ferrous alloys influencing various engineering applications.
CO3. Conduct investigations to select suitable materials with desired properties for engineering applications.
CO4. Use phase diagrams to interpret the data regarding microstructure of materials.
CO5. Consider health and safety issues while providing materials to real time applications.
CO6. Use composite materials that reduce material waste in design and manufacturing for sustainability.

III B.Tech - II Semester
(16BT70412) **GREEN TECHNOLOGIES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Principles of green engineering; Green communications; Green energy; Green computing; Green construction; Green manufacturing.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Deploy conceptual knowledge in green technologies pertaining to engineering practice.
CO2. Analyze various green technologies for engineering practice.
CO3. Provide green solutions to engineering problems.
CO4. Apply various green techniques in the engineering practice.
CO5. Consider health and safety issues while providing green solutions to the society.
CO6. Understand issues related to environment sustainability.
CO7. Apply ethical standards for environmental sustainability in the engineering practice.

III B.Tech. - II Semester
(16BT70413) **INTRODUCTION TO NANOSCIENCE AND NANOTECHNOLOGY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Introduction to the concept of nano; Description of nanomaterial; Nanostructure characterization tools; Classification of nanomaterials; Fabrication of nanomaterial; Different applications of nanostructures and nanomaterials.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate knowledge in
a) Nanoscale technology.
b) Difference between micro and nanotechnology
c) Classification of Nanostructure and Nanomaterial
d) Fabrication of various nanomaterials and nanostructures.
CO2. Analyze numerical and analytical problems in
a) Nanomaterial size by using Scanning Electron Microscope and X-Ray diffraction
CO3. Design and fabricate devices based on nanostructures like
a) Nano solar cell
b) Nano cantilever
c) Nano bio-sensor
CO4. Synthesize nano particle of different materials to solve the problems related to fabrication of nanostructures.
CO5. Select appropriate technique for fabrication of nanostructures and nanocomposites.
CO6. Apply ethical standards and legal issues while using chemical substances in fabrication of new nanostructures.

III B.Tech. – II Semester
(16BT60505) **ENGINEERING SYSTEM ANALYSIS AND DESIGN**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION:
Systems Process; Technologies for Systems; System Development Life Cycle; System Analysis and Modeling; Levels of Management; Project Management; Systems Implementation and Importance of UML Prototyping; Maintaining and Managing the Systems Output Process.
COURSE OUTCOMES: On successful completion of this course, the student will be able to:
CO1. Demonstrate knowledge in
a) Systems Process and System Design
b) Systems Analysis and Modeling
c)System Development Life Cycle
d) Design Management and Maintenance Tools.
CO2. Analyze System Process and estimate the given models by using case tools.
CO3. Design and Develop a model to the organizational systems.
CO4. Solve complex problems related to engineering systems and produce accurate results.
CO5. Apply object oriented techniques for modeling dynamic systems.
CO6. Contribute towards societal issues and responsibilities in designing, modeling and developing of organizational systems.

III B.Tech. – II Semester
(16BT71011) **MICRO-ELECTRO-MECHANICAL SYSTEMS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Overview of Micro Electro Mechanical Systems (MEMS); scaling laws; working principles of microsensors and microactuators; materials; microfabrication processes; packaging of Microsystems.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1.Demonstrate knowledge on MEMS devices, scaling laws, microsensors and microactuators.
CO2.Analyze the properties of materials and identify its suitability for MEMS devices.
CO3.Design MEMS devices that meet desired specifications and requirements.
CO4. Analyze and synthesize the information to provide effective solution to engineering problems with MEMS devices.
CO5.Use modern techniques in micro manufacturing process.
CO6.Develop efficient and cost effective MEMS based products for society.

III B.Tech. – II Semester
(16BT61205) **CYBER SECURITY AND LAWS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Cyber Crimes and Indian IT Act; Cyber Offenses; Tools and Methods used in Cyber Crime; Phishing ad Identity Theft; Indian and Global Perspective on Cyber Crimes and Cyber Security; Organizational Implications on Cyber Security; IPR Issues; Cyber Crime and Terrorism; Cyber Crime Illustrations.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate knowledge in Cyber security, Cyber crimes and its related laws in Indian and Global Act.
CO2. Analyze the legal perspectives and laws related to cyber crimes in Indian context.
CO3. Apply security and privacy methods in development of modern applications and in organizations to protect people and to prevent cyber crimes.
CO4. Solve Cyber security issues using privacy policies.
CO5. Use antivirus tools to minimize the impact of cyber threats.
CO6. Follow security standards for the implementation of Cyber Security and laws

III B.Tech. – II Semester
(16BT61505) **BIOINFORMATICS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: -
COURSE DESCRIPTION: Introduction to Bioinformatics; Biology and Information; Sequence alignment and dynamic programming; Biological Database; Homology Modeling; Structure Prediction; Molecular Dynamics
COURSE OUTCOMES: After successful completion of this course, the students will be able to:
CO1. Demonstrate knowledge on concepts of biological databases, Genome and proteome.
CO2. Analyze biological sequences for Homology Modeling.
CO3. Apply clustering methods for Phylogenetic trees.
CO4. Solve bio sequencing problems using dynamic programming.
CO5. Select and apply appropriate techniques and tools to structure Prediction

III B. Tech. - II Semester
(16BT61531) **DATA WAREHOUSING AND DATA MINING LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: A Course "Data Warehousing and Data Mining"
COURSE DESCRIPTION:
Hands on practical experience on Warehouse design; OLAP operation; Data pre-processing techniques; Association rule mining; classification of data; Naïve Bayes classifier; Decision tree; Clustering technique using WEKA-Open source machine learning tool.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge on the creation and usage of data warehouses.
CO2. Analyze and interpret the results using data mining techniques.
CO3. Design and develop transformations such as filter, join and rank on data warehouses.
CO4. Use classification and clustering techniques to find interesting patterns in large databases.
CO5. Choose and deploy modern tools to handle large, missing and noisy data in datasets.
CO6. Use appropriate data mining algorithms to find solutions for real time societal applications.
CO7. Function effectively as an individual to perform operations on different databases using *Informatica.*
CO8. Communicate effectively using report generation tools on business data.

III B. Tech. – II Semester
(16BT60531) **SOFTWARE TESTING LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES:
A course on "Software Testing"
COURSE DESCRIPTION:
Hands on Practice to Develop Functional, System, Regression and Acceptance tests; White Box Testing & Black Box Testing; Test Automation.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate practical knowledge of
- ☐ White Box Testing
- ☐ Black Box Testing
- ☐ Regression Testing
- ☐ Test Automation

CO2. Analyze the software requirements and report the bugs.
CO3. Design test cases using relevant testing techniques for an application.
CO4. Demonstrate decision making skills for testing desktop applications.
CO5. Use software testing tools and technologies for testing desktop applications.
CO6. Apply contextual knowledge to perform testing on software related to societal applications.
CO7. Work effectively as an individual and member of a team for testing software applications.

III B. Tech. – II Semester
(16BT60532) **SEMINAR**

Int. Marks	Ext. Marks	Total Marks		L	T	P	C
	100	100	-	-	-	2	

PREREQUISITES:
All the courses of the program up to III B. Tech. I-Semester
COURSE DESCRIPTION:
Identification of topic for the seminar; Literature survey; Performing critical study and analysis of the topic identified; Preparation of report and presentation
COURSE OUTCOMES:
On successful completion of the seminar work, the student will be able to demonstrate:
CO1. Knowledge on the seminar topic
CO2. Analytical ability exercised during the seminar work.
CO3. Ability to investigate and solve complex engineering problems faced during the Seminar work
CO4. Ability to apply techniques to complex engineering activities with an Understanding of limitations as applied in the seminar work.
CO5. Ability to function effectively as an individual as experienced during the Seminar Work
CO6. Ability to present views cogently and precisely on the seminar topic
CO7. Ability to engage in life-long leaning as experience during the seminar work.

IV B. Tech. – I Semester
(16BT61201) **CLOUD COMPUTING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on "Computer Networks" and "Operating Systems".
COURSE DESCRIPTION: Virtualization, Virtualization Technologies; Cloud Computing Fundamentals, Deployment Models; Cloud Computing Architecture; Cloud Computing Mechanisms; Cloud Security, Cloud Disaster Recovery; Working with Clouds; and Case Studies.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge on services, architecture, types of infrastructural models, disaster recovery and virtualization.
CO2. Analyze the issues in cloud computing Data, Network and Host security.
CO3. Apply API development skills in web applications for Cloud deployment.
CO4. Use research based knowledge to build cloud applications.
CO5. Use advanced programming languages to access cloud services.
CO6. Build cloud environment suitable for societal requirements.

IV B. Tech. - I Semester
(16BT51501) **COMPILER DESIGN**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: A course on "Theory of Computation"
COURSE DESCRIPTION:
Lexical analysis; Parsers; Run Time Environments; Syntax Directed Translation; Type checking; Code Optimization; Code Generation and Compiler tools.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge on the phases involved in design of compilers.
CO2. Analyze code optimization Techniques.
CO3: Design experiments for implementing parsing techniques.
CO4. Synthesize rules in compiler to demonstrate semantic attribution during Parsing.
CO5: Use compiler construction tools such as LEX and YACC for designing a Parser.
CO6: Apply Ethical principles for usage of stack and other storage memory.

IV B. Tech. – I Semester
(16BT51203) **WEB TECHNOLOGIES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Java Programming".
COURSE DESCRIPTION:
Hyper Text Markup Language (HTML); Features of HTML5; Cascading Style Sheets (CSS); JavaScript; JQuery; Bootstrap; Hypertext Preprocessor (PHP); MySQL.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge on web page design elements, dynamic content and database interaction.
CO2. Analyze user requirements to develop web applications.
CO3. Design client-server applications using web technologies.
CO4. Demonstrate problem solving skills to develop enterprise web applications.
CO5. Use HTML, CSS, JavaScript, JQuery, Bootstrap and PHP technologies for device independent web application development.
CO6. Apply Web Technologies to develop interactive, dynamic and scalable web applications for societal needs.

IV B. Tech. – I Semester
(16BT70501) **BIG DATA ANALYTICS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course "Data Warehousing and Data Mining"
COURSE DESCRIPTION:
Big Data; Types of Data Elements; Introduction to Hadoop; MapReduce; Building Blocks of Hadoop; Big Data Analytics Applications; Predictive and Descriptive Analytics**.**
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge in
- ☐ Big Data Characteristics,
- ☐ Hadoop & Hadoop Distributed File System
- ☐ Hadoop Framework & Hadoop Release
- ☐ Map Reduce work flow
- ☐ Hive and Hive Services.

CO2. Analyze large data sets by using Hadoop, Map Reduce, Hive, Pig tools.
CO3. Design and develop Map Reduce models for data sets.
CO4. Solve complex problems and store the results of the large data sets.
CO5. Select Hive and Hive services techniques for effective database models.
CO6. Contribute towards societal issues and responsibilities in designing, modeling and developing Big Data systems.

IV B. Tech. – I Semester
(16BT71205) **CRYPTOGRAPHY AND NETWORK SECURITY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Computer Networks".
COURSE DESCRIPTION: Principles and Practice of Cryptography and Network Security; Classical Systems; Symmetric Block Ciphers; Public-key Cryptography; Hash Functions; Authentication; Key Management; Key Exchange; Signature Schemes; E-mail; Web Security; Malicious Software; Intrusion Detection; Phishing and Identity Theft.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge on:
- ☐ Cryptographic algorithms and their mathematical models
- ☐ Message Authentication
- ☐ Digital Signatures
- ☐ Malicious Software
- ☐ Intrusion Detection
- ☐ Phishing and Identity Theft

CO2. Analyze vulnerabilities and threats on information systems based on various security parameters.
CO3. Apply security and privacy methods to protect and prevent cyber crimes.
CO4. Solve information privacy issues using encryption and digital signatures.
CO5. Use firewall and PGP to protect network and e-mail respectively.
CO6. Follow standards in implementation of network security.

IV B. Tech. – I Semester
(16BT70502) **ETHICAL HACKING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A Course on "Computer networks"
COURSE DESCRIPTION:
Network and Computer Attacks; Foot Printing and Social Engineering; Port Scanning; Enumeration; Desktop and Server Operating System vulnerabilities; Hacking Web Servers; Cryptography; Network Protection System; Hacking Wireless Network.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate Knowledge on
- ☐ Network and Computer attacks
- ☐ OS Vulnerabilities
- ☐ Hacking web servers, Hacking wireless network

CO2. Analyze system and network vulnerabilities.
CO3. Design security solutions for risks that arise from hacking.
CO4. Use appropriate ethical hacking technique to solve security problems.
CO5. Apply contextual knowledge to assess safety and legal issues in applications like cyber crime, social engineering.
CO6. Inculcate use of ethical hacking practices while maintaining professional ethics.

IV B. Tech. - I Semester
(16BT61503) **SOFTWARE PROJECT MANAGEMENT**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: A Course on "Software Engineering".
COURSE DESCRIPTION:
Conventional Software Management; Evolution of Software Economics; Improving Software Economics; Lifecycle Phases; Artifacts of the Process; Workflow of the Process; Checkpoints of the Process; Software Economics; Iterative Process Planning; Project Organization and Responsibilities; Project Control and Project Instrumentation; Agile Overview.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge on software effort estimation techniques, Agile life cycle, project control and instrumentation.
CO2. Analyze the major and minor milestones, artifacts, metrics from management and technical perspectives.

CO3. Design and develop software products using conventional and modern principles of software project management. CO4. Effectively implement project management through appropriate planning of Work flows and Work Breakdown Structures of the process.
CO5. Select appropriate techniques to evaluate progress of software project in terms of milestones and check points.
CO6. Apply appropriate ethical principles to be followed in management of software economics.

IV B. Tech. – I Semester
(16BT70503) **COMPUTER FORENSICS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A Course on "Computer Networks"
COURSE DESCRIPTION:
Computer Forensic Technologies; Evidence Collection and Data Seizure; Duplication and Preservation of Digital Evidence; E-mail Investigations; Data Analysis and Validation; Processing Crime and Incident Scenes; Mobile Device and Network Forensics; Computer Forensic Tools; Report Writing for Investigations
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge on
- ☐ Occurrence of Cyber Crime, Cyber Detectives.
- ☐ Evidence and Data Capture and Computer Forensic Analysis.
- ☐ Law Enforcement crime and incident scenes.

CO2. Analyze and present computer forensic evidence.
CO3. Design solutions for a wide range of computer forensic problems - attack on routers and e-mail crimes.

CO4. Conduct investigations on forensic data.
CO5. Utilize appropriate forensic tools to collect digital evidence.
CO6. Apply contextual knowledge to assess the computer crimes relevant to cyber crime detection.

IV B. Tech. – I Semester
(16BT70504) **DESIGN PATTERNS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A Course on "Object Oriented Analysis and Design"
COURSE DESCRIPTION:
Introduction to Design Patterns; Creational Patterns; Structural Patterns; Behavioral Patterns.
COURSE OUTCOMES:
After successful completion of the course, the student will be able to:
CO1. Demonstrate knowledge on
- ☐ Creational patterns
- ☐ Structural Patterns
- ☐ Behavioral Patterns

CO2. Analyze various object oriented concepts using Design Patterns.
CO3. Implement Design Pattern in C++ or Java.
CO4. Use Appropriate design Pattern to solve computational problems.
CO5. Create Design Pattern to enhance software quality of a system.
CO6. Apply contextual knowledge of design patterns to address human computer interaction in societal applications.

IV B. Tech. I-Semester
(16BT71508) INTERNET OF THINGS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: A Course on Computer Networks
COURSE DESCRIPTION:
Internet of Things Components; Communication models; Prototyping; Hardware; Design models; Analytics for IoT.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge on Protocols, functional blocks and communication models of Internet of things.

CO2. Identify appropriate sensors and communication modes used in IoT based systems.
CO3. Design appropriate solutions for IoT applications using Raspberry Pi and Arduino kits.
CO4. Appropriately synthesize the models and applications for usage in Home automation and cities.
CO5. Apply evolutionary techniques to perform analytics on the data integrated from IoT based systems.
CO6. Use advances in IoT technology to design and develop applications.

IV B. Tech. – I Semester
(16BT71208) **SERVICE ORIENTED ARCHITECTURE**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Software Engineering".
COURSE DESCRIPTION: Web Services; Principles of SOA; Service Layers; Simple Object Access Protocol (SOAP); Web Services Description Language (WSDL).
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge on:
- ☐ Principles, services and policies of service orientation.
- ☐ Fundamentals of web services.
- ☐ XML, WSDL related to SOA.

CO2. Analyze complex business process critically in identifying appropriate service model logic.
CO3. Design service oriented architecture suitable for different environments.
CO4. Use XML, SOAP and service interface design tools for building service oriented architecture.

IV B. Tech. – I Semester
(16BT70505) **HUMAN COMPUTER INTERACTION**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Computer Graphics".
COURSE DESCRIPTION:
Graphical User Interface; Design Process; Screen Designing; Windows; Components; Software Tools; Interaction Devices.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge on principles, characteristics, tools and devices of Human Computer Interaction.
CO2. Analyze the user requirements, technological and physical characteristics of users for better interface design.
CO3. Design appropriate user interface for desktop and web applications.
C04. Conduct investigations on User requirements to provide an effective user interface.
CO5. Utilize user interface mockup tools and input, output and pointing devices for designing user interfaces.
CO6. Apply Contextual knowledge to develop interfaces for differently abled people.

IV B. Tech. – I Semester
(16BT71203) **INFORMATION RETRIEVAL SYSTEMS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on "Data Structures" and "Database Management Systems".
COURSE DESCRIPTION: Architecture of Information Retrieval Systems; Functional Capabilities; Data Structures; Mathematical Algorithms; Indexing; Similarity and Clustering; Human Perception and Presentation; Text Search Techniques and Evaluation Measures.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1: Demonstrate knowledge on:
- ☐ Information Retrieval System Architecture
- ☐ Functional capabilities
- ☐ Indexing and data presentation methods.
- ☐ Evaluation measures of Information Retrieval Systems.

CO2: Analyze indexing methods and clustering algorithms to group similar data items for efficient search.

CO3: Design and develop data structures used to store and retrieve data items.
CO4: Demonstrate problem solving skills in the usage of mathematical algorithms for information retrieval.
CO5: Use text search algorithms and collaborative filtering techniques for information retrieval and visualization methods for information presentation.

IV B. Tech. – I Semester
(16BT70506) **MULTIMEDIA APPLICATION DEVELOPMENT**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:
Courses on "Object Oriented Programming through C++" and "Computer Graphics"
COURSE DESCRIPTION:
Multimedia; Fundamental Concepts in Audio and Video; Action Script 3.0; Multimedia Data Compression; Multimedia Network Communications and Applications.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge on
- Multimedia and Hypermedia
- Action Script 3.0
- Video representations and standards
- Multimedia Network Communications.

CO2. Analyze Action Script 3.0 principles, functions and components for developing multimedia authoring applications.
CO3. Design multimedia software for developing Internet applications and flash animations.
CO4. Develop solutions for simple to complex real life multimedia applications.
CO5. Use compression techniques and Action script 3.0 for development of multimedia applications.
CO6. Apply contextual knowledge to address issues like data compression, network communications in societal applications.

IV B. Tech. – I Semester
(16BT61204) **SEMANTIC WEB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Web Technologies".
COURSE DESCRIPTION: Semantic web fundamentals; Semantic web technology; Ontology web language; Swoogle; Semantic web services.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge on:
- Semantic web search
- RDF and SWOOGLE
- Semantic web services
- RDFS and OWL

CO2. Analyze layers of web architecture for describing web content.
CO3. Design semantic web search engine for capturing information on the current web.
CO4. Select RDF and SWOOGLE for search engine usage.

IV B. Tech. - I Semester
(16BT61231) **CLOUD COMPUTING LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: A course on "Cloud Computing".
COURSE DESCRIPTION: Hands-on experience on creating virtual machines on Windows and Linux platforms; Development of service based web applications and their deployment.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate hands-on experience on Virtualization models and Cloud Environment.
CO2. Analyze the given experiment and relate to existing cloud architectures.
CO3. Apply API development skills in web applications for cloud deployment.

CO4. Demonstrate independent problem solving skills in developing dynamic web applications.
CO5. Use advanced programming languages to access cloud services.
CO6. Build suitable cloud environment for societal requirements.
CO7. Work effectively as an individual and as a member in team for mini-project implementation.
CO8. Demonstrate communication skills, both oral and written for preparing and presenting reports.

IV B. Tech. – I Semester

(16BT51233) **WEB TECHNOLOGIES LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: A course on “Web Technologies”.
COURSE DESCRIPTION: Hands-on experience on HTML, HTML5, CSS, JavaScript, JQuery, Bootstrap, PHP and MySQL.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge on web page design elements, dynamic content and database Interaction.
CO2. Analyze user requirements to develop web applications.
CO3. Design client-server applications using web technologies.
CO4. Demonstrate problem solving skills to develop enterprise web applications.
CO5. Use HTML, CSS, JavaScript, JQuery, Bootstrap and PHP technologies for device independent web application development.
CO6. Apply web technologies to develop interactive, dynamic and scalable web applications for societal needs.
CO7. Work effectively as an individual and as a member in team for mini-project implementation.
CO8. Demonstrate communication skills, both oral and written for preparing and presenting reports.

IV B. Tech. – I Semester

(16BT70531) **COMPREHENSIVE ASSESSMENT**

Int. Marks	Ext. Marks	Total Marks		L	T	P	C
	100	100	-	-	-	2	

PREREQUISITES: All the courses of the program
COURSE DESCRIPTION:
Assessment of student learning outcomes in all the courses of the program
COURSE OUTCOMES:
On successful completion of Comprehensive Assessment, the student will be able to demonstrate:
CO1. Knowledge in the courses of the program.
CO2. Analytical ability in the courses of the program.
CO3. Design skills in the courses of the program.
CO4. Ability to investigate and solve complex engineering problems in the courses of the program.
CO5. Ability to apply tools and techniques to complex engineering activities with an understanding of limitations in the courses of the program.
CO6. Ability to provide solutions as per societal needs with consideration to health, safety, legal and cultural issues in the courses of the program.
CO7. Understanding of the impact of the professional engineering solutions in environmental context and need for sustainable development in the courses of the program.
CO8. Ability to apply ethics and norms of the engineering practice in the courses of the program.
CO9. Ability to function effectively as an individual in the courses of the program.
CO10. Ability to present views cogently and precisely in the courses of the program.
CO11. Ability to engage in life-long in the courses of the program.

IV B. Tech. – II Semester
(16BT80531) **PROJECT WORK**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
100	100	200	-	-	-	12

PREREQUISITES: All the courses of the program

COURSE DESCRIPTION:

Identification of topic for the project work; Literature survey; Collection of preliminary data; Identification of implementation tools and methodologies; Performing critical study and analysis of the topic identified; Time and cost analysis; Implementation of the project work; Preparation of thesis and presentation.

COURSE OUTCOMES:

On successful completion of the project work, the student will be able to demonstrate:

CO1. Knowledge on the project topic
CO2. Analytical ability exercised in the project work.
CO3. Design skills applied on the project topic.
CO4. Ability to investigate and solve complex engineering problems faced during the project work.
CO5. Ability to apply tools and techniques to complex engineering activities with an understanding of limitations in the project work.
CO6. Ability to provide solutions as per societal needs with consideration to health, safety, legal and cultural issues considered in the project work.
CO7. Understanding of the impact of the professional engineering solutions in environmental context and need for sustainable development experienced during the project work.
CO8. Ability to apply ethics and norms of the engineering practice as applied in the project work.
CO9. Ability to function effectively as an individual as experienced during the project work.
CO10. Ability to present views cogently and precisely on the project work.
CO11. Project management skills as applied in the project work.
CO12. Ability to engage in life-long leaning as experience during the project work.

Program: B.Tech. INFORMATION TECHNOLOGY

I B.Tech. - I Semester
(16BT1HS01) **TECHNICAL ENGLISH**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: English at Intermediate level

COURSE DESCRIPTION:

Introduction to Communication; Active Listening; Effective Speaking; Reading; and Writing.

COURSE OUTCOMES:

On successful completion of this course, the students will be able to:

1. Demonstrate knowledge in:
   - Process of communication
   - Modes of listening
   - Paralinguistic features
   - Skimming and Scanning
   - Elements of style in writing
2. Analyze the possibilities and limitations of language for understanding.
   - Barriers to Communication
   - Barriers to Effective Listening
   - Barriers to Speaking
   - Formal and metaphorical language
3. Design and develop functional skills for professional practice.
4. Apply writing skills in preparing and presenting documents.
5. Function effectively as an individual and as a member in diverse teams.
6. Communicate effectively with the engineering community and society in formal and informal situations.

I B.Tech. - I Semester
(16BT1BS01) **ENGINEERING CHEMISTRY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE REQUISITE: Intermediate/Senior Secondary Chemistry

COURSE DESCRIPTION: Water technology, Chemistry of Engineering materials, Nanochemistry, Green Chemistry, Electro chemical cells, Sensors, Corrosion and Lubricants.

COURSE OUTCOMES:

After completion of the course, a successful student is able to:

CO1: Acquire basic knowledge in water technology, engineering plastics, conducting polymers, composites, Electro chemical cells, Nano Chemistry, principles of Green Chemistry, corrosion phenomenon and lubricants.

CO2: Develop analytical skills in:

a. Determination of hardness of water.

b. Determination of viscosity, flame and fire points, cloud and pour points.

CO3: Develop designing skills in:

a. Synthesis of engineering plastics.

b. Chemical methods for the synthesis of Nano materials.

CO4: Develop skills for providing solutions through:

a. Mitigation of hardness of water.

b. Newer Nanomaterials and engineering plastics for specific applications

CO5: Acquire awareness to practice engineering in compliance to modern techniques such as:

a. Nalgonda technique for defluoridation of water

b. Electroplating technique for control of corrosion.

CO6: Acquire awareness to societal issues on:

a. Quality of water.

b. Bio-diesel

c. Chemical materials utility and their impact.

I B.Tech. - I Semester
(16BT1BS03) MATRICES AND NUMERICAL METHODS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Intermediate /Senior secondary mathematics

COURSE DESCRIPTION: Fundamentals of matrix theory; numerical solutions of equations, curve fitting; interpolation; numerical differentiation and integration; numerical solutions of ordinary differential equations.

COURSE OUTCOMES: After completion of the course a successful student is able to

CO1: Acquire basic **knowledge** in
- (a) Finding the rank of matrices and analyzing them.
- (b) Solving algebraic and transcendental equations by various numerical methods.
- (c) Fitting of various types of curves to the experimental data.
- (d) Estimating the missing data through interpolation methods.
- (e) Identification of errors in the experimental data
- (f) Finding the values of derivatives and integrals through various numerical methods.
- (g) Solving differential equations numerically when analytical methods fail.

CO2: Develop skills in **analyzing** the
- (a) methods of interpolating a given data
- (b) properties of interpolating polynomials and derive conclusions
- (c) properties of curves of best fit to the given data
- (d) algebraic and transcendental equations through their solutions
- (e) properties of functions through numerical differentiation and integration
- (f) properties of numerical solutions of differential equations

CO3: Develop skills in **designing** mathematical models for
- (a) Fitting geometrical curves to the given data
- (b) Solving differential equations
- (c) Constructing polynomials to the given data and drawing inferences.

CO4: Develop numerical skills in **solving the problems** involving
- (a) Systems of linear equations
- (b) Fitting of polynomials and different types of equations to the experimental data
- (c) Derivatives and integrals
- (d) Ordinary differential equations

CO5: Use relevant numerical **techniques** for
- (a) Diagonalising the matrices of quadratic forms
- (b) Interpolation of data and fitting interpolation polynomials
- (c) Fitting of different types of curves to experimental data
- (d) obtaining derivatives of required order for given experimental data
- (e) Expressing the functions as sum of partial fractions

I B.Tech. - I Semester

(16BT1BS04) **MULTI-VARIABLE CALCULUS AND DIFFERENTIAL EQUATIONS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Intermediate /Senior secondary mathematics
COURSE DESCRIPTION: First order differential equations; higher order linear differential equations; functions of several variables; applications of integration; multiple integrals; vector calculus.
COURSE OUTCOMES: After completion of the course a successful student is able to

CO1: Acquire knowledge in
- (a) Higher order Differential equations
- (b) Maximum and minimum values for the functions of several variables
- (c) Double and triple integrals
- (d) Differentiation and integration of vector functions.
- (e) Line and surface volume
- (f) transforming integrals from three dimensional surfaces and volumes on to plane surfaces

CO2: Develop skills in analyzing the
- (a) methods for differential equation for obtaining appropriate solutions,
- (b) Properties of oscillatory electrical circuits and heat transfer in engineering systems
- (c) The variations in the properties of functions near their stationary values
- (d) Flow patterns of fluids, electrical and magnetic flux and related aspects

CO3: Develop skills in designing mathematical models for
- (a) R-C and L-R-C oscillatory electrical circuits
- (b) Heat transfer and Newton's law of cooling
- (c) Engineering concepts involving lengths of curves and areas of planes, Flux across surfaces

CO4: Develop analytical skills in solving the problems involving
- (a) Newton's law of cooling
- (b) non homogeneous linear differential equations
- (c) maximum and minimum values for the functions
- (d) lengths of curves, areas of surfaces and volumes of solids in engineering
- (e) transformation of integrals from three dimensional surfaces and volumes on to plane surfaces

CO5: Use relevant mathematical techniques for evaluating
- (a) various types of particular integrals in differential equations
- (b) stationary values for multi variable functions
- (c) multiple integrals in change of variables
- (d) integrations of vector functions.

I B.Tech. - I Semester

(16BT10501) **PROGRAMMING IN C**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: NIL
COURSE DESCRIPTION:
Program design; Operators and Expressions; Data Input and Output; Control Statements; Functions; Arrays; Strings; Pointers; Structures & Unions and File handling Techniques;

COURSE OUTCOMES:
After successful completion of the course, students will be able to:

CO1: Demonstrate knowledge in:
- o Elements of C Language
- o Selection and Repetition statements.
- o Arrays, Strings and Functional statements.
- o Derived data types, Files and Pointers

CO2: Analyze complex engineering problems to develop suitable solutions
CO3: Design algorithms for specified engineering problems
CO4: Use appropriate 'C' language constructs for solving engineering problems
CO5: Write programs using 'C' language to implement algorithms

I B.Tech. - I Semester
(16BT1HS31) **ENGLISH LANGUAGE LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: English at intermediate or equivalent level.
COURSE DESCRIPTION: Phonetics Vocabulary Building; Functional Grammar; Just a Minute; Elocution/Impromptu; Giving Directions/Conversation Starters; Role Play; Public Speaking; Describing People, Places, Objects and Events; Reading Comprehension; Listening Comprehension; Information Transfer.
COURSE OUTCOMES:
On successful completion of this course, the students will be able to:

1. Demonstrate knowledge in
   - Phonetics
   - Information Transfer
2. Analyze the functional knowledge in
   - Vocabulary
   - Grammar
3. Design and develop functional skills for professional practice.
4. Apply the techniques of Listening and Reading skills to comprehend Listening and Reading comprehension.
5. Function effectively as an individual and as a member in diverse teams to demonstrate
   - Extempore talk and
   - Role Play
6. Communicate effectively in public speaking in formal and informal situations.
7. Recognize the need to engage in lifelong learning to upgrade competence of knowledge and communication.

I B.Tech. - I Semester
(16BT1BS31) **ENGINEERING CHEMISTRY LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE REQUISITE: Intermediate/Senior Secondary Chemistry

COURSE DESCRIPTION: Estimation of hardness, alkalinity, dissolved oxygen of water samples and estimation of Iron by volumetric methods, determination of effect of P^H on rate of corrosion, measurement of viscosity of lubricants; Instrumental methods like potentiometer, conductivity meter, P^H meter and colorimeter; synthesis of Polymers and Nano materials.

COURSE OUTCOMES:
After completion of the course, a successful student is able to:

CO1: Acquire basic Knowledge about the volumetric analysis and synthesis of materials used for engineering applications.

CO2: Acquire analytical skills in the estimation of hardness of water, alkalinity of water, dissolved oxygen in water and estimation of Iron through wet laboratory methods.

CO3: Develop designing skills for the synthesis of polymers and Nanomaterials.

CO4: Acquire skills to use instrumental techniques for the determination of Electrical conductance of electrolytes, EMF of a cell, PH of a solution, determination of viscosity of lubricants and estimation of iron in cement.

CO5: Provide solutions for environmental issues through determination of quality of water.

I B.Tech. - I Semester
(16BT10331) **COMPUTER AIDED ENGINEERING DRAWING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	1	6	3

PRE-REQUISITES: *None*
COURSE DESCRIPTION:
Engineering drawing conventions; importance of engineering drawing; fundamental concepts of sketching; computed aided drafting and different types of projections of geometric entities (both 2D and 3D) through computer aided drafting packages.
COURSE OUTCOMES:
After completion of the course, a successful student is able to:

- CO1: Understand, write and read the language of engineering drawing in industry through International System of Standards.
- CO2: Develop the imagination and mental visualization ability for interpreting the geometrical details of engineering objects.
- CO3: Produce different views and projection in drawing.
- CO4: Use modern CAD software for design and drafting of drawings.
- CO5: Create multi-view drawings suitable for presentation to Engineering community.
- CO6: Introduce and communicate universally accepted conventions and symbols for their usage in technical drawing.

I B.Tech - I Semester
(16BT10531) **PROGRAMMING IN C LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: A course on "Programming in C"

COURSE DESCRIPTION: Hands on practice in developing and executing simple programs using C Programming constructs– Conditional statements, Loops, Arrays, Strings, Functions, Structures, Pointers and Functions.

COURSE OUTCOMES:

On successful completion of this course the students will be able to:

1. Demonstrate practical knowledge of using C language constructs:
   - Selection and Repetition statements.
   - Arrays, Strings and Functional statements.
   - Derived data types, Files and Pointers
2. Analyze problems to develop suitable algorithmic solutions
3. Design Solutions for specified engineering problems
4. Use appropriate 'C' language constructs for solving engineering problems
5. Implement and execute programs using 'C' language
6. Document programs and communicate effectively while conducting Professional transactions.

I B.Tech. - II Semester
(16BT1BS02) **ENGINEERING PHYSICS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Intermediate / senior secondary Physics
COURSE DESCRIPTION: Lasers; optical fibers; principles of quantum mechanics; band theory of solids; semiconductors; dielectric properties of materials; acoustics of buildings; superconductors; crystallography and nanomaterials.
COURSE OUTCOMES:
On successful completion of this course, the students will be able to:

1. Acquire basic knowledge of lasers, optical fibers, quantum mechanics, dielectrics, semiconductors, and superconductors, acoustic of buildings, crystallography and nanomaterials.

2. Analyze the construction and working of various laser systems, semiconductor devices, various types of optical fibers and its communication system and nano materials properties.
3. Gain skills in designing lasers, optical fiber cable, semiconductor devices, acoustically good halls and nanomaterials.
4. Develop problem solving skills in engineering context.
5. Use relevant techniques for assessing ball milling, pulsed laser deposition, p-n junction and Laser.

I B.Tech. - II Semester
(16BT2BS01) TRANSFORMATION TECHNIQUES AND PARTIAL DIFFERENTIAL EQUATIONS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE REQUISITE: Intermediate /Senior secondary mathematics
COURSE DESCRIPTION: Fourier series; Fourier integrals and transforms; Laplace transforms; z – transforms; partial differential equations.
COURSE OUTCOMES:
After completion of the course a successful student is able to
CO1: Acquire basic knowledge in
- (a) Fourier series and Fourier transforms
- (b) Fourier integrals
- (c) Laplace transforms and their applications
- (d) z- transforms and their applications
- (e) solving partial differential equations

CO2: Develop skills in analyzing the
- (a) Properties of Fourier series for a given function
- (b) Partial differential equations through different evaluation methods
- (c) Difference equations through z – transforms
- (d) Engineering systems and processes involving wave forms and heat transfer

CO3: Develop skills in designing mathematical models for
- (a) Problems involving heat transfer and wave forms
- (b) Engineering concepts involving, Fourier transforms, Fourier integrals, Laplace transforms, z-transforms and difference equations

CO4: Develop analytical skills in solving the problems involving
- (a) Fourier series and Fourier transforms
- (b) Laplace transforms
- (c) Z-transforms and difference equations
- (d) Heat transfer and wave motion

CO5: Use relevant transformation techniques for
- (a) Obtaining Fourier transforms for different types of functions
- (b) Laplace transforms
- (c) Z- transforms
- (d) Partial differential equations

I B.Tech. - II Semester
(16BT20441) BASIC ELECTRONIC DEVICES AND CIRCUITS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: A course on Engineering Physics.
COURSE DESCRIPTION:
Characteristics of general and special purpose electronic devices; Rectifiers; Biasing of BJT; FET, Feedback Amplifiers, Oscillator.
COURSE OUTCOMES: On successful completion of this course the students will be able to
CO1: Gain in-depth knowledge in
- *p-n* junction diode and its characteristics
- Zener diode and its characteristics
- Rectifiers and Filters

- Characteristics of BJT, FET, MOSFET and special purpose electronic devices.
- FET amplifiers
- Feedback amplifiers and Oscillators

CO2: Analyze numerical and analytical problems in
- Rectifiers using Filters
- Transistor biasing circuits
- FET biasing circuits and amplifiers
- Feedback amplifiers and oscillators

CO3: Design electronic circuits such as
- Rectifiers with and without filters
- BJT and FET biasing circuits
- FET amplifiers
- Feedback amplifiers and oscillators

CO4: Solve engineering problems and arrive at solutions pertaining to electronic circuits.
CO5: Select appropriate technique for transistor biasing.

I B.Tech. - II Semester
(16BT21201) **OBJECT ORIENTED PROGRAMMING THROUGH C++**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	4	1	-	4

PREREQUISITES: A Course on "Programming in C".
COURSE DESCRIPTION:
Introduction to Object Oriented concepts and Fundamental Concepts of C^{++}; Decision Making Statements, Looping Statements and Functions; Arrays, Pointers & References and Strings; Classes & Objects and Overloading Operators; Composition & Inheritance, Templates, Iterators & Generics and File Handling;
COURSE OUTCOMES:
On successful completion of this course, the students will be able to:
CO1: Demonstrate knowledge on object oriented programming concepts - Object, Class, Inheritance, Polymorphism, Encapsulation, Abstraction and Message passing.
CO2: Identify object oriented concepts for code reusability and optimization.
CO3: Design and develop solutions for given specifications.
CO4: Demonstrate problem solving skills to provide software solutions to real world problems.
CO5: Develop C^{++} programming to provide solutions to complex engineering problems using object oriented concepts.

I B.Tech. - II Semester
(16BT21501) **DIGITAL LOGIC DESIGN**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -NIL-

COURSE DESCRIPTION: Introduction to number systems; logic gates; Boolean Algebra; simplification of Boolean functions; Design of combinational circuits; Design of sequential circuits, Memory and Programmable Logic

COURSE OUTCOMES:

On Successful completion of this course student will be able to:

CO1. Demonstrate knowledge on Boolean algebra, Minimization of Boolean functions using Map Reduce method.

CO2. Identify appropriate simplification techniques for Boolean functions.

CO3. Design combinational and sequential logic circuits, memory and programmable logic for digital systems.

CO4. Select and Apply Boolean algebra and gate level minimization techniques for designing combinational and sequential logic circuits.

CO5. Learn independently new concepts, new techniques and advanced subject knowledge in the area of combinational and sequential logic circuits.

I B.Tech. - II Semester
(16BT1BS32) **ENGINEERING PHYSICS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Intermediate / senior secondary Physics.

COURSE DESCRIPTION:

Characteristics of p-n junction diode, Photodiode, LED, and semiconductor laser diode. Experimental determination of carrier concentration and energy gap of a semiconductor material, wave length of a laser source, size of fine particle, numerical aperture and acceptance angle of optical fiber. Determination of frequency of electrically vibrating tuning fork and A.C source using A.C sonometer, magnetic field along axial line of a current carrying coil and rigidity modulus of material of a wire using torsional pendulum.

COURSE OUTCOMES:

After completion of the course, a successful student will be able to:

CO1: Acquire basic knowledge about semiconductor materials, magnetic materials and lasers.

CO2: Acquire analytical skills in the estimation of carrier concentration of semiconductor materials and characterization of p-n junction.

CO3: Develop skills in designing electronic circuits using semiconductor components.

CO4: Acquire skills to use instrumental techniques in A.C sonometer and Melde's experiment.

CO5: Apply diffraction techniques for determination of size of tiny particles and wave length of lasers.

I B.Tech II semester
(16BT20451) **ANALOG AND DIGITAL ELECTRONICS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: Courses on "Basic Electronic Devices & Circuits and Digital Logic Design"

COURSE DESCRIPTION: Identification and testing of active and passive components; RPS, DMM, Function Generator, CRO; Diode characteristics; Rectifiers; BJT and FET characteristics; UJT and SCR characteristics; BJT Amplifiers; Realization of FFs, Combinational Circuits, sequential Circuits; Demonstration on VHDL Programme.

COURSE OUTCOMES: On successful completion of this course, the student will be able to:

CO1. Demonstrate knowledge in different electronic devices, analog and digital circuits

CO2. Analyze the characteristics of different electronic devices and circuits like
- Diodes p-n Junction Diodes, Zener Diodes, SCR
- Transistors-BJT,FET,UJT
- Flip Flops-JK FF, D FF
- Combinational Circuits-HA, FA
- Sequential Circuits -Counters

CO3. Design electronic circuits like FET Amplifiers, Feedback amplifiers, Oscillators, Combinational Circuits and Sequential Circuits.

CO4. Solve engineering problems by proposing potential solutions through Design of better electronic circuits.

CO5. Model an electronic circuit which fulfil the needs of the society.

CO6: Function effectively as an individual and as a member in a group

CO7: Communicate effectively in verbal and written form.

I B.Tech. - II Semester
(16BT21231) **IT Workshop**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: —Nil—

COURSE DESCRIPTION:

Practice sessions on PC hardware, Internet, World Wide Web, LibreOffice Suite. Demonstrations on installations of system software such as MS-Windows, Linux and device drivers, hardware and software troubleshooting, and protecting the personal computer from viruses and other cyber attacks are include.

COURSE OUTCOMES:

On successful completion of this course, the students will be able to:

1. Demonstrate analytical skills in:
   - Identification of functional parts of PC
   - Internet and World Wide Web.
   - Computer security issues and preventive measures.
   - Operating Systems.
2. Design document and presentations effectively.
3. Apply modern tools to develop IT based applications.
4. Demonstrate effective communication skills through IT tools.
5. Update knowledge and skills in PC maintenance and usage of latest Operating Systems and Office automation tools.

I B.Tech. - II Semester
(16BT21232) **OBJECT ORIENTED PROGRAMMING LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: A Course on "OOPS through C++".

COURSE DESCRIPTION:

Hands-on experience on creating Virtual machines on Windows and Linux platforms, Development of Service based web applications & their deployment and Mobile app development.

COURSE OUTCOMES:

On successful completion of this course, the students will be able to:

1. Demonstrate practical knowledge on Object oriented programming concepts - Object, Class, Inheritance, Polymorphism, encapsulation, Abstraction, message passing.
2. Apply object oriented programming concepts to develop real world applications.
3. Demonstrate Problem solving skills using basic and advanced concepts of C++.
4. Work individually and in teams collaboratively in implementing the applications.
5. Demonstrate communication skills both oral and written for preparing and presenting reports.

II B.Tech. - I Semester
(16BT3BS01) **PROBABILITY DISTRIBUTIONS AND STATISTICAL METHODS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Intermediate/senior secondary mathematics.
COURSE DESCRIPTION: Random variables; Mathematical expectations; Probability distributions; Correlation and regressions; Statistical quality control; Sampling distributions; Tests for small and large samples and their significances.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Acquire basic knowledge on:
- Probability distributions, correlation and regressions.
- Statistical quality control and testing of hypotheses.
- Simple linear regression.
- Tests of significance for small and large samples.

C02 Develop skills for analyzing the data with:
- Mathematical expectations for realistic results.
- Probability distributions for practical situations.
- Control charts of statistical quality control. Correlation and regression concepts.
- Suitable tests of significance for practical situations.

C03 Develop skills in designing:
- Probability distributions.
- Limitations of statistical quality control.
- Control charts.
- X, R, np, and c charts

CO4. Develop analytical skills for solving problems involving:
- Probability distributions, means, variances and standard deviations.
- Statistical techniques employed for quality.
- Sampling techniques for decision making.
- Tests of significances for small and large samples.

CO5. Use relevant probability and statistical techniques for:
- Mathematical expectations of desired results.
- Fitting probability distributions for experimental data.
- Quality control and testing of hypothesis.

II B.Tech. - I Semester
(16BT30501) **COMPUTER ORGANIZATION**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Digital Logic Design".
COURSE DESCRIPTION: Basic structure and operation of a digital computer; Organization and functional principles of the arithmetic and logic unit, control unit, memory unit and I/O unit; Concepts of pipelining and parallel processing techniques.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Demonstrate knowledge on:
- Computer Arithmetic units
- Register Transfer and Computer Instructions
- Design of Control Unit
- Input Output Organization and Memory system
- Pipelining and Multiprocessing.

CO2. Analyze the functional units of a digital computer.
CO3. Design the functional modules in a digital computer - Arithmetic Units, Memory and I/O.
CO4. Investigate the performance of memory, I/O, and pipelined processors.
CO5. Select appropriate techniques of I/O, Pipelining and Multiprocessing to solve computing problems.
CO6. Apply contextual knowledge of computer systems development to societal applications.

II B.Tech. - I Semester
(16BT30502) **DATA STRUCTURES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Programming in C".

COURSE DESCRIPTION: Linked Lists; Type of lists; Operations and Applications; Stacks and Queues; Operations and Applications; Trees, Search trees and Heaps; Multiway Trees and Graphs; Searching and Hashing.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on:
- Principles of Data Structures.
- Linear and Non-linear Data Structures.
- Sorting and hashing techniques.

CO2. Analyze and Identify suitable data structure for computational problem solving.

CO3. Design solutions for complex engineering problems using linear and non-linear data structures.

CO4. Develop solutions for Complex computational problems by conducting explorative analysis.

CO5. Apply appropriate data structure to provide solutions for real time problems by using C Language.

CO6. Apply contextual knowledge of data structures to design applications for societal applications like payroll systems, web applications, banking and financial systems.

II B.Tech. - I Semester
(16BT31201) **DISCRETE MATHEMATICAL STRUCTURES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Multivariable Calculus and Differential Equations".

COURSE DESCRIPTION: Mathematical Logic; Predicates; Functions and Relations; Algebra Structures; Mathematical Reasoning; Recurrence Relations; Graphs; Graph Theory and its Applications.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on mathematical logic, algebraic structures, relations, recurrence relations and mathema-tical reasoning.

CO2. Analyze and prove given statement by contradiction and automatic theorem.

CO3. Design network applications using Prim's and Kruskal's algorithms.

CO4. Solve tree traversal problems using Graph Theory.

CO5. Apply permutation, combinations, counting principle, Lagrange's theorem and graph theory in solving real-time problems.

II B.Tech. - I Semester
(16BT50502) **LINUX PROGRAMMING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Operating Systems".
COURSE DESCRIPTION: Concepts on Linux Programming; Shell Programming; Process, Signals and File System Structure; Inter process Communications and Socket Programming for Client-Server Interaction.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Demonstrate knowledge on:
- Shell programming
- File Structure and System Calls
- Processes management and handling signals,
- IPC and Sockets

CO2. Analyze shell scripts and system calls related to Linux Environment.
CO3. Design shell scripts and system calls for specified computational problems.
CO4. Use appropriate shell scripts and system calls for solving complex problems.
CO5. Provide appropriate Linux solutions for real time applications.
CO6. Apply contextual knowledge to solve problems related to societal issues.

II B.Tech. - I Semester
(16BT31501) **OPERATING SYSTEMS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: --
COURSE DESCRIPTION: Operating systems operations, scheduling; Critical section problem, deadlocks; Paging, segmentation; File Concept, Disk scheduling; I/O interface; concepts of protection.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Demonstrate knowledge on Operating system operations, services, file management, disk management, I/O management and protection.
CO2. Identify the functionality involved in process management concepts like scheduling and synchronization.
CO3. Design models for handling deadlock and perform memory management.
CO4. Synthesize and apply programming API's to perform Process management.
CO5. Use appropriate protection tools to provide access control to Operating system users.

II B.Tech. - I Semester
(16BT30531) **DATA STRUCTURES LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: A course on "Data Structures".
COURSE DESCRIPTION: Hands on practice on Linked Lists; Type of lists; Stacks and Queues; Trees and Search trees; Graphs; Searching and Hashing.

COURSE OUTCOMES:
On successful completion of this course, students will be able to:

CO1. Demonstrate practical knowledge on Stacks, Queues, Linked lists, Trees Sorting and Hashing Techniques.
CO2. Analyze suitable data structure to solve real world computing problems.
CO3. Design solutions for complex computational problems using linear and non-linear data structures.
CO4. Solve for Complex computational problems by conducting explorative analysis.
CO5. Use C language for implementing linear and non-linear data structures.
CO6. Apply contextual knowledge of data structures to design applications for societal requirements.
CO7. Communicate effectively using data structures with engineering community, being able to comprehend and write effective programs and Prepare Reports.

II B.Tech. - I Semester
(16BT50532) LINUX PROGRAMMING LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: A course on "Linux Programming".
COURSE DESCRIPTION: Hands on Practice with - Shell Programs; System Calls; Environment Variables; Inter Process Communication; File System and Socket Programming.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Demonstrate practical knowledge on
- Shell programming
- File Structure and System Calls
- Processes management and handling signals,
- IPC and Sockets

CO2. Analyze shell scripts and system calls in Linux operating system.
CO3. Design shell scripts for specified computational problems.
CO4. Use appropriate shell scripts and system calls for solving complex problems.
CO5. Create shell scripts and system calls for real time Linux applications.
CO6. Apply contextual knowledge to solve problems related to societal issues.
CO7. Communicate effectively using Linux with engineering community being able to comprehend and write effective programs and prepare reports.

II B.Tech. - I Semester
(16BT31531) OPERATING SYSTEMS LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: A course on "Operating Systems".

COURSE DESCRIPTION: Hands on practice in simulating algorithms for CPU Scheduling, Memory Management, I/O Management, Deadlock Handling mechanisms; Implementing Synchronization problems; practice on UNIX commands.

COURSE OUTCOMES:
On successful completion of this course, students will be able to:

CO1. Demonstrate of the following algorithms to solve problems:
- CPU Scheduling
- Memory Management
- I/O Management

CO2. Formulate and analyze solutions to problems pertaining to Memory and I/O.
CO3. Designing models for deadlock handling mechanisms.
CO4. Develop skills in basic UNIX commands.

CO5. Use appropriate APIs' available in modern operating systems (such as threads, system calls, semaphores, etc.) for software development.

CO6. Communicate effectively on complex operating system problems with implication to User-friendliness.

CO7. Develop and demonstrate user defined libraries to communicate with the kernel for effective implementation of projects across multidisciplinary environments.

II B.Tech. - II Semester

(16BT3HS01) **ENVIRONMENTAL STUDIES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	3	-	-	3

PRE-REQUISITES: A course on "Engineering Chemistry".

COURSE DESCRIPTION: Multidisciplinary nature of environment; Natural resources; Ecosystems; Biodiversity; Environment pollution and control; Social issues and environment; Human population and environment; Field studies.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Acquire knowledge on nature of environment, natural resources, ecosystems, biodiversity, environmental pollution and control, social issues and human population.

CO2. Analyze natural resources, ecosystems, biodiversity, environmental pollution and control, social issues and human population.

CO3. Develop strategies for environmental pollution control and natural resource management.

CO4. Solve environmental problems through proper analysis and interpretation of environmental data.

CO5. Choose appropriate techniques in environmental pollution control and natural resource management.

CO6. Understand the impact of social issues and population on environment.

CO7. Provide solutions to individuals, industries and government for environmental sustainable development.

CO8. Follow environmental protection laws for sustainable development.

CO9. Communicate effectively on environmental issues in the form of reports.

II B.Tech. - II Semester

(16BT41204) **THEORY OF COMPUTATION**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Discrete Mathematical Structures".

COURSE DESCRIPTION: Fundamentals of Computation; Finite State Automaton; Regular Expressions; Grammars; Push Down Automaton; Turing Machine.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on Formal languages and automata.

CO2. Analyze the classification of languages, automata's and their computing power.

CO3. Design grammars and automata (recognizers) for regular expressions and formal languages.

CO4. Solve computational problems using automata.

CO5. Apply theorems to translate automata's and identify the class of languages.

II B.Tech. - II Semester
(16BT40502) **DATABASE MANAGEMENT SYSTEMS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: --

COURSE DESCRIPTION: Database Systems; Database Design; Relational Model; SQL Queries, Constraints and Triggers; Schema Refinement and Normal Forms; Transaction Management; Concurrency Control; Overview of Storage and Indexing.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on:
- Data models and Database Languages
- Database design
- Normal forms
- Storage and Indexing

CO2. Analyze databases using normal forms to provide solutions for real time applications.
CO3. Design solutions for database problems using database design, view design and framing queries.
CO4. Use database techniques for designing databases, managing databases and its security.
CO5. Select SQL, Hash based Indexing and Tree based Indexing to manage data in databases.
CO6. Apply contextual knowledge to develop database applications related to societal applications like Information Retrieval Systems, Banking and Financial systems.

II B.Tech. - II Semester
(16BT41201) **DESIGN AND ANALYSIS OF ALGORITHMS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Data Structures".

COURSE DESCRIPTION: Introduction to Algorithms and Asymptotic Notations; Disjoint Sets and Graphs; Divide and Conquer, Greedy Method; Dynamic Programming, Back Tracking; Branch and Bound.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on:
- Algorithm Complexities and Asymptotic notations.
- Algorithm Design techniques-Divide and Conquer, Greedy Method, dynamic programming, Back tracking, Branch and Bound.

CO2. Analyze the performance of algorithms with respect to Time and Space complexities.
CO3. Design the algorithms for solving real world problems.
CO4. Solve sorting and searching problems using Divide and Conquer method.
CO5. Use dynamic programming and backtracking in finding shortest paths.

II B.Tech. - II Semester
(16BT41202) **JAVA PROGRAMMING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Object Oriented Programming through C++".

COURSE DESCRIPTION: Introduction of Java, Classes and Objects; Inheritance, Packages, Interfaces; Exception handling, Multithreading; Event handling, AWT, Collection Classes; Applets, Servlets.

COURSE OUTCOMES:
On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on:
- Object Oriented Programming concepts - classes, objects, inheritance, polymorphism, encapsulation and abstraction.
- Packages, interfaces, multithreading, exception handling, event handling.

CO2. Analyze complex engineering problems using object oriented concepts.
CO3. Design and develop reusable code to provide effective solutions for real world problems using inheritance and polymorphism.
CO4. Apply AWT and Applets to create interactive Graphical User Interfaces.
CO5. Use advanced programming languages to develop web applications.
CO6. Build Java Applications suitable for societal requirements.

II B.Tech. - II Semester
(16BT41203) SOFTWARE ENGINEERING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: --
COURSE DESCRIPTION: Concepts of Software Engineering; Software Process Models; Conventional and Agile Process Models; Software Requirements Engineering Process; System Analysis; Architectural Design; User Interface Design and Re-engineering; Software Testing; Risk and Quality Management.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Demonstrate knowledge on:
- Fundamental concepts of software engineering.
- Process models.
- Software development life cycle.

CO2. Analyze software requirements and process models required to develop a software system.
CO3. Design and develop a quality software product using design engineering principles.
CO4. Develop software product as per user and societal requirements.
CO5. Follow standards for software development and quality management.
CO6. Demonstrate skills in applying risk and quality management principles for effective management of software projects.

II B.Tech. - II Semester
(16BT40531) DATABASE MANAGEMENT SYSTEMS LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: A course on "Database Management Systems".
COURSE DESCRIPTION: Hands on experience on - DDL, DML commands; Query processing using operators; Joins, Views, Single Row functions, Group Functions and SET functions; PL/SQL concepts - Basic Programs, Triggers, Functions, Cursors and Stored Procedures.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:

CO1. Demonstrate practical knowledge on creation and alteration of tables, insertion and Querying of data.
CO2. Analyze and evaluate the databases using SQL DML/DDL commands.
CO3. Design database schemas for the sales database, customer database and product database.
CO4. Develop solutions for database problems using stored procedures, stored functions, cursors and triggers.

CO5. Implement DDL and DML commands in SQL and PL/SQL, ORACLE to manage data in databases.
CO6. Apply contextual knowledge to develop database applications related to societal issues.
CO7. Demonstrate communication skills, both oral and written for preparing and presenting reports on databases.

II B.Tech. - II Semester
(16BT31231) **JAVA PROGRAMMING LAB'**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: A course on "Java Programming".
COURSE DESCRIPTION: Hands-on experience on Polymorphism; Inheritance and Interfaces; Exception Handling; Multithreading; Event Handling; AWT; Applets; Servlets.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Demonstrate knowledge on basic concepts of Java programming.
CO2. Design and develop efficient programs with multitasking ability and handle exceptions.
CO3. Demonstrate independent problem solving skills in developing interactive applications.
CO4. Apply object oriented approach to develop user friendly interface and learn how to communicate with systems over the network.
CO5. Build Java applications suitable for societal requirements.
CO6. Work effectively as an individual and as a member in team for case studies implementation.
CO7. Demonstrate communication skills, both oral and written for preparing and presenting reports.

II B.Tech. - II Semester
(16BT4HS31) **SOFT SKILLS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: English Language Laboratory in I B.Tech.
COURSE DESCRIPTION: This course covers Body Language; Assertiveness; Goal Setting; Creative Thinking; Interpersonal Skills; Team Work; Conflict Management; Etiquette; Report Writing; Group Discussions; Interviewing Skills.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Acquire knowledge on
- Goal Setting
- Creative Thinking
- Leadership Skills and
- Team Work

CO2. Analyze the situations and develop skills for
- Body Language
- Personality Development and
- Stress Management

CO3. Apply the techniques of soft skills in a problem situation enhanced through multimedia software.
CO4. Function effectively as an individual and as a member in diverse teams.
CO5. Communicate effectively in public speaking in formal and informal forums.

III B.Tech. - I Semester
(16BT51201) **COMPUTER GRAPHICS AND MULTIMEDIA**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Matrices and Numerical Methods".
COURSE DESCRIPTION: Introduction to Computer Graphics, Output Primitives; 2D Geometric Transformations and Viewing; 3D object representation and Visible Surface Detection Methods; Introduction to Multimedia, Audio and Video; Multimedia Data Compression.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on:
- Graphical interactive devices
- Viewing transformations
- 3-D object representations
- Surface detection methods
- Image, audio, video representations and standards.

CO2. Analyze multimedia compression issues using image, audio and video compression techniques.
CO3. Design algorithms to generate points, lines, polygons for 2-D, 3-D objects.
CO4. Apply Transformations and Clipping algorithms for 2-D and 3-D objects, various lossy / lossless coding techniques on text and images for compression and decompression.
CO5. Build multimedia applications for societal requirements.

III B.Tech. - I Semester
(16BT50501) **COMPUTER NETWORKS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A Course on "Operating Systems".
COURSE DESCRIPTION: Introduction to Computer Networks; The Physical Layer; The Data Link Layer; The Medium Access Control Sublayer; The Network Layer; The Transport Layer; The Application Layer.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on:
- Functionalities of Various OSI and TCP/IP layers
- 3G Mobile phone networks, 802.11
- TCP,UDP and SMTP

CO2. Analyze the issues related to data link, medium access and transport layers by using channel allocation and connection management schemes.
CO3. Design and compute subnet masks and addresses for networking requirements.
CO4. Solve problems related to Flow control, Error control, congestion control and Network Routing.
CO5. Apply Network Standards - 802.3 and 802.11 for developing computer Networks.
CO6. Assess the impact of wired and wireless Networks in the context of societal applications like VoIP, Multi-user Network Games, Internet of Things.

III B.Tech. - I Semester
(16BT51501) **COMPILER DESIGN**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Theory of Computation".

COURSE DESCRIPTION: Lexical analysis; Parsers; Run Time Environments; Syntax Directed Translation; Type checking; Code Optimization; Code Generation and Compiler tools.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on the phases involved in design of compilers.

CO2. Analyze code optimization Techniques.

CO3. Design experiments for implementing parsing techniques.

CO4. Synthesize rules in compiler to demonstrate semantic attribution during Parsing.

CO5. Use compiler construction tools such as LEX and YACC for designing a Parser.

CO6. Apply ethical principles for usage of stack and other storage memory.

III B.Tech. - I Semester
(16BT51202) **OBJECT ORIENTED ANALYSIS AND DESIGN**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on "Software Engineering" and "Object Oriented Programming through C++".

COURSE DESCRIPTION: Introduction to UML, Basic structural modeling; Advanced structural modeling, Class and object diagrams; Basic behavioral modeling; Advanced behavioral modeling; Architectural modeling.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on principles of object oriented analysis and design through UML Diagrams.

CO2. Analyze user requirements and identify suitable structural and behavioral modeling components.

CO3. Design and develop UML models for real time software applications.

CO4. Solve real world problems by applying structural and behavioral modeling techniques.

CO5. Use unified modeling language in preparing blue prints for software solutions.

CO6. Design and develop UML models to solve societal problems.

III B.Tech. - I Semester
(16BT51203) **WEB TECHNOLOGIES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Java Programming".

COURSE DESCRIPTION: Hyper Text Markup Language (HTML); Features of HTML5; Cascading Style Sheets (CSS); JavaScript; JQuery; Bootstrap; Hypertext Preprocessor (PHP); MySQL.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on web page design elements, dynamic content and database interaction.

CO2. Analyze user requirements to develop web applications.
CO3. Design client-server applications using web technologies.
CO4. Demonstrate problem solving skills to develop enterprise web applications.
CO5. Use HTML, CSS, JavaScript, JQuery, Bootstrap and PHP technologies for device independent web application development.
CO6. Apply Web Technologies to develop interactive, dynamic and scalable web applications for societal needs.

III B.Tech. - I Semester
(16BT50341) **OPTIMIZATION TECHNIQUES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Multi Variable Calculus and Differential Equations".

COURSE DESCRIPTION: Introduction to optimization; classical optimization techniques; classification of optimization problems; linear programming; transportation and assignment problem; non-linear programming; un-constrained non-linear programming; constrained non-linear programming; dynamic programming.

COURSE OUTCOMES:
On successful completion of this course, students will be able to:

CO1. Demonstrate the knowledge on Optimization techniques for Linear, Non linear and Dynamic programming problems.
CO2. Analyze and quantify a system architecture or product design problem for selecting appropriate objective function, design variables, parameters and constraints.
CO3. Develop mathematical models for real time optimization problems.
CO4. Conduct investigations on complex problems and make recommendations based on solutions, analysis and limitations of models.
CO5. Use optimization techniques for solving complex problems of real time applications.
CO6. Optimize the resources in organizations for sustainable development.

III B.Tech. - I Semester
(16BT50442) **MICROPROCESSORS AND INTERFACING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on "Digital Logic Design" and "Computer Organization".

COURSE DESCRIPTION: INTEL 8086 and 8051- Architectures; Instruction set; Programmable Interfacing Concepts; ADC, DAC, 8255, 8257,8259 ,8279,8251, Advanced peripheral Interfacing; Applications.

COURSE OUTCOMES:
On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on
- Internal Hardware details of Intel 8086, 8051 and programming devices like 8255, 8257, 8259, 8279 and 8251.
- Interfacing various peripherals to build standalone systems.

CO2: Analyze various peripherals and interfacing techniques.
CO3: Design application based Microcomputer system using 8086 and 8051.
CO4: Solve problems by providing microcomputer-based real time solutions.
CO5: Apply programming tools, appropriate techniques and resources to complex engineering activities for microprocessor and microcontroller based systems with understanding of limitations.
C06: Solving societal problems by applying concepts of microprocessors and microcontrollers.

III B.Tech. - I Semester

(16BT60404) **IMAGE PROCESSING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: --

COURSE DESCRIPTION: Fundamentals of image processing; Image transforms; Image enhancement techniques in spatial and frequency domains; Restoration techniques; Image segmentation techniques; Image compression techniques.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on

- Image Fundamentals
- Image Enhancement and Restoration Techniques
- Image Segmentation and Compression Techniques
- Color image processing

CO2. Analyze different images using various processing techniques.

CO3. Design and Develop various image processing algorithms to process the images in various Real Time Applications.

CO4. Solve problems related to images for feasible and optimal solutions in the core area of Image Processing.

CO5. Apply appropriate techniques to complex engineering activities in the field of image processing.

CO6. Understand the impact of the image processing for societal needs.

III B.Tech. - I Semester

(16BT60503) **WIRELESS NETWORKS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Computer Networks".

COURSE DESCRIPTION: Generations of Wireless Networks; Voice and Data Processing; Wireless Network Topology; GSM; TDMA; CDMA; Wireless LANs; Wireless WANs; Wireless PAN.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on

- Wireless Medium Access methods.
- Network Topology
- Wireless LAN, HIPERLAN
- GSM, CDMA, GPRS

CO2. Analyze the network topologies in Wireless Networks.

CO3. Design solutions for network communications at physical and transport layers.

CO4. Solve complex problems related to network communications and wireless networks.

CO5. Apply GSM, CDMA, GPRS and Bluetooth to create Home Access Networks and wireless Personal Area Network.

CO6. Apply contextual knowledge to solve problems using societal applications like health care devices, Internet of Things.

III B.Tech. - I Semester

(16BT51231) **CASE TOOLS AND COMPUTER NETWORKS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Courses on "Object Oriented Analysis and Design", "Computer Networks" and "Java Programming".

COURSE DESCRIPTION: Modeling case studies -Online Ticket Reservation system; Point of sales; Hands-on Experience on data link Framing methods; CRC; Routing algorithms; Congestion Control Algorithms; Substitution Techniques and Network Simulation using NS-2.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on:
- UML architecture
- Routing algorithms
- Error detection and correction techniques.

CO2. Analyze real world problems and study the applicability of UML design.

CO3. Apply Unified Modeling Language to design software and design routing algorithms Shortest path using Dijkstra's, and Distance vector.

CO4. Demonstrate independent problem solving skills in designing and developing software solutions.

CO5. Use NS-2 tool for simulating computer network processes.

CO6. Build network models and UML models suitable for societal needs.

CO7. Work effectively as an individual and as a member in team for mini-project implementation.

CO8. Demonstrate communication skills, both oral and written for preparing and presenting reports.

III B.Tech. - I Semester

(16BT51232) **COMPUTER GRAPHICS AND MULTIMEDIA LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Courses on "Computer Graphics and Multimedia" and "Java Programming".

COURSE DESCRIPTION: Hands on experience in developing graphics, Animating Flash Movies and Developing Applications using a Flash Tool.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on creation of 2D, 3D objects and compression techniques.

CO2. Analyze real world problems and identify solutions based on computer graphics and multimedia concepts.

CO3. Design and develop various algorithms for graphics, user authoring applications and animation movies.

CO4. Demonstrate independent problem solving in developing multimedia applications.

CO5. Apply various programming principles to implement graphics and to animate interactive flash movies for presenting multimedia content.

CO6. Build multimedia applications suitable for societal requirements.

CO7. Work effectively as an individual and as a member in team for mini-project implementation.

CO8. Demonstrate communication skills, both oral and written for preparing and presenting reports.

III B.Tech. - I Semester
(16BT51233) **WEB TECHNOLOGIES LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: A course on "Web Technologies".

COURSE DESCRIPTION: Hands-on experience on HTML, HTML5, CSS, JavaScript, JQuery, Bootstrap, PHP and MySQL.

COURSE OUTCOMES:

On Successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on web page design elements, dynamic content and database Interaction.
CO2. Analyze user requirements to develop web applications.
CO3. Design client-server applications using web technologies.
CO4. Demonstrate problem solving skills to develop enterprise web applications.
CO5. Use HTML, CSS, JavaScript, JQuery, Bootstrap and PHP technologies for device independent web application development.
CO6. Apply web technologies to develop interactive, dynamic and scalable web applications for societal needs.
CO7. Work effectively as an individual and as a member in team for mini-project implementation.
CO8. Demonstrate communication skills, both oral and written for preparing and presenting reports.

III B.Tech. - II Semester
(16BT3HS02) **MANAGERIAL ECONOMICS AND PRINCIPLES OF ACCOUNTANCY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: --

COURSE DESCRIPTION: Managerial Economics; Demand and Elasticity of Demand; Production Functions; Markets and Pricing Policies; Basic concepts of Accounting (Journal, Ledger and Trial balance); Trading Account, Profit and Loss Account and Balance sheet with simple adjustments; Computerized Accounting.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Acquire knowledge on:
- Tools and concepts of Micro Economics.
- Basic Principles and concepts of Accountancy.
- Provides life skills for effective utilization of scarce resources.
- Financial Accounting.
- Significance of Economics and Accountancy

CO2. Develop skills in managerial decision making of an organization.
CO3. Apply the Economic theories i.e., Demand, Production, Cost, Markets and Price.
CO4. Develop effective communication in Business and Accounting transactions.
CO5. Ascertain the profitability and soundness of an organization.
CO6. Practice Financial Accounting.

III B.Tech. - II Semester
(16BT61501) **DATA WAREHOUSING AND DATA MINING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Database Management Systems".

COURSE DESCRIPTION: Data Mining Fundamentals; Data Preprocessing; Operational Database Systems and Data Warehouses; Mining Frequent Patterns; Classification and Prediction; Clustering; New Trends and Research Frontiers.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate Concepts of knowledge in data warehousing and data mining.

CO2. Analyze using data mining techniques to find useful and potential Knowledge.

CO3. Design Data Warehouse for OLAP applications for deployment.

CO4. Evaluate the usage of association mining techniques on complex data objects.

CO5. Select appropriate techniques to measure the interesting patterns from heterogeneous databases.

CO6. Apply appropriate evolutionary data mining algorithms to find solutions of Real time Applications.

III B.Tech. - II Semester
(16BT61201) **CLOUD COMPUTING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on "Computer Networks" and "Operating Systems".

COURSE DESCRIPTION: Virtualization, Virtualization Technologies; Cloud Computing Fundamentals, Deployment Models; Cloud Computing Architecture; Cloud Computing Mechanisms; Cloud Security, Cloud Disaster Recovery; Working with Clouds; and Case Studies.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on services, architecture, types of infrastructural models, disaster recovery and virtualization.

CO2. Analyze the issues in cloud computing Data, Network and Host security.

CO3. Apply API development skills in web applications for Cloud deployment.

CO4. Use research based knowledge to build cloud applications.

CO5. Use advanced programming languages to access cloud services.

CO6. Build cloud environment suitable for societal requirements.

III B.Tech. - II Semester
(16BT60441) **PATTERN RECOGNITION**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: --

COURSE DESCRIPTION: Importance of pattern recognition; Baye's Decision Theory; Linear and non linear classifiers; Feature selection based on statistical hypothesis testing; Feature Generation; KL Transform; SVD; ICA; Clustering of features and clustering algorithms.

COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Apply the knowledge of engineering fundamentals on:
- Classifying the features and patterns.
- Feature selection and generation.
- Clustering patterns of objects.

CO2. Analyze numerical and analytical problems of features and patterns of object using pattern recognition algorithms.
CO3. Design and develop algorithms to optimize classification of patterns, feature selection and generation and clustering of objects.
CO4. Interpretation and synthesis the features of objects to validate the performances of pattern recognition algorithms.
CO5. Apply appropriate techniques and algorithms to identify patters of objects with an understanding of limitations.
CO6. Use pattern recognition techniques for societal needs.

III B.Tech. - II Semester
(16BT70402) **EMBEDDED SYSTEMS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on "Digital Logic Design" and "Computer Organization".
COURSE DESCRIPTION: Embedded system design approaches; MSP430 Architecture; Instruction Set; On-Chip Resources; Programming; Communication with peripherals; Internet of Things related Issues.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Apply knowledge on:
- MSP430 Architecture, Pin out, Instruction set
- High level programming
- Usage of On-chip resources like ADC, DAC, Timers
- Internet of Things related issues

CO2. Analyze various designing issues regarding:
- Usage of on chip resources
- Low power modes
- Communication support

CO3. Design embedded systems using MSP430 series microcontrollers to suit market requirements.
CO4. Solve engineering problems and arrive at solutions in designing embedded systems to support interconnectivity.
CO5. Apply techniques, program skills, On-Chip resources to design networked embedded systems with an understanding of limitations.
CO6. Reason out and practice professional engineering to deliver efficient and cost effective embedded based products to society.

III B.Tech. - II Semester
(16BT60502) **SOFT COMPUTING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: --
COURSE DESCRIPTION: Concepts on Soft Computing Techniques; Artificial Neural Networks; Supervised Learning; Unsupervised Learning; Fuzzy logic; Genetic Algorithms.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Demonstrate knowledge on:

- Artificial Neural Networks
- Supervised Learning Networks
- Unsupervised Learning Networks
- Fuzzy sets, relations and measures
- Genetic Operators

CO2. Analyze neural network architectures, Fuzzy systems and Genetic algorithms.
CO3. Design soft computing solutions for real life computational problems.
CO4. Use soft computing techniques to solve complex computational problems.
CO5. Create algorithms using soft computing techniques.
CO6. Apply contextual knowledge to solve problems related to societal issues like Business Intelligence, Forecasting.

III B.Tech. - II Semester
(16BT61202) **AD-HOC AND WIRELESS SENSOR NETWORKS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Computer Networks".
COURSE DESCRIPTION: Ad-hoc Wireless Networks, MAC Protocols; Routing Protocols; Transport Layer Protocols; Quality of Service and Energy Management; Wireless Sensor Networks.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Demonstrate knowledge on:
- Ad-hoc and sensor networks
- MAC Protocols and Routing Protocols
- TCP over Ad-hoc wireless networks
- QoS in Ad-hoc wireless networks.
- Sensor networks.

CO2. Analyze the issues in MAC, Routing and Transport Layer in Ad-hoc and wireless sensor networks.
CO3. Apply routing and energy management techniques in Ad-hoc wireless networks.
CO4. Demonstrate problem solving skills in the implementation of secured and optimum QoS wireless networks.
CO5. Use routing algorithms in ad-hoc wireless networks.

III B.Tech. - II Semester
(16BT30503) **PYTHON PROGRAMMING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Object Oriented Programming through C++"
COURSE DESCRIPTION: Data types and Expressions; Control Statements; Strings; Text Files; Lists; Dictionaries; Functions; Objects and their use; Exception Handling; Design with Classes; Graphical User Interface.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Demonstrate knowledge on:
- Data Types, Variables, Expressions
- Control statements, Strings and Text files.
- Lists, Dictionaries and Functions.
- Objects and Design with classes
- Exception Handling and GUI

CO2. Analyze complex computational problems.
CO3. Design solutions for real life computational problems.

CO4. Solve complex problems using python scripting constructs.
CO5. Implement python scripts using Integrated Development Environment.
CO6. Apply Python programming knowledge to solve problems related to societal applications like Medical and Weather Forecasting.

III B.Tech. - II Semester
(16BT61203) **ADVANCED DATABASES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on "Database Management Systems" and "Computer Networks".

COURSE DESCRIPTION: Parallel Databases; Object based Databases; Distributed Databases; Distributed Transaction Management; Emerging Database Technologies and Applications.

COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Demonstrate knowledge on:
- Parallel databases.
- Object based and Object Relational databases.
- Distributed databases, horizontal and vertical data fragmentations.
- Mobile databases, Geographic Information Systems, Genome Data Management, Multimedia Database and NoSQL.

CO2. Demonstrate skills in Query optimization, Data Fragmentation, Transaction Management and Con-currency Control for Distributed Transactions.
CO3. Design Parallel, Object-Oriented, Object-Relational and NoSQL databases.
CO4. Solve Concurrency Problems in Distributed Transactions.
CO5. Use database techniques for Mobile, Geographic Information Systems, Genome Data Management, and Multimedia Data.
CO6. Create databases as per societal needs.

III B.Tech. - II Semester
(16BT61204) **SEMANTIC WEB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Web Technologies".

COURSE DESCRIPTION: Semantic web fundamentals; Semantic web technology; Ontology web language; Swoogle; Semantic web services.

COURSE OUTCOMES:
On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on:
- Semantic web search
- RDF and SWOOGLE
- Semantic web services
- RDFS and OWL

CO2. Analyze layers of web architecture for describing web content.
CO3. Design semantic web search engine for capturing information on the current web.
CO4. Select RDF and SWOOGLE for search engine usage.

III B.Tech. - II Semester

(16BT61503) **SOFTWARE PROJECT MANAGEMENT**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Software Engineering".

COURSE DESCRIPTION: Conventional Software Management;Evolution of Software Economics; Improving Software Economics; Lifecycle Phases; Artifacts of the Process; Workflow of the Process; Checkpoints of the Process; Software Economics; Iterative Process Planning; Project Organization and Responsibilities; Project Control and Project Instrumentation; Agile Overview.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on software effort estimation techniques, Agile life cycle, project control and instru-mentation.

CO2. Analyze the major and minor milestones, artifacts, metrics from management and technical perspectives.

CO3. Design and develop software products using conventional and modern principles of software project management.

CO4. Effectively implement project management through appropriate planning of Work flows and Work Breakdown Structures of the process.

CO5. Select appropriate techniques to evaluate progress of software project in terms of milestones and check points.

CO6. Apply appropriate ethical principles to be followed in management of software economics.

III B.Tech. - II Semester

(16BT6HS01) **BANKING AND INSURANCE**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: --

COURSE DESCRIPTION: Origin of Banking; Functions of Banking; Role & Functions of RBI; Bank-Customer Relationship; Deposit and Loan Services of Banks; Banking Procedures; Electronic Payment Mechanisms; Business Models; Concepts of Risk and Uncertainty; Fundamentals of Insurance; Principles of Insurance; Essentials of Insurance Contracts; Insurance players in India.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate Knowledge in
- Tools and concepts of Banking and Insurance.
- Basic Principles and concepts of Insurance and Banking.
- e-fund transfers, e-payments and e-business models.

CO2. Develop skills in providing solutions for
- Online banking and e – payments.
- Risk Management through insurance benefits the society at large.
- Money management by leveraging on technology, banking and insurance services.

CO3. Exhibit conceptual soundness about banking and insurance, this would contribute to More employment opportunities.

CO4. Provide life skills for effective utilization of Banking and Insurance facilities.

III B.Tech. - II Semester

(16BT6HS02) **BUSINESS COMMUNICATION AND CAREER SKILLS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Nature and scope of communication; Corporate communication; Writing business documents; Careers and resumes; Interviews.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge in
- · Corporate Communication
- · Main Stages of Writing Messages
- · Career Building

CO2. Analyze the possibilities and limitations of language in
- · Communication Networks
- · Crisis Management/Communication

CO3. Design and develop the functional skills for professional practice inBusiness Presentations & Speeches

CO4. Applywritten and oral communicationtechniques in preparing and presenting various documents in technical writing.

CO5. Function effectively as an individual and as a member in diverse teams.

CO6. Communicate effectively with the engineering community and society in formal and informal situations.

III B.Tech. – II Semester

(16BT6HS03) **COST ACCOUNTING AND FINANCIAL MANAGEMENT**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Scope, Objectives and Elements ofcost Accounting; Cost Sheet and Tender quotations; Variance Analysis: Material variances, Labor variances; Meaning and Scope, Liquidity, Profitability Ratios: concept of Risk and Return on Investment.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Acquire Knowledge in
- · Elements of Costing.
- · Basic concepts of Financial Management.
- · Risk and Return
- · Significance of Cost Accountancy
- · Behavioral Finance

CO2. Develop skills in
- · Material, Labor, Overheads control.
- · Excellence and ability to minimize the cost of the organization

CO3. Develop effective Communication in Cost control and Financial Management.

CO4. Providesolutions for effective investment decisions.

III B.Tech. – II Semester

(16BT6HS04) **ENTREPRENEURSHIP FOR MICRO, SMALL AND MEDIUM ENTERPRISES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Introduction to Entrepreneur Development; Idea generation and formation of Business Plan; Micro and Small Enterprises; Institutional Finance and Support to Entrepreneur; Woman Entrepreneurship.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Acquire Knowledge in
- Schemes and institutions encouraging entrepreneurship.
- Basic Principles and concepts of Accountancy.
- Significance of entrepreneurship.

CO2. Develop skills in providing solutions for
- Personal excellence through financial and professional freedom.
- Women entrepreneurship serving as contrivance in societal development

CO3. Develop critical thinking and evaluation ability.

CO4. Widens knowledge and build up attitude towards trouble shooting.

CO5. Demonstrate business acumen.

III B. Tech. – II Semester

(16BT6HS05) **FRENCH LANGUAGE (La Langue Francais)**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:—

COURSE DESCRIPTION: Oral communications; Basic grammar; advancedgrammar;basic writing; Business French (La Francais Commercial)

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge in
- Process of communication
- Modes of listening
- Paralinguistic features
- Skimming and Scanning
- Elements of style in writing

CO2. Analyze the possibilities and limitations of language, understanding
- Barriers to Communication
- Barriers to Effective Listening
- Barriers to Speaking
- Formal and metaphorical language

CO3. Design and develop language skills for professional practice.

CO4. Apply basic writing skills in writing Emails and understanding wide range of technical terminologies.

CO5. Understand French culture and civilization.

CO6. Communicate effectively with the native French in day to day situation.

III B.Tech. - II Semester
(16BT6HS06) **GERMAN LANGUAGE (Deutsch alsFremdsprache)**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:—
COURSE DESCRIPTION: Oral communication;Basic grammar; Advanced grammar; Basic writing; Berufsdeutcsch (Business German)
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Demonstrate knowledge in
- · Process of communication
- · Modes of listening
- · Paralinguistic features
- · Skimming and Scanning
- · Elements of style in writing

CO2. Analyze the possibilities and limitations of language, understanding
- · Barriers to Communication
- · Barriers to Effective Listening
- · Barriers to Speaking
- · Formal and metaphorical language

CO3. Design and develop language skills for professional practice**.**
CO4. Apply basic writing skills in writing Emails and understanding wide range of technical terminologies.
CO5. UnderstandGerman culture and civilization.
CO6. Communicate effectively with the native German in day to day situation**.**

III B.Tech. - II Semester
(16BT6HS07) **INDIAN CONSTITUTION**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —
COURSE DESCRIPTION: Elements, functions and functionaries according to Indian Constitution, understanding forbetter professional practice and good citizenry.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Gain knowledge in
- · Parliamentary proceedings, laws, legislature, administration and its philosophy Federal system and judiciary of India.
- · Socials problems and public services like central civil services and state civil services
- · Indian and international political aspects and dynamics.

CO2. Develop etiquette and professional behavior in line with the constitution of India for becoming a responsible citizen.

III B.Tech. - II Semester
(16BT6HS08) **INDIAN ECONOMY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —
COURSE DESCRIPTION: Introduction; Time Value of Money; Elementary Economic Analysis; Value analysis, Value Engineering; Economic Planning.

COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Acquire the knowledge in
- · Micro and Macro Economics.
- · Traditional and Modern methods of Capital Budgeting.
- · Five year plans and NITI Aayog.

CO2. Analyze
- · Capital Budgeting.
- · Value Analysis and Value Engineering.
- · Economic analysis
- · Law of supply and demand

CO3. Understand the nuances of project management and finance

III B.Tech. - II Semester
(16BT6HS09) **INDIAN HERITAGE AND CULTURE**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —
COURSE DESCRIPTION:
Basic traits of Indian Culture; Humanistic Reforms under Jainism and Buddhism; Culture in the medieval period; Socio Religious reforms in Indian Culture; Reform movements for harmonious relations.
COURSE OUTCOMES: On successful completion of this course, students will be able to:
CO1. Acquaint knowledge in
- · Human aspirations and values in Vedic culture.
- · Cultural aspects of Buddhism and Jainism
- · Unification of our country under Mourya's and Gupta's administrations
- · Socio Religious aspects of Indian culture
- · Reform movements and harmonious relations.

CO2. Apply ethical principles and reforms as models for the upliftment of the societal status in the present cultural contexts

III B.Tech. - II Semester
(16BT6HS10) **INDIAN HISTORY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Introduction; Ancient India; Classical and Medieval era; Modern India; India after independence.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Gain knowledge on evolution and history of India as a nation

CO2. Analyze social and political situations of past and current periods

CO3. Practice in career or at other social institutions morally and ethically

III B.Tech. - II Semester

(16BT6HS11) **PERSONALITY DEVELOPMENT**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Self-esteem & Self-Management; Developing Positive Attitudes; Self-Motivation & Self-Management; Getting Along with the Supervisor; Workplace Success.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge in
- Self-Management
- Planning Career

CO2. Analyze the situations based on
- Attitudes
- Thinking strategies

CO3. Design and develop the functional skills for professional practice in

CO4. Function effectively as an individual and as a member in diverse teams.

CO5. Communicate effectively in public speaking in formal and informal situations.

III B.Tech. - II Semester

(16BT6HS12) **PHILOSOPHY OF EDUCATION**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Introduction to Philosophy and Engineering Education; Philosophical methods and their implications in engineering; Philosophical education in India; Values and Engineering education; Outcome based education.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Acquire knowledge in
- Philosophy of Engineering education.
- Philosophical Methods.
- Knowledge acquiring methods.
- Engineering education and responsibilities.

CO2. Understand the impact of Outcome Based Education for effective educational outcomes

CO3. Apply reasoning to assess societal issues with the contextual knowledge of engineering education and responsibilities.

III B.Tech. - II Semester

(16BT6HS13) **PUBLIC ADMINISTRATION**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Introduction; Public Policy; Good Governance; E-Governance; Development Administration.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Acquireknowledge in
- Public Policy.
- Good Governance.
- E-governance.
- Development Administration.

CO2. Analyze the possibilities and limitations ofexisting policies through Good Governance perspective.
CO3. Design and develop solutions in e-governance modelsto find and provide opportunities in e-governance.
CO4. Adopt principles ofe-governance in addressing the existing issues and challenges in e-governance sector.
CO5. Understand the significance of Administrative Development in finding professional engineering solutions by probing
· Bureaucracy.
· Role of civil society.

III B.Tech. - II Semester

(16BT60112) **BUILDING MAINTENANCE AND REPAIR**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Durability of buildings, Failure and repair of buildings, Material Techniques for repair, Maintenance of buildings, Conservation and recycling.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Acquire basic knowledge on durability and serviceability, failures, repair and rehabilitation of buildings.
CO2. Analyzefailures, repair and rehabilitation techniques.
CO3. Solve complex building maintenance problems through proper investigations and interpretation.
CO4. Use modern tools and techniques for various repairs and rehabilitation of structures.
CO5. Provide solutions for building maintenance and repair problems considering health and safety.
CO6. Consider environmental sustainability in building maintenance and repair.
CO7. Maintain ethical standards for quality in repairs and rehabilitation of structures.
CO8. Evaluate specifications and perform cost analysis of building components while repair and rehabilitation.

III B.Tech. - II Semester

(16BT60113) **CONTRACT LAWS AND REGULATIONS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Construction contracts; Tenders; Arbitration; Legal requirements; Labour regulations.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate basic Knowledge on construction contracts, tenders, arbitration, legalrequirements and labour regulations.
CO2. Analyze contracts and tenders.
CO3. Address the legal issues in contracts and tenders.
CO4. Follow laws and regulations in the preparation of contracts and tenders.
CO5. Prepare contract and tender documents as per the standards.
CO6. Consider project schedule, cost, quality and risk in the preparation of contracts and tenders.

III B.Tech. - II Semester
(16BT60114) **DISASTER MITIGATION AND MANAGEMENT**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: —
COURSE DESCRIPTION: Disasters; Earthquakes; Floods; Cyclones; Droughts; Landslides; Disaster management.
COURSE OUTCOMES: On successful completion of this course, students will be able to:
CO1. Demonstrateknowledge on disasters, their vulnerability and mitigation measures.
CO2. Analyze disasters and their vulnerability.
CO3. Design strategies for effective disaster mitigation.
CO4. Address pre and post disaster issues for better preparedness and mitigation measures, through proper analysis and interpretation.
CO5. Use appropriate methods in disaster mitigation and management.
CO6. Use historical data of disasters to inform the people over preparedness and mitigation measures.
CO7. Solve disaster related issues considering environment.
CO8. Consider economical issues in disaster management.

III B.Tech - II Semester
(16BT60115) **ENVIRONMENTAL POLLUTION AND CONTROL**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —
COURSE DESCRIPTION: Fundamentals ofair pollution;Dispersion of pollutants; Effects and control of air pollution; Water pollution;Soil pollution and control; Municipal solid waste management.
COURSE OUTCOMES: On successful completion of this course, students will be able to:
CO1. Demonstrateknowledge on air, water, soil pollution and their control and solid waste management.
CO2. Analyze causes and effects of air, water and soilpollution and their remedial measures.
CO3. Recommend suitable solutionsto complex environmental pollution problems.
CO4. Use appropriate remedial technique to solve environmental pollution problems.
CO5. Understand the effects of environmental pollutionon human health and vegetation.
CO6. Encourage sustainable development through implementation of pollution control measures.
CO7. Maintain IS Codes for environmental quality control.

III B.Tech - II Semester
(16BT60116) **PLANNING FOR SUSTAINABLE DEVELOPMENT**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —
COURSE DESCRIPTION: Sustainable development; Environmental impact;Sustainable Policies; Governance; Theories and strategies; Media and education for sustainability.
COURSE OUTCOMES: On successful completion of this course, students will be able to:
CO1. Demonstrate the knowledge on sustainable development, environmental impact, sustainable policies, governance, systems and strategies, media and education for sustainability.
CO2. Analyze theories, environmental impact, policies, systems and strategies for sustainable development.
CO3. Develop suitable methods and systems for sustainable development.
CO4. Use appropriate techniquesin solving issues related to sustainable development.

CO5. Provide solutions to problems associated with sustainable development considering society.
CO6. Consider environment while planning sustainable development.
CO7. Communicate effectively on sustainable development issues through media and education.
CO8. Consider economical issues while planning for sustainable development.

III B.Tech. - II Semester
(16BT60117) **PROFESSIONAL ETHICS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —
COURSE DESCRIPTION: Engineering ethics; Professional ideals and virtues; Engineering as social experimentation; Responsibilities and rights; Global issues.
COURSE OUTCOMES: On successful completion of this course, students will be able to:
CO1. Demonstrate the principles of ethics, importance of professional values and social responsibility.
CO2. Analyze the problems in the implementation of moral autonomy and use ethical theories in resolving moral dilemmas.
CO3. Develop suitable strategies to resolve problems arise in practicing professional ethics.
CO4. Provide solutions to complex problems associated with professional ethics by proper analysis and interpretation.
CO5. Use appropriate theories in resolving issues pertain to professional ethics.
CO6. Understand the impact of professional ethics on society and address the limitations of codes of ethics.
CO7. Practice engineering with professionalism, accountability and ethics.
CO8. Function as a member, consultant, manager, advisor and leader in multi-disciplinary teams.
CO9. Write reports without bias and give instructions to follow ethics.

III B.Tech. - II Semester
(16BT60118) **RURAL TECHNOLOGY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —
COURSE DESCRIPTION:
Rural technology; Non conventionalenergy; Community development; IT in rural development.
COURSE OUTCOMES: On successful completion of this course, students will be able to:
CO1. Demonstrate the knowledge on technologies for rural development.
CO2. Analyze various technologies available which are appropriate for rural development.
CO3. Carryout feasibility study on the public and private partnership for rural development.
CO4. Develop and use latest technologies for rural development.
CO5. Address health and safety issues while choosing technologies for rural development.
CO6. Educate the rural populace on the positive impacts of bio-fertilisers and usage of agro machinery in agriculture.

III B.Tech - II Semester

(16BT60308) **GLOBAL STRATEGY AND TECHNOLOGY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Introduction to strategic management; Strategic management process; Principles of good strategy; Globalization strategies; Research and Development strategies; Technology Management and Transfer; Elements of Transfer Process; Corporate Governance in the Indian scenario.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the knowledge on Strategic management, Research & development strategies, Technology management and transfer, Globalization and Corporate governance.

CO2. Identify and analyze crucial problems in strategic management to improve performance of the organizations.

CO3. Develop the products and production process by using research and development strategies.

CO4. Conduct investigations on the impact of globalization in current scenario in the context of corporate governance.

CO5. Appraise the resources and capabilities of the firm in terms of their ability to confer sustainable development.

CO6. Apply ethics in strategic decision making.

III B.Tech - II Semester

(16BT60309) **INTELLECTUAL PROPERTY RIGHTS AND MANAGEMENT**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Protection of ideas; innovation and artistic endeavors; Acts and procedure related to patents, trademarks, copy right, design registration, trade secrets and cyber laws; Infringement; Commercialization of intellectual property rights; Case studies in each.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on intellectual property rights, patents, trademarks, copyrights, trade secrets and commercialization of intellectual property.

CO2. Analyse the commercial significance of discoveries and developments and to assist in bringing these into public use.

CO3. Investigate and ensure smooth transition from concept to final product by following National & International Laws of Intellectual Property.

CO4. Utilize the various policies and procedures related to patents, trademarks and copyrights relating to IPR.

CO5. Safeguard, review and manage the intellectual property so that it may receive adequate and appropriate legal protection against unauthorized use.

CO6. Follow ethical standards in capacity building and work as a platform for development, promotion, protection, compliance, and enforcement of intellectual property and knowledge.

CO7. Prepare documents and fill applications needed for filing a patent, design, copyright and trade mark.

III B.Tech. - II Semester

(16BT60310) MANAGING INNOVATION AND ENTREPRENEURSHIP

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:—

COURSE DESCRIPTION: Evolution of entrepreneurship from economic theory Managerial and entrepreneurial competencies; Concepts of Shifting Composition of the Economy Purposeful Innovation & Sources of Innovative Opportunity; The Innovation Process; Innovative Strategies; Entrepreneurial Motivation; Entrepreneurs versus inventors; Ethics and International Entrepreneurship; Strategic Issues in International Entrepreneurship; Problem solving Innovation and Diversification.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the principles of business innovation and entrepreneurship for establishing industrial ventures.
CO2. Analyze business plans for potential investors and stakeholders and effectively answer probabilistic questions on the substance of plan.
CO3. Develop a comprehensive and well planned business structure for a new venture.
CO4. Conduct investigation on complex problems, towards the development of Project.
CO5. Apply modern statistical and mathematical tools to design projects and subsequent work procedures.
CO6. Apply ethics in constructive innovation framework.
CO7. Exhibit professionalism by employing modern project management and financial tools.

III B.Tech. - II Semester

(16BT60311) MATERIALS SCIENCE

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES:—

COURSE DESCRIPTION: Structure and Bonding in metals; Steels, Cast Irons and Non Ferrous alloys; Material Selection for conductors, Insulators and semiconductors; Strengthening mechanisms of metals; Plastics and Ceramics as Insulators; AC and DC properties of Insulators; Semiconductors and Magnetic materials; Composite materials in Electrical and Electronics engineering; Material Selection and manufacturing of Optical fibers.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the knowledge on concepts of fundamental science and engineering principles relevant to materials.
CO2. Analyze the structures of various types of Ferrous, Non-ferrous alloys influencing various engineering applications.
CO3. Conduct investigations to select suitable materials with desired properties for engineering applications.
CO4. Use phase diagrams to interpret the data regarding microstructure of materials.
CO5. Consider health and safety issues while providing materials to real time applications.
CO6. Use composite materials that reduce material waste in design and manufacturing for sustainability.

III B.Tech. - II Semester

(16BT70412) GREEN TECHNOLOGIES

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Principles of green engineering; Green communications; Green energy; Green computing; Green construction; Green manufacturing.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Deploy conceptual knowledge in green technologies pertaining toengineering practice.
CO2. Analyze various green technologies for engineering practice.
CO3. Provide green solutions to engineering problems.
CO4. Apply various green techniques in the engineering practice.
CO5. Consider health and safety issues while providing green solutions to the society.
CO6. Understand issues related to environment sustainability.
CO7. Apply ethical standards for environmental sustainability in the engineering practice.

III B.Tech. - II Semester
(16BT70413) INTRODUCTION TO NANOSCIENCE AND NANOTECHNOLOGY

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:—

COURSE DESCRIPTION: Introduction to the concept ofnano;Description of nanomaterial;Nanostructure characterization tools;Classification of nanomaterials;Fabrication of nanomaterial;Different applications of nanostructures and nanomaterials.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge in
- Nanoscale technology.
- Difference between micro and nanotechnology
- Classification of Nanostructure and Nanomaterial
- Fabrication of various nanomaterials and nanostructures.

CO2. Analyze numerical and analytical problems in
- Nanomaterial size by using Scanning Electron Microscope and X-Ray diffraction

CO3. Design and fabricate devices based on nanostructures like
- Nano solar cell
- Nano cantilever
- Nano bio-sensor

CO4. Synthesize nano particle of different materials to solve the problems related to fabrication of nanostructures.
CO5. Select appropriate technique for fabrication ofnanostructures and Nano composites.
CO6. Apply ethical standards and legal issues while using chemical substances infabrication of new nanostructures.

III B.Tech. - II Semester
(16BT60505) ENGINEERING SYSTEM ANALYSIS AND DESIGN

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:—

COURSE DESCRIPTION: Systems Process; Technologies for Systems; System Development Life Cycle; System Analysis and Modeling; Levels of Management; Project Management; Systems Implementation and Importance of UML Prototyping; Maintaining and Managing the Systems Output Process.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge in
- Systems Process and System Design
- Systems Analysis and Modeling
- System Development Life Cycle
- Design Management and Maintenance Tools.

CO2. Analyzesystem Process and estimate the given models by using case tools.
CO3. Design and develop a model to the organizational systems.
CO4. Solve complex problems related to engineering systems and produce accurate results
CO5. Apply object oriented techniques for modeling dynamic systems.
CO6. Contribute towards societal issues and responsibilities in designing, modeling and developing of organizational systems.

III B.Tech.- II Semester

(16BT71011) MICRO-ELECTRO-MECHANICAL SYSTEMS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:—

COURSE DESCRIPTION: Overview of Micro Electro Mechanical Systems (MEMS); scaling laws; working principles of microsensors and microactuators; materials; microfabrication processes; packaging of Microsystems.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on MEMS devices, scaling laws, microsensors and microactuators

CO2. Analyze the properties of materials and identify its suitability for MEMS devices.

CO3. Design MEMS devices that meet desired specifications and requirements.

CO4. Analyze and synthesize the information to provide effective solution to engineering problems with MEMS devices.

CO5. Use modern techniques in micro manufacturing process.

CO6. Develop efficient and cost effective MEMS based products for society.

III B.Tech. – II Semester

(16BT61205) CYBER SECURITY AND LAWS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:—

COURSE DESCRIPTION:

Cyber Crimes and Indian IT Act; Cyber Offenses; Tools and Methods used in Cyber Crime; Phishing ad Identity Theft; Indian and Global Perspective on Cyber Crimes and Cyber Security; Organizational Implications on Cyber Security; IPR Issues; Cyber Crime and Terrorism; Cyber Crime Illustrations

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge in Cyber security, Cybercrimes and its related laws in Indian and Global Act.

CO2. Analyze the legal perspectives and laws related to cybercrimes in Indian context.

CO3. Apply security and privacy methods in development of modern applications and in organizations to protect people and to prevent cybercrimes.

CO4. Solve Cyber security issues using privacy policies.

CO5. Use antivirus tools to minimize the impact of cyber threats.

CO6. Follow security standards for the implementation of Cyber Security and laws.

III B.Tech. - II Semester

(16BT61505) BIO-INFORMATICS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION:

Introduction to Bioinformatics; Biology and Information; Sequence alignment and dynamic programming; Biological Database; Homology Modeling; Structure Prediction; Molecular Dynamics.

COURSE OUTCOMES: On successful completion of this course, students will be able to:
CO1. Demonstrate knowledge on concepts of biological databases, Genome and proteome.
CO2. Analyze biological sequences for Homology Modeling.
CO3. Apply clustering methods for Phylogenetic trees.
CO4. Solve bio sequencing problems using dynamic programming.
CO5. Select and apply appropriate techniques and tools to structure Prediction.

III B.Tech. - II semester
(16BT61231) **CLOUD COMPUTING LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: A course on "Cloud Computing".
COURSE DESCRIPTION: Hands-on experience on creating virtual machines on Windows and Linux platforms; Development of service based web applications and their deployment.
COURSE OUTCOMES: On successful completion of this course, students will be able to:
CO1. Demonstrate hands-on experience on Virtualization models and Cloud Environment.
CO2. Analyze the given experiment and relate to existing cloud architectures.
CO3. Apply API development skills in web applications for cloud deployment.
CO4. Demonstrate independent problem solving skills in developing dynamic web applications.
CO5. Use advanced programming languages to access cloud services.
CO6. Build suitable cloud environment for societal requirements.
CO7. Work effectively as an individual and as a member in team for mini-project implementation.
CO8. Demonstrate communication skills, both oral and written for preparing and presenting reports.

III B.Tech. - II semester
(16BT61232) **KNOWLEDGE ENGINEERING LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: A course on "Data Warehousing and Data Mining".
COURSE DESCRIPTION: Hands-on experience on Data preprocessing techniques; Mining frequent patterns; classification and clustering techniques using Weka and R Studio tools.
COURSE OUTCOMES: On successful completion of this course, students will be able to:
CO1. Demonstrate knowledge on: preprocessing techniques, Descriptive and predictive mining tasks.
CO2. Identify suitable algorithms to mine knowledge from real-time databases.
CO3. Classify and predict the information for forecasting applications.
CO4. Demonstrate independent decision making skills for business analysis applications.
CO5. Apply Weka and R tools to extract interesting patterns from large databases.
CO6. Prepare analytical reports suitable for societal requirements.
CO7. Work effectively as an individual and member of a team to implement mini-project.
CO8. Demonstrate communication skills, both oral and written for preparing and presenting reports.

III B.Tech. - II semester

(16BT61233) **SEMINAR**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
	100	100	-	-	-	2

PRE-REQUISITES: All the courses of the program up to III B. Tech. – I Semester.

COURSE DESCRIPTION: Identification of topic for the seminar; Literature survey; Performing critical study and analysis of the topic identified; Preparation of report and presentation.

COURSE OUTCOMES:

Completion of the seminar work enables a successful student to demonstrate:

CO1. Demonstrate in-depth knowledge on the seminar topic.
CO2. Analyze critically, the concepts relevant to the seminar topic.
CO3. Understand methodology relevant to seminar topic.
CO4. Undertake investigation of issues related to seminar topic providing valid conclusions.
CO5. Use techniques and tools to consolidate the solutions relevant to the seminar topic.
CO6. Comprehend societal issues in the context of seminar topic.
CO7. Understand ethical issues in the context of seminar topic.
CO8. Function effectively as individual on the chosen seminar topic.
CO9. Develop communication skills, both in oral and written form, for preparing and presenting seminar report.
CO10. Engage in lifelong learning to improve knowledge and competence in the chosen area of seminar.

IV B.Tech. - I semester

(16BT5HS01) **MANAGEMENT SCIENCE**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: --

COURSE DESCRIPTION: Concepts of Management; Environmental Scanning; Concepts Related to Organization; Operations Management; Work Study; Statistical Quality Control; Inventory Management; Marketing; Human Resource Management; Project Management; Project Crashing; Entrepreneurship; Contemporary Management Practices.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1: Demonstrate the concepts of operations management, human resources management, project management and contemporary management practices in managerial context.
CO2: Identify and analyse management problems in the business organizations reaching substantiated conclusions using principles of management.
CO3: Design appropriate organization structure for meeting the needs of the organization with consideration of the employees of the organization.
CO4: Competently employ broad based analytical tools for decision making, system design, analysis and performance.
CO5: Provide solution to organizations for sustainable development.
CO6: Apply knowledge of engineering and management principles to manage the projects in multidisciplinary environments.

IV B.Tech. - I semester
(16BT71201) **BIG DATA TECHNOLOGIES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Data Warehousing and Data Mining".
COURSE DESCRIPTION: Introduction to Big Data, Hadoop; Hadoop Distributed File Systems; Hadoop I/O; MapReduce; Hive; Pig; HBase; Zookeeper; Sqoop and Case studies.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on Big Data characteristics, storage, processing, querying and reporting.

CO2. Analyze large dataset issues and solve using data analytic techniques.

CO3. Design and Develop classification and clustering models for dataset analysis.

CO4. Use research knowledge to manage large datasets.

CO5. Apply MapReduce, Hive, Pig, Sqoop, HBase, and Zookeeper tools for data analytics.

CO6. Use data analytics tools to solve societal problems.

IV B.Tech. - I semester
(16BT71202) **MOBILE APPLICATION DEVELOPMENT**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on "Java Programming" and "Web Technologies".

COURSE DESCRIPTION: Mobile platforms; Mobile User Interface and tools; Introduction to Android; Activities; Views; Menus; Database Storage; SMS; e-mail; Displaying Maps; Building a Location Tracker Web Services Using HTTP; Sockets Programming; Communication between a Service and an Activity; Introduction to iOS.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on:
- Mobile platforms and Mobile User Interface
- Android Activities and Intents
- Messaging, Networking, Location based Services, Android Services
- Basics of iOS

CO2. Analyze the context of complex problems and identify user interface design requirements.

CO3. Design and develop solutions for real world problems with android mobile applications.

CO4. Demonstrate problem solving skills to create applications for mobile devices.

CO5. Apply Android studio and iOS tools to develop mobile applications.

CO6. Create mobile applications as per societal needs.

IV B.Tech. - I semester
(16BT71203) **INFORMATION RETRIEVAL SYSTEMS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on "Data Structures" and "Database Management Systems".

COURSE DESCRIPTION: Architecture of Information Retrieval Systems; Functional Capabilities; Data Structures; Mathematical Algorithms; Indexing; Similarity and Clustering; Human Perception and Presentation; Text Search Techniques and Evaluation Measures.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on:
- Information Retrieval System Architecture
- Functional capabilities
- Indexing and data presentation methods.
- Evaluation measures of Information Retrieval Systems.

CO2. Analyze indexing methods and clustering algorithms to group similar data items for efficient search.

CO3. Design and develop data structures used to store and retrieve data items.

CO4. Demonstrate problem solving skills in the usage of mathematical algorithms for information retrieval.

CO5. Use text search algorithms and collaborative filtering techniques for information retrieval and visualization methods for information presentation.

IV B.Tech. - I semester

(16BT71204) MOBILE COMPUTING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Computer Networks".

COURSE DESCRIPTION: Introduction to Mobile Computing, GSM; Medium Access Control, Wireless LAN; Mobile Network and Transport Layers; Data Dissemination; Mobile Ad-Hoc Networks (MANETs), Wireless Application Protocol (WAP).

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on:
- GSM, GPRS, 3G, 4G, Wireless LAN, MANETs.
- Protocols in Data Link, Network, Transport and Application layer.

CO2. Analyze the issues related to database design and data retrieval in mobile applications.

CO3. Apply routing algorithms for finding shortest path in MANETs.

CO4. Use protocols of Wireless Technologies for security implementation in mobile computing.

CO5. Follow standards in the usage of mobile communications.

IV B.Tech. - I semester

(16BT71505) NETWORK PROGRAMMING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Computer Networks".

COURSE DESCRIPTION: OSI model, Unix standards; Normal startup, terminate and signal handling server process termination; lost datagram, summary of UDP example, Lack of flow control with UDP; Function and IPV6 support, uname function ,IPv4 Client- IPv6 Server ;FIFO's, streams and messages, RPC.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on concepts of sockets, inter process communication and remote login.

CO2. Identify appropriate TCP Echo server functions and Socket options used in Network based systems.

CO3. Analyze networking protocols such as TCP and UDP for connection establishment between client and server.

CO4. Design appropriate solutions for network applications based on UNIX.

CO5. Apply modern tools to create cooperating processes in network based Systems.

CO6. Relate suitable ethical principles to design and develop applications related to Network Traffic Monitoring.

IV B.Tech. - I semester

(16BT60501) **SOFTWARE TESTING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Software Engineering".

COURSE DESCRIPTION: Software Testing Basics: Goals, Defects, Terminology, Methodology, STLC in SDLC, Verification and Validation; Software Testing Techniques: White box testing, Black Box Testing, Regression testing; Test Management: Test Planning, Design and Specifications; Test Automation: Tool selection and Guidelines.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on:
- Software Testing Life Cycle.
- Testing Techniques.
- Test Management and Metrics.
- Regression Testing
- Test Automation

CO2. Analyze testing circumstances and their resultants in software development.

CO3. Design and develop the appropriate test cases in accordance to the software development model.

CO4. Use problem solving skills to control and monitor the testing process.

CO5. Apply testing tools for testing the software quality.

CO6. Apply contextual knowledge to perform testing on software related to societal applications.

IV B.Tech. - I semester

(16BT71205) **CRYPTOGRAPHY AND NETWORK SECURITY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Computer Networks".

COURSE DESCRIPTION: Principles and Practice of Cryptography and Network Security; Classical Systems; Symmetric Block Ciphers; Public-key Cryptography; Hash Functions; Authentication; Key Management; Key Exchange; Signature Schemes; E-mail; Web Security; Malicious Software; Intrusion Detection; Phishing and Identity Theft.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on:
- Cryptographic algorithms and their mathematical models
- Message Authentication
- Digital Signatures
- Malicious Software
- Intrusion Detection
- Phishing and Identity Theft

CO2. Analyze vulnerabilities and threats on information systems based on various security parameters.

CO3. Apply security and privacy methods to protect and prevent cyber crimes.

CO4. Solve information privacy issues using encryption and digital signatures.

CO5. Use firewall and PGP to protect network and e-mail respectively.

CO6. Follow standards in implementation of network security.

IV B.Tech. - I semester

(16BT71206) **NET TECHNOLOGIES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Web Technologies".

COURSE DESCRIPTION: Introduction to .NET Framework and C# Programming;Object-oriented concepts with C#, Exception handling; Interfaces, Generics, Delegates and Events in C#; Database access with ADO.NET; Web application development using ASP.NET Web forms and Web controls.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on:
- Basics of .NET platform.
- Building C# applications, designing ASP.NET websites, perform Data access, building ASP.NET applications.

CO2. Analyze complex problems and identify .NET components for client-server environment.
CO3. Design and develop Graphical User Interface and Web applications using .NET technologies.
CO4. Demonstrate problem solving skills for developing interactive web applications.
CO5. Use C#, ADO.NET and ASP.NET technologies for website design.
CO6. Create websites as per societal needs.

IV B.Tech. - I semester

(16BT71207) **E – COMMERCES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Computer Networks".

COURSE DESCRIPTION: Electronic Commerce Framework; Consumer Oriented Electronic Commerce; Electronic Payment Systems; Inter and Intra Organizational Commerce; Corporate Digital Library; Advertising and Marketing on Internet; Consumer Search and Resource Discovery; Multimedia and Digital Video.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on:
- The basic concepts and technologies used in the field of E-Commerce.
- E-Payment systems
- Inter and Intra Organizational E-Commerce
- Advertising and Marketing on Internet
- Key Multimedia Concepts

CO2. Analyze the Mercantile Process Models in different views.
CO3. Apply compression and decompression techniques and codec required for Video Conferencing.
CO4. Solve security issues in E-Commerce using encryption mechanisms.
CO5. Follow ethics in the usage of E-Commerce.

IV B.Tech. - I semester

(16BT71207) **SERVICE ORIENTED ARCHITECTURE**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Software Engineering".

COURSE DESCRIPTION: Web Services; Principles of SOA; Service Layers; Simple Object Access Protocol (SOAP); Web Services Description Language (WSDL).

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on:
- Principles, services and policies of service orientation.

- Fundamentals of web services.
- XML, WSDL related to SOA.

CO2. Analyze complex business process critically in identifying appropriate service model logic.
CO3. Design service oriented architecture suitable for different environments.
CO4. Use XML, SOAP and service interface design tools for building service oriented architecture.

IV B.Tech. - I semester

(16BT71209) MACHINE LEARNING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on "Probability and Statistics" and "Data Warehousing and Data Mining".

COURSE DESCRIPTION: Introduction to Machine Learning; Planning for Machine Learning; Bayesian Techniques; Decision Trees; Bayesian Networks; Artificial Neural Networks; Association Rules Learning; Support Vector Machines; Clustering; Machine Learning as a Batch Process; Case Studies, Data Science Fundamentals.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on:
- Decision Trees and Bayesian Networks
- Artificial Neural Networks and Association Rules
- Support Vector Machines, Data Science fundamentals.

CO2. Analyze complex datasets and identify suitable machine learning algorithms.
CO3. Design decision making algorithms using supervised and unsupervised approaches.
CO4. Solve complex data analytical problems using machine learning and data science techniques.
CO5. Use Apache Spark and R tools for real-time and batch processing applications.
CO6. Develop machine learning based solutions as per societal needs.

IV B.Tech. - I semester

(16BT71508) INTERNET OF THINGS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Computer Networks".

COURSE DESCRIPTION: Internet of Things Components; Communication models; Prototyping; Hardware; Design models; Analytics for IoT.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on Protocols, functional blocks and communication models of Internet of things.
CO2. Identify appropriate sensors and communication modes used in IoT based systems.
CO3. Design appropriate solutions for IoT applications using Raspberry Pi and Arduino kits.
CO4. Appropriately synthesize the models and applications for usage in Home automation and cities.
CO5. Apply evolutionary techniques to perform analytics on the data integrated from IoT based systems.
CO6. Use advances in IoT technology to design and develop applications.

IV B.Tech. - I semester
(16BT71210) **HIGH PERFORMANCE COMPUTING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Computer Organization".

COURSE DESCRIPTION: Cache-based Microprocessor Architecture; Memory Hierarchies; Multithreaded Processors; Common Sense Optimizations; The Role of Compilers; Data Access Optimization; Shared-memory Computers; Parallel Scalability; Introduction to OpenMP; Parallel Jacobi Algorithm; Introduction to MPI; MPI Performance Tools; MPI Parallelization of Jacobi Solver.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on:
- Modern Processors and code Optimization.
- Parallel computing paradigms.

CO2. Analyze computation problems and identify the suitable parallel processing approaches to achieve optimum computation.

CO3. Design Parallel processing algorithms for achieving high performance computing.

CO4. Solve shared memory problems using Parallel Programming.

CO5. Use OpenMP and MPI tools in Parallel Programming.

IV B.Tech. - I semester
(16BT70505) **HUMAN COMPUTER INTERACTION**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on "Computer Graphics".

COURSE DESCRIPTION: Graphical User Interface; Design Process; Screen Designing; Windows; Components; Software Tools; Interaction Devices.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on principles, characteristics, tools and devices of Human Computer Interaction.

CO2. Analyze the user requirements, technological and physical characteristics of users for better interface design.

CO3. Design appropriate user interface for desktop and web applications.

CO4. Conduct investigations on User requirements to provide an effective user interface.

CO5. Utilize user interface mockup tools and input, output and pointing devices for designing user interfaces.

CO6. Apply Contextual knowledge to develop interfaces for differently abled people.

IV B.Tech. - I semester
(16BT71231) **BIG DATA TECHNOLOGIES LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Courses on "Big Data Technologies" and "Java Programming".

COURSE DESCRIPTION: Hands-on experience in Big data storage, processing, querying, reporting, predictive analytics, classification, clustering, recommendation system using Data-parallel programming model of Hadoop, MapReduce, HDFS, Hive, Pig, HBase, Zookeeper and Sqoop Big Data Tools.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on Big Data characteristics, storage, processing, querying and reporting.

CO2. Analyze large dataset issues and solve using data analytic techniques.

CO3. Design and Develop classification and clustering models for dataset analysis.

CO4. Solve large data analysis problems using Big data techniques.

CO5. Apply Big Data Tools: Sqoop, HBase, Hive, Pig, MapReduce and Zookeeper for large data management and knowledge extraction.

CO6. Build Hadoop environment suitable for societal requirements.

CO7. Work effectively as an individual and as a member in team for mini-project implementation.

CO8. Demonstrate communication skills, both oral and written for preparing and presenting reports.

IV B.Tech. - I semester

(16BT71232) **MOBILE APPLICATION DEVELOPMENT LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: A Course on "Mobile Application Development".

COURSE DESCRIPTION: Hands-on experience on development of Android Mobile applications with Submenus; Context menus; Layouts; Buttons; Date Picker and database access with Android SQLite.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on:

- Mobile platforms and Mobile User Interface
- Android Activities and Intents
- Messaging, Networking, Location based Services, Android Services
- Basics of iOS

CO2. Analyze the context of complex problems and identify user interface design requirements.

CO3. Design and develop solutions for real world problems with android mobile applications.

CO4. Demonstrate problem solving skills to create applications for mobile devices.

CO5. Apply Android studio and iOS tools to develop mobile applications.

CO6. Create mobile applications as per societal needs.

CO7. Work effectively as an individual and as a member in team for mini-project implementation.

CO8. Demonstrate communication skills, both oral and written for preparing and presenting reports.

IV B.Tech. - I semester

(16BT71233) **COMPREHENSIVE ASSESSMENT**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
	100	100	-	-	-	2

PRE-REQUISITES: All the technical courses of the program upto IV B. Tech. - I Semester.

COURSE DESCRIPTION: Assessment of student learning outcomes in the courses of the program.

COURSE OUTCOMES: Comprehensive Assessment enables successful students to demonstrate:

CO1. Knowledge in the courses of the program.

CO2. Analytical ability in the courses of the program.

CO3. Design skills in the courses of the program.

CO4. Ability to investigate and solve complex engineering problems in the courses of the program.

CO5. Ability to apply tools and techniques to complex engineering activities with an understanding of limitations in the courses of the program.

CO6. Ability to provide solutions as per societal needs with consideration to health, safety, legal and cultural issues in the courses of the program.

CO7. Understanding of the impact of the professional engineering solutions in environmental context and need for sustainable development in the courses of the program.

CO8. Ability to apply ethics and norms of the engineering practice in the courses of the program.

CO9. Ability to function effectively as an individual in the courses of the program.

CO10. Ability to present views cogently and precisely in the courses of the program.

CO11. Ability to engage in life-long leaning in the courses of the program.

IV B.Tech. - II semester

(16BT81231) **PROJECT WORK**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
100	100	200	-	-	-	12

PRE-REQUISITES: All technical courses of the program up to IV B. Tech. - I Semester.

COURSE DESCRIPTION: Identification of topic for the project work; Literature survey; Collection of preliminary data; Identification of implementation tools and methodologies; Performing critical study and analysis of the topic identified; Time and cost analysis; Implementation of the project work; Preparation of thesis and presentation.

COURSE OUTCOMES: Completion of the project work enables successful students to:

CO1. Demonstrate knowledge on the topic of project work.

CO2. Demonstrate analytical ability exercised in the project work.

CO3. Apply design skills for the project implementation.

CO4. Investigate and solve chosen project problem with optimum solution.

CO5. Use techniques and modern engineering tools for the development of project work.

CO6. Provide solutions as per societal needs with consideration to health, safety, legal and cultural issues in the project work.

CO7. Understand environmental issues while executing the project work

CO8. Understand professional and ethical responsibilities while executing the project work.

CO9. Function effectively as an individual and a member in the project team.

CO10. Present views cogently and precisely on the project work.

CO11. Demonstrate project management skills and estimate time and cost required for carrying out the project work.

CO12. Engage lifelong learning to improve knowledge and competence in the chosen area of the project work.

Program: B.Tech. COMPUTER SCIENCE AND SYSTEMS ENGINEERING

I B.Tech. - I Semester
16BT1HS01: **TECHNICAL ENGLISH**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: English at Intermediate level
COURSE DESCRIPTION: Introduction to Communication; Active Listening; Effective Speaking; Reading; and Writing.
COURSE OUTCOMES:
On successful completion of this course the students will be able to:
1. Demonstrate knowledge in
   a) Process of communication
   b) Modes of listening
   c) Paralinguistic features
   d) Skimming and Scanning
   e) Elements of style in writing
2. Analyze the possibilities and limitations of language for understanding
   a) Barriers to Communication
   b) Barriers to Effective Listening
   c) Barriers to Speaking
   d) Formal and metaphorical language
3. Design and develop functional skills for professional practice.
4. Apply writing skills in preparing and presenting documents
5. Function effectively as an individual and as a member in diverse teams.
6. Communicate effectively with the engineering community and society in formal and informal situations.

I B.Tech. - I Semester
16BT1BS01: **ENGINEERING CHEMISTRY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE REQUISITE: Intermediate/Senior Secondary Chemistry
COURSE DESCRIPTION: Water technology, Chemistry of Engineering materials, Nanochemistry, Green Chemistry, Electro chemical cells, Sensors, Corrosion and Lubricants.
COURSE OUTCOMES:
After completion of the course, a successful student is able to:

CO1: Acquire basic knowledge in water technology, engineering plastics, conducting polymers, composites, Electro chemical cells, Nano Chemistry, principles of Green Chemistry, corrosion phenomenon and lubricants.
CO2: Develop analytical skills in:
   a. Determination of hardness of water.
   b. Determination of viscosity, flame and fire points, cloud and pour points.
CO3: Develop designing skills in:
   a. Synthesis of engineering plastics.
   b. Chemical methods for the synthesis of Nano materials.
CO4: Develop skills for providing solutions through:
   a. Mitigation of hardness of water.
   b. Newer Nanomaterials and engineering plastics for specific applications
CO5: Acquire awareness to practice engineering in compliance to modern techniques such as:
   a. Nalgonda technique for defluoridation of water
   b. Electroplating technique for control of corrosion.
CO6: Acquire awareness to societal issues on:
   a. Quality of water.
   b. Bio-diesel
   c. Chemical materials utility and their impact.

I B.Tech. - I Semester
16BT1BS03: **MATRICES AND NUMERICAL METHODS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Intermediate /Senior secondary mathematics
COURSE DESCRIPTION: Fundamentals of matrix theory; numerical solutions of equations, curve fitting; interpolation; numerical differentiation and integration; numerical solutions of ordinary differential equations.
COURSE OUTCOMES: After completion of the course a successful student is able to

CO1: Acquire basic **knowledge** in
- (a) Finding the rank of matrices and analyzing them.
- (b) Solving algebraic and transcendental equations by various numerical methods.
- (c) Fitting of various types of curves to the experimental data.
- (d) Estimating the missing data through interpolation methods.
- (e) Identification of errors in the experimental data
- (f) Finding the values of derivatives and integrals through various numerical methods.
- (g) Solving differential equations numerically when analytical methods fail.

CO2: Develop skills in **analyzing** the
- (a) methods of interpolating a given data
- (b) properties of interpolating polynomials and derive conclusions
- (c) properties of curves of best fit to the given data
- (d) algebraic and transcendental equations through their solutions
- (e) properties of functions through numerical differentiation and integration
- (f) properties of numerical solutions of differential equations

CO3: Develop skills in **designing** mathematical models for
- (a) Fitting geometrical curves to the given data
- (b) Solving differential equations
- (c) Constructing polynomials to the given data and drawing inferences.

CO4: Develop numerical skills in **solving the problems** involving
- (a) Systems of linear equations
- (b) Fitting of polynomials and different types of equations to the experimental data
- (c) Derivatives and integrals
- (d) Ordinary differential equations

CO5: Use relevant numerical **techniques** for
- (a) Diagonalising the matrices of quadratic forms
- (b) Interpolation of data and fitting interpolation polynomials
- (c) Fitting of different types of curves to experimental data
- (d) obtaining derivatives of required order for given experimental data
- (e) Expressing the functions as sum of partial fractions

I B. Tech. - I Semester
16BT1BS04: **MULTI - VARIABLE CALCULUS AND DIFFERENTIAL EQUATIONS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Intermediate /Senior secondary mathematics
COURSE DESCRIPTION: First order differential equations; higher order linear differential equations; functions of several variables; applications of integration; multiple integrals; vector calculus.
COURSE OUTCOMES: After completion of the course a successful student is able to

CO1: Acquire knowledge in
- (a) Higher order Differential equations
- (b) Maximum and minimum values for the functions of several variables
- (c) Double and triple integrals
- (d) Differentiation and integration of vector functions.
- (e) Line and surface volume
- (f) transforming integrals from three dimensional surfaces and volumes on to plane surfaces

CO2: Develop skills in analyzing the
- (a) methods for differential equation for obtaining appropriate solutions,
- (b) Properties of oscillatory electrical circuits and heat transfer in engineering systems
- (c) The variations in the properties of functions near their stationary values
- (d) Flow patterns of fluids, electrical and magnetic flux and related aspects

CO3: Develop skills in designing mathematical models for
- (a) R-C and L-R-C oscillatory electrical circuits
- (b) Heat transfer and Newton's law of cooling
- (c) Engineering concepts involving lengths of curves and areas of planes, Flux across surfaces

CO4: Develop analytical skills in solving the problems involving
(a) Newton's law of cooling
(b) non homogeneous linear differential equations
(c) maximum and minimum values for the functions
(d) lengths of curves, areas of surfaces and volumes of solids in engineering
(e) transformation of integrals from three dimensional surfaces and volumes on to plane surfaces

CO5: Use relevant mathematical techniques for evaluating
(a) various types of particular integrals in differential equations
(b) stationary values for multi variable functions
(c) multiple integrals in change of variables
(d) integrations of vector functions.

I B. Tech. - I Semester
(16BT10501) **PROGRAMMING IN C**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: NIL
COURSE DESCRIPTION:
Program design; Operators and Expressions; Data Input and Output; Control Statements; Functions; Arrays; Strings; Pointers; Structures & Unions and File handling Techniques;
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
CO1: Demonstrate knowledge in:
- Elements of C Language
- Selection and Repetition statements.
- Arrays, Strings and Functional statements.
- Derived data types, Files and Pointers

CO2: Analyze complex engineering problems to develop suitable solutions
CO3: Design algorithms for specified engineering problems
CO4: Use appropriate 'C' language constructs for solving engineering problems
CO5: Write programs using 'C' language to implement algorithms

I B.Tech. - I Semester
16BT1HS31: **ENGLISH LANGUAGE LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: English at intermediate or equivalent level.
COURSE DESCRIPTION: Phonetics; Vocabulary Building; Functional Grammar; Just a Minute; Elocution/Impromptu; Giving Directions/Conversation Starters; Role Play; Public Speaking; Describing People, Places, Objects and Events; Reading Comprehension; Listening Comprehension; Information Transfer.
COURSE OUTCOMES:
On successful completion of this course the students will be able to:
1. Demonstrate knowledge in
   a) Phonetics
   b) Information Transfer
2. Analyze the situations in professional context by using
   a) Vocabulary
   b) Grammar
3. Design and develop functional skills for professional practice.
4. Apply the techniques of Listening and Reading skills to comprehend Listening and Reading comprehension.
5. Function effectively as an individual and as a member in diverse teams through
   a) Extempore talk and b) Role Play
6. Communicate effectively in public speaking in formal and informal situations.
7. Recognize the need to engage in lifelong learning to upgrade competence of knowledge and communication.

I B.Tech. - I Semester
16BT1BS31: **ENGINEERING CHEMISTRY LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE REQUISITE: Intermediate/Senior Secondary Chemistry
COURSE DESCRIPTION: Estimation of hardness, alkalinity, dissolved oxygen of water samples and estimation of Iron by volumetric methods, determination of effect of P^H on rate of corrosion, measurement of viscosity of lubricants; Instrumental methods like potentiometer, conductivity meter, P^H meter and colorimeter; synthesis of Polymers and Nano materials.
COURSE OUTCOMES:
After completion of the course, a successful student is able to:
CO1: Acquire basic Knowledge about the volumetric analysis and synthesis of materials used for engineering applications.
CO2: Acquire analytical skills in the estimation of hardness of water, alkalinity of water, dissolved oxygen in water and estimation of Iron through wet laboratory methods.
CO3: Develop designing skills for the synthesis of polymers and Nanomaterials.
CO4: Acquire skills to use instrumental techniques for the determination of Electrical conductance of electrolytes, EMF of a cell, PH of a solution, determination of viscosity of lubricants and estimation of iron in cement.
CO5: Provide solutions for environmental issues through determination of quality of water.

I B.Tech. - I Semester
16BT10331: **COMPUTER AIDED ENGINEERING DRAWING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	1	6	3

PRE-REQUISITES: *None*
COURSE DESCRIPTION:
Engineering drawing conventions; importance of engineering drawing; fundamental concepts of sketching; computed aided drafting and different types of projections of geometric entities (both 2D and 3D) through computer aided drafting packages.
COURSE OUTCOMES:
After completion of the course, a successful student is able to:
CO1: Understand, write and read the language of engineering drawing in industry through International System of Standards.
CO2: Develop the imagination and mental visualization ability for interpreting the geometrical details of engineering objects.
CO3: Produce different views and projection in drawing.
CO4: Use modern CAD software for design and drafting of drawings.
CO5: Create multi-view drawings suitable for presentation to Engineering community.
CO6: Introduce and communicate universally accepted conventions and symbols for their usage in technical drawing.

I B.Tech. - I Semester
16BT10531: **PROGRAMMING IN C LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: A course on "Programming in C"
COURSE DESCRIPTION: Hands on practice in developing and executing simple programs using C Programming constructs– Conditional statements, Loops, Arrays, Strings, Functions, Structures, Pointers and Functions.
COURSE OUTCOMES:
On successful completion of this course the students will be able to:
1. Demonstrate practical knowledge of using C language constructs:
   a) Selection and Repetition statements.
   b) Arrays, Strings and Functional statements.
   c) Derived data types, Files and Pointers
2. Analyze problems to develop suitable algorithmic solutions
3. Design Solutions for specified engineering problems
4. Use appropriate 'C' language constructs for solving engineering problems
5. Implement and execute programs using 'C' language
6. Document programs and communicate effectively while conducting Professional transactions.

I B.Tech. - II Semester
16BT1BS02: **ENGINEERING PHYSICS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Intermediate/senior secondary Physics
COURSE DESCRIPTION: Lasers; optical fibers; principles of quantum mechanics; band theory of solids; semiconductors; dielectric properties of materials; acoustics of buildings; superconductors; crystallography and nanomaterials.
COURSE OUTCOMES:
On successful completion of this course the students will be able to:

1. Acquire basic knowledge of lasers, optical fibers, quantum mechanics, dielectrics, semiconductors, and superconductors, acoustic of buildings, crystallography and anomaterials.
2. Analyze the construction and working of various laser systems, semiconductor devices, various types of optical fibers and its communication system and nano materials properties.
3. Gain skills in designing lasers, optical fiber cable, semiconductor devices, acoustically good halls and nanomaterials.
4. Develop problem solving skills in engineering context.
5. Use relevant techniques for assessing ball milling, pulsed laser deposition, p-n junction and Laser.

I B.Tech. - II Semester
16BT2BS01: **TRANSFORMATION TECHNIQUES AND PARTIAL DIFFERENTIAL EQUATIONS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE REQUISITE: Intermediate /Senior secondary mathematics
COURSE DESCRIPTION: Fourier series; Fourier integrals and transforms; Laplace transforms; z –transforms; partial differential equations.
COURSE OUTCOMES:
After completion of the course a successful student is able to
CO1: Acquire basic knowledge in
- (a) Fourier series and Fourier transforms
- (b) Fourier integrals
- (c) Laplace transforms and their applications
- (d) z- transforms and their applications
- (e) solving partial differential equations

CO2: Develop skills in analyzing the
- (a) Properties of Fourier series for a given function
- (b) Partial differential equations through different evaluation methods
- (c) Difference equations through z – transforms
- (d) Engineering systems and processes involving wave forms and heat transfer

CO3: Develop skills in designing mathematical models for
- (a) Problems involving heat transfer and wave forms
- (b) Engineering concepts involving, Fourier transforms, Fourier integrals, Laplace transforms, z-transforms and difference equations

CO4: Develop analytical skills in solving the problems involving
- (a) Fourier series and Fourier transforms
- (b) Laplace transforms
- (c) Z-transforms and difference equations
- (d) Heat transfer and wave motion

CO5: Use relevant transformation techniques for
- (a) Obtaining Fourier transforms for different types of functions
- (b) Laplace transforms
- (c) Z- transforms
- (d) Partial differential equations

I B.Tech. - II Semester
16BT20441: **BASIC ELECTRONIC DEVICES AND CIRCUITS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: A course on Engineering Physics.
COURSE DESCRIPTION:
Characteristics of general and special purpose electronic devices; Rectifiers; Biasing of BJT; FET, Feedback Amplifiers, Oscillator.
COURSE OUTCOMES: On successful completion of this course the students will be able to
CO1: Gain in-depth knowledge in
- ☐ *p-n* junction diode and its characteristics
- ☐ Zener diode and its characteristics
- ☐ Rectifiers and Filters
- ☐ Characteristics of BJT, FET, MOSFET and special purpose electronic devices.
- ☐ FET amplifiers
- ☐ Feedback amplifiers and Oscillators

CO2: Analyze numerical and analytical problems in
- ☐ Rectifiers using Filters
- ☐ Transistor biasing circuits
- ☐ FET biasing circuits and amplifiers
- ☐ Feedback amplifiers and oscillators

CO3: Design electronic circuits such as
- ☐ Rectifiers with and without filters
- ☐ BJT and FET biasing circuits
- ☐ FET amplifiers
- ☐ Feedback amplifiers and oscillators

CO4: Solve engineering problems and arrive at solutions pertaining to electronic circuits.
CO5: Select appropriate technique for transistor biasing.

I B.Tech. - II Semester
16BT21201: **OBJECT ORIENTED PROGRAMMING THROUGH C++**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	4	1	-	4

PREREQUISITES: A Course on "Programming in C".
COURSE DESCRIPTION:
Introduction to Object Oriented concepts and Fundamental Concepts of C^{++}; Decision Making Statements, Looping Statements and Functions; Arrays, Pointers & References and Strings; Classes & Objects and Overloading Operators; Composition & Inheritance, Templates, Iterators & Generics and File Handling;
COURSE OUTCOMES:
On successful completion of this course, the students will be able to:
CO1: Demonstrate knowledge on object oriented programming concepts - Object, Class, Inheritance, Polymorphism, Encapsulation, Abstraction and Message passing.
CO2: Identify object oriented concepts for code reusability and optimization.
CO3: Design and develop solutions for given specifications.
CO4: Demonstrate problem solving skills to provide software solutions to real world problems.
CO5: Develop C^{++} programming to provide solutions to complex engineering problems using object oriented concepts.

I B.Tech. - II Semester
16BT21501: **DIGITAL LOGIC DESIGN**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -NIL-
COURSE DESCRIPTION: Introduction to number systems; logic gates; Boolean Algebra; simplification of Boolean functions; Design of combinational circuits; Design of sequential circuits, Memory and Programmable Logic
COURSE OUTCOMES:
On Successful completion of this course student will be able to:
CO1. Demonstrate knowledge on Boolean algebra, Minimization of Boolean functions using Map Reduce method.
CO2. Identify appropriate simplification techniques for Boolean functions.

CO3. Design combinational and sequential logic circuits, memory and programmable logic for digital systems.
CO4. Select and Apply Boolean algebra and gate level minimization techniques for designing combinational and sequential logic circuits.
CO5. Learn independently new concepts, new techniques and advanced subject knowledge in the area of combinational and sequential logic circuits.

I B.Tech. - II Semester
16BT1BS32: **ENGINEERING PHYSICS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Intermediate / senior secondary Physics.
COURSE DESCRIPTION:
Characteristics of p-n junction diode, Photodiode, LED, and semiconductor laser diode. Experimental determination of carrier concentration and energy gap of a semiconductor material, wave length of a laser source, size of fine particle, numerical aperture and acceptance angle of optical fiber. Determination of frequency of electrically vibrating tuning fork and A.C source using A.C sonometer, magnetic field along axial line of a current carrying coil and rigidity modulus of material of a wire using torsional pendulum.
COURSE OUTCOMES:
After completion of the course, a successful student will be able to:
CO1: Acquire basic knowledge about semiconductor materials, magnetic materials and lasers.
CO2: Acquire analytical skills in the estimation of carrier concentration of semiconductor materials and characterization of p-n junction.
CO3: Develop skills in designing electronic circuits using semiconductor components.
CO4: Acquire skills to use instrumental techniques in A.C sonometer and Melde's experiment.
CO5: Apply diffraction techniques for determination of size of tiny particles and wave length of lasers.

I B.Tech. - II Semester
16BT20451: **ANALOG AND DIGITAL ELECTRONICS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: Courses on "Basic Electronic Devices & Circuits and Digital Logic Design"
COURSE DESCRIPTION: Identification and testing of active and passive components; RPS, DMM, Function Generator, CRO; Diode characteristics; Rectifiers; BJT and FET characteristics; UJT and SCR characteristics; BJT Amplifiers; Realization of FFs, Combinational Circuits, sequential Circuits; Demonstration on VHDL Programme.
COURSE OUTCOMES: On successful completion of this course, the student will be able to:
CO1. Demonstrate knowledge in different electronic devices, analog and digital circuits
CO2. Analyze the characteristics of different electronic devices and circuits like
☐☐Diodes p-n Junction Diodes, Zener Diodes, SCR
☐ Transistors-BJT,FET,UJT
☐ Flip Flops-JK FF, D FF
☐ Combinational Circuits-HA, FA
☐ Sequential Circuits -Counters
CO3. Design electronic circuits like FET Amplifiers, Feedback amplifiers, Oscillators, Combinational Circuits and Sequential Circuits.
CO4. Solve engineering problems by proposing potential solutions through Design of better electronic circuits.
CO5. Model an electronic circuit which fulfil the needs of the society.
CO6: Function effectively as an individual and as a member in a group
CO7: Communicate effectively in verbal and written form.

I B.Tech. - II Semester
16BT21231: **IT WORKSHOP**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: -
COURSE DESCRIPTION:
Practice sessions on PC hardware, Internet, World Wide Web, LibreOffice Suite. Demonstrations on installations of system software such as MS-Windows, Linux and device drivers, hardware and software troubleshooting, and protecting the personal computer from viruses and other cyber attacks are include.

COURSE OUTCOMES:

On successful completion of this course the students will be able to:

1. Demonstrate analytical skills in:
   a) Identification of functional parts of PC
   b) Internet and World Wide Web.
   c) Computer security issues and preventive measures.
   d) Operating Systems.
2. Design document and presentations effectively.
3. Apply modern tools to develop IT based applications.
4. Demonstrate effective communication skills through IT tools.
5. Update knowledge and skills in PC maintenance and usage of latest Operating Systems and Office automation tools.

I B.Tech. - II Semester

16BT21232: **OBJECT ORIENTED PROGRAMMING LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: A Course on "OOPS through C++".

COURSE DESCRIPTION: Hands-on experience on creating Virtual machines on Windows and Linux platforms, Development of Service based web applications & their deployment and Mobile app development.

COURSE OUTCOMES:

On successful completion of this course the students will be able to:

1. Demonstrate practical knowledge on Object oriented programming concepts - Object, Class, Inheritance, Polymorphism, encapsulation, Abstraction, message passing.
2. Apply object oriented programming concepts to develop real world applications.
3. Demonstrate Problem solving skills using basic and advanced concepts of C++.
4. Work individually and in teams collaboratively in implementing the applications.
5. Demonstrate communication skills both oral and written for preparing and presenting reports.

II B. Tech. – I Semester

(16BT3BS01) **PROBABILITY DISTRIBUTIONS AND STATISTICAL METHODS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: Intermediate/senior secondary mathematics

COURSE DESCRIPTION: Random variables; mathematical expectations; probability distributions; correlation and regressions; statistical quality control; sampling distributions; tests for small and large samples and their significances.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1.Acquire basic knowledge in
- (a) probability distributions, correlation and regressions
- (b) statistical quality control and testing of hypotheses
- (c) Simple linear regression
- (d) Tests of significance for small and large samples

CO2.Develop skills for analyzing the data with
- (a) mathematical expectations for realistic results
- (b) probability distributions for practical situations.
- (c) control charts of statistical quality control
- (d) correlation and regression concepts
- (e) suitable tests of significance for practical situations.

CO3. Develop skills in designing
- (a) probability distributions
- (b) limitations of statistical quality control
- (c) control charts,
- (d) X, R, np, and c charts

CO4. Develop analytical skills for solving problems involving
- (a) probability distributions, means, variances and standard deviations
- (b) statistical techniques employed for quality
- (c) sampling techniques for decision making
- (d) Tests of significances for small and large samples

CO5. Use relevant probability and statistical techniques for
- (a) Mathematical expectations of desired results
- (b) Fitting probability distributions for experimental data.
- (c) Quality control and testing of hypothesis.

II B. Tech. – I Semester
(16BT30501) **COMPUTER ORGANIZATION**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: A course on Digital Logic Design
COURSE DESCRIPTION:
Basic structure and operation of a digital computer; Organization and functional principles of the arithmetic and logic unit, control unit, memory unit and I/O unit; Concepts of pipelining and parallel processing techniques;
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Demonstrate knowledge on:
- Computer Arithmetic units
- Register Transfer and Computer Instructions
- ☐ Design of Control Unit
- Input Output Organization and Memory system
- Pipelining and Multiprocessing.

CO2. Analyze the functional units of a digital computer.
CO3. Design the functional modules in a digital computer - Arithmetic Units, Memory and I/O.
CO4. Investigate the performance of memory, I/O, and pipelined processors.
CO5. Select appropriate techniques of I/O, Pipelining and Multiprocessing to solve computing problems.
CO6. Apply contextual knowledge of computer systems development to societal applications.

II B. Tech. – I Semester
(16BT30502) **DATA STRUCTURES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: A course on Programming in C
COURSE DESCRIPTION:
Linked Lists; Type of lists; Operations and Applications; Stacks and Queues; Operations and Applications; Trees, Search trees and Heaps; Multi-way Trees and Graphs; Searching and Hashing.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Demonstrate knowledge on
☐ Principles of Data Structures.
☐ Linear and Non-linear Data Structures.
☐ Sorting and hashing techniques.
CO2. Analyze and Identify suitable data structure for computational problem solving.
CO3. Design solutions for complex engineering problems using linear and non-linear data structures.
CO4. Develop solutions for Complex computational problems by conducting explorative analysis.
CO5. Apply appropriate data structure to provide solutions for real time problems by using C Language.
CO6. Apply contextual knowledge of data structures to design applications for societal applications like payroll systems, web applications, banking and financial systems.

II B. Tech. - I Semester
(16BT31201) **DISCRETE MATHEMATICAL STRUCTURES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: A course on Multivariable Calculus and Differential Equations.
COURSE DESCRIPTION: Mathematical Logic; Predicates; Functions and Relations; Algebra Structures; Mathematical Reasoning; Recurrence Relations; Graphs; Graph Theory and its Applications.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Demonstrate knowledge on mathematical logic, algebraic structures, relations, recurrence relations and mathematical reasoning.
CO2. Analyze and prove given statement by contradiction and automatic theorem.
CO3. Design network applications using Prim’s and Kruskal’s algorithms.
CO4. Solve tree traversal problems using Graph Theory.
CO5. Apply permutation, combinations, counting principle, Lagrange’s theorem and graph theory in solving real-time problems.

II B. Tech. – I Semester
(16BT41202) **JAVA PROGRAMMING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: A course on Object Oriented Programming through C++.
COURSE DESCRIPTION: Introduction of Java, Classes and Objects; Inheritance, Packages, Interfaces; Exception handling, Multithreading; Event handling, AWT, Collection Classes; Applets, Servlets.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Demonstrate knowledge on:
- Object Oriented Programming concepts - classes, objects, inheritance, polymorphism, encapsulation and abstraction.
- Packages, interfaces, multithreading, exception handling, event handling.

CO2. Analyze complex engineering problems using object oriented concepts.
CO3. Design and develop reusable code to provide effective solutions for real world problems using inheritance and polymorphism**.**
CO4. Apply AWT and Applets to create interactive Graphical User Interfaces.
CO5. Use advanced programming languages to develop web applications.
CO6. Build Java Applications suitable for societal requirements.

II B. Tech. - I Semester
(16BT31501) **OPERATING SYSTEMS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: —
COURSE DESCRIPTION: Operating systems operations, scheduling; Critical section problem, deadlocks; Paging, segmentation; File Concept, Disk scheduling; I/O interface; concepts of protection.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Demonstrate knowledge on Operating system operations, services, file management, disk management, I/O management and protection.
CO2. Identify the functionality involved in process management concepts like scheduling and synchronization.
CO3. Design models for handling deadlock and perform memory management.
CO4. Synthesize and apply programming API's to perform Process management.
CO5. Use appropriate protection tools to provide access control to Operating system users.

II B. Tech. – I Semester
(16BT30531) **DATA STRUCTURES LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: A course on Data Structures
COURSE DESCRIPTION:
Hands on practice on Linked Lists; Type of lists; Stacks and Queues; Trees and Search trees; Graphs; Searching and Hashing.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Demonstrate practical knowledge on Stacks, Queues, Linked lists, Trees Sorting and Hashing Techniques.
CO2. Analyze suitable data structure to solve real world computing problems.
CO3. Design solutions for complex computational problems using linear and non-linear data structures.
CO4. Solve for Complex computational problems by conducting explorative analysis.
CO5. Use C language for implementing linear and non-linear data structures.
CO6. Apply contextual knowledge of data structures to design applications for societal requirements.
CO7. Communicate effectively using data structures with engineering community, being able to comprehend and write effective programs and Prepare Reports.
CO8. Engage in learning advances in Data structures.

II B. Tech. – I Semester
(16BT31231) **JAVA PROGRAMMING LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITE: A course on Java Programming.
COURSE DESCRIPTION: Hands on experience on Polymorphism; Inheritance and Interfaces; Exception Handling; Multithreading; Event Handling; AWT; Applets; Servlets.
COURSE OUTCOMES:
On successful completion of this course, the students will be able to:
CO1. Demonstrate knowledge on basic concepts of Java programming.
CO2. Design and develop efficient programs with multitasking ability and handle exceptions.
CO3. Demonstrate independent problem solving skills in developing interactive applications.
CO4. Apply object oriented approach to develop user friendly interface and learn how to communicate with systems over the network.
CO5. Build Java applications suitable for societal requirements.
CO6. Work effectively as an individual and as a member in team for case studies implementation.
CO7. Demonstrate communication skills, both oral and written for preparing and presenting reports.

II B. Tech. - I Semester
(16BT31531) **OPERATING SYSTEMS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITE: A course on Operating Systems.
COURSE DESCRIPTION: Hands on practice in simulating algorithms for CPU Scheduling, Memory Management, I/O Management, Deadlock Handling mechanisms; Implementing Synchronization problems; practice on UNIX commands.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Demonstrate knowledge of the following algorithms to solve problems:
   i. CPU Scheduling
   ii. Memory Management
   iii. I/O Management
CO2. Formulate and analyze solutions to problems pertaining to Memory and I/O.
CO3. Designing models for deadlock handling mechanisms.
CO4. Develop skills in basic UNIX commands.
CO5. Use appropriate APIs' available in modern operating systems (such as threads, system calls, semaphores, etc…) for software development.
CO6. Communicate effectively on complex operating system problems with implication to User-friendliness.
CO7. Develop and demonstrate user defined libraries to communicate with the kernel or effective implementation of projects across multidisciplinary environments

II B.Tech - II Semester
(16BT3HS01) **ENVIRONMENTAL STUDIES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	0	-	3

PRE-REQUISITE: A course on Engineering Chemistry
COURSE DESCRIPTION: Multidisciplinary nature of environment; Natural resources; Ecosystems; Biodiversity; Environment pollution and control; Social issues and environment; Human population and environment; Field studies.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Acquire knowledge on nature of environment, natural resources, ecosystems, biodiversity, environmental pollution and control, social issues and human population.
CO2. Analyze natural resources, ecosystems, biodiversity, environmental pollution and control, social issues and human population.
CO3. Develop strategies for environmental pollution control and natural resource management.
CO4. Solve environmental problems through proper analysis and interpretation of environmental data.
CO5. Choose appropriate techniques in environmental pollution control and natural resource management.
CO6. Understand the impact of social issues and population on environment.

CO7. Provide solutions to individuals, industries and government for environmental sustainable development.
CO8. Follow environmental protection laws for sustainable development.
CO9. Communicate effectively on environmental issues in the form reports.

II B. Tech. - II Semester
(16BT41204) **THEORY OF COMPUTATION**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: A course on Discrete Mathematical Structures.
COURSE DESCRIPTION: Fundamentals of Computation; Finite State Automaton; Regular Expressions; Grammars; Push Down Automaton; Turing Machine.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Demonstrate knowledge on Formal languages and automata.
CO2. Analyze the classification of languages, automata's and their computing power.
CO3. Design grammars and automata (recognizers) for regular expressions and formal languages.
CO4. Solve computational problems using automata.
CO5. Apply theorems to translate automata's and identify the class of languages.

II B. Tech. – II Semester
(16BT40502) **DATABASE MANAGEMENT SYSTEMS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: —
COURSE DESCRIPTION:
Database Systems; Database Design; Relational Model; SQL Queries, Constraints and Triggers; Schema Refinement and Normal Forms; Transaction Management; Concurrency Control; Overview of Storage and Indexing.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Demonstrate knowledge on
- Data models and Database Languages
- Database design
- Normal forms
- Storage and Indexing

CO2. Analyze databases using normal forms to provide solutions for real time applications.
CO3. Design solutions for database problems using database design, views design and framing queries.
CO4. Use database techniques for designing databases, managing databases and its security.
CO5. Select SQL, Hash based Indexing and Tree based Indexing to manage data in databases.
CO6. Apply contextual knowledge to develop database applications related to societal applications like Information Retrieval Systems, Banking and Financial systems.

II B. Tech. – II Semester
(16BT41201) **DESIGN AND ANALYSIS OF ALGORITHMS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: A course on Data Structures.
COURSE DESCRIPTION: Introduction to Algorithms and Asymptotic Notations; Disjoint Sets and Graphs; Divide and Conquer Greedy Method; Dynamic Programming, Back Tracking; Branch and Bound.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Demonstrate knowledge on:
- Algorithm Complexities and Asymptotic notations.
- Algorithm Design techniques-Divide and Conquer, Greedy Method, dynamic programming, Back tracking, Branch and Bound.

CO2. Analyze the performance of algorithms with respect to Time and Space complexities.
CO3. Design the algorithms for solving real world problems.
CO4. Solve sorting and searching problems using Divide and Conquer method.
CO5. Use dynamic programming and backtracking in finding shortest paths.

II B. Tech. – II Semester
(16BT51202) **OBJECT ORIENTED ANALYSIS AND DESIGN**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Software Engineering and Object Oriented Programming through C++.
COURSE DESCRIPTION: Introduction to UML, Basic structural modeling; Advanced structural modeling, Class and object diagrams; Basic behavioral modeling; Advanced behavioral modeling; Architectural modeling.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Demonstrate knowledge on principles of object oriented analysis and design through UML Diagrams.
CO2. Analyze user requirements and identify suitable structuraland behavioral modeling components.
CO3. Design and develop UML models for real time software applications.
CO4. Solve real world problems by applying structural and behavioral modeling techniques.
CO5. Use unified modeling language in preparing blue prints for software solutions.
CO6. Design and develop UML models to solve societal problems.

II B. Tech. – II Semester
(16BT41203) **SOFTWARE ENGINEERING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: —
COURSE DESCRIPTION: Concepts of Software Engineering; Software Process Models; Conventional and Agile Process Models; Software Requirements Engineering Process; System Analysis; Architectural Design; User Interface Design and Re-engineering; Software Testing; Risk and Quality Management.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge on:
- Fundamental concepts of software engineering.
- Process models.
- Software development life cycle.

CO2. Analyze software requirements and process models required to develop a software system.
CO3. Design and develop a quality software product using design engineering principles.
CO4. Develop software product as per user and societal requirements.
CO5. Follow standards for software development and quality management.
CO6. Demonstrate skills in applying risk and quality management principles for effective management of software projects.

II B. Tech. II Semester
(16BT40531) **DATABASE MANAGEMENT SYSTEMS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITE: A course on Database Management Systems
COURSE DESCRIPTION:
Hands on experience on - DDL, DML commands; Query processing using operators; Joins, Views, Single Row functions, Group Functions and SET functions; PL/SQL concepts - Basic Programs, Triggers, Functions, Cursors and Stored Procedures.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Demonstrate practical knowledge on creation and alteration of tables, insertion and Querying of data.
CO2. Analyze and evaluate the databases using SQL DML/ DDL commands.
CO3. Design database schemas for the sales database, customer database and product database.
CO4. Develop solutions for database problems using stored procedures, stored functions, cursors and triggers.
CO5. Implement DDL and DML commands in SQL and PL/SQL, ORACLE to manage data in databases.
CO6. Apply contextual knowledge to develop database applications related to societal applications like Information Retrieval Systems, Banking and Financial systems.
CO7. Demonstrate communication skills, both oral and written for preparing and presenting reports on databases.

II B. Tech. – II Semester
(16BT50533) **OBJECT ORIENTED ANALYSIS AND DESIGN LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITE: A course on Object Oriented Analysis & Design
COURSE DESCRIPTION:
Hands on Practice to Design and Implement - Automated Teller Machine, Library Information System, Online Ticket Reservation System, Point of Sales, Airport Simulation, Course Registration System, Home Appliance Control System and Hospital Management System using Object-Oriented Language.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Demonstrate practical knowledge on principles of object oriented analysis and design through UML diagrams.
CO2. Analyze user requirements and identify suitable structural and behavioral modeling components.
CO3. Design and develop UML models for real time applications.
CO4. Solve real world problems by applying structural and behavioral modeling techniques.
CO5. Use UML to design the software system.
CO6. Apply contextual knowledge of UML models to assess societal issues.
CO7. Involve as individual to solve case studies.
CO8. Develop a model for complex computational activities by preparing and presenting reports through effective communication.

II B. Tech. – II Semester
(16BT4HS31) **SOFT SKILLS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITE: English Language Laboratory in I B.Tech or English Laboratory at Diploma Level.
COURSE DESCRIPTION: This course covers Body Language; Assertiveness; Goal Setting; Creative Thinking; Interpersonal Skills; Team Work; Conflict Management; Etiquette; Report Writing; Group Discussions; Interviewing Skills.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Acquire knowledge in
- Goal Setting
- Creative Thinking
- Leadership Skills and
- Team Work

CO2. Analyze the situations and develop skills for
- Body Language
- Personality Development and
- Stress Management

CO3. Apply the techniques of soft skills in a problem situation enhanced through multimedia software.
CO4. Function effectively as an individual and as a member in diverse teams.
CO5**.** Communicate effectively in public speaking in formal and informal forums.

III B. Tech. – I Semester
(16BT5HS01) **MANAGEMENT SCIENCE**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: —
COURSE DESCRIPTION: Concepts of Management; Environmental Scanning; Concepts Related to Organization; Operations Management; Work Study; Statistical Quality Control; Inventory Management; Marketing; Human Resource Management; Project Management; Project Crashing; Entrepreneurship; Contemporary Management Practices.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Demonstrate the concepts of operations management, human resources management, project management and contemporary management practices in managerial context.
CO2. Identify and analyse management problems in the business organizations reaching substantiated conclusions using principles of management.

CO3. Design appropriate organization structure for meeting the needs of the organization with consideration of the employees of the organization.
CO4. Competently employ broad based analytical tools for decision making, system design, analysis and performance.
CO5. Provide solution to organizations for sustainable development.
CO6. Apply knowledge of engineering and management principles to manage the projects in multidisciplinary environments.

III B. Tech. – I Semester
(16BT50501) **COMPUTER NETWORKS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Computer Organization and Operating Systems
COURSE DESCRIPTION:
Introduction to Computer Networks; The Physical Layer; The Data Link Layer; The Medium Access Control Sub-layer; The Network Layer; The Transport Layer; The Application Layer.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Demonstrate knowledge on:
- Functionalities of Various OSI and TCP/IP layers
- 3G Mobile phone networks, 802.11
- TCP,UDP and SMTP

CO2. Analyze the issues related to data link, medium access and transport layers by using channel allocation and connection management schemes.
CO3. Design and compute subnet masks and addresses for networking requirements.
CO4. Solve problems related to Flow control, Error control, congestion control and Network Routing.
CO5. Apply Network Standards - 802.3 and 802.11 for developing computer Networks.
CO6. Assess the impact of wired and wireless Networks in the context of societal applications like VoIP, Multi-user Network Games, Internet of Things.

III B. Tech. - I Semester
(16BT51501) **COMPILER DESIGN**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: A course on Theory of Computation
COURSE DESCRIPTION:
Lexical analysis; Parsers; Run Time Environments; Syntax Directed Translation; Type checking; Code Optimization; Code Generation and Compiler tools.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Demonstrate knowledge on the phases involved in design of compilers.
CO2. Analyze code optimization Techniques.
CO3. Design experiments for implementing parsing techniques.
CO4. Synthesize rules in compiler to demonstrate semantic attribution during Parsing.
CO5. Use compiler construction tools such as LEX and YACC for designing a Parser.
CO6. Apply Ethical principles for usage of stack and other storage memory.

III B. Tech. – I Semester
(16BT50442) **MICROPROCESSORS AND INTERFACING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Digital Logic Design and Computer Organization.
COURSE DESCRIPTION: INTEL 8086 & 8051- Architectures; Instruction set; Programmable Interfacing Concepts; ADC, DAC, 8255, 8257,8259 ,8279,8251, Advanced peripheral Interfacing; Applications.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO 1: Demonstrate knowledge in
a) Internal Hardware details of Intel 8086, 8051 & programming devices like 8255, 8257, 8259, 8279 and 8251.
b) Interfacing various peripherals to build standalone systems.

CO2. Analyze various peripherals and interfacing techniques.
CO3. Design application based Microcomputer system using 8086 and 8051.
CO4. Solve problems by providing microcomputer-based real time solutions.
CO5. Apply programming tools, appropriate techniques and resources to complex engineering activities for microprocessor and microcontroller based systems with understanding of limitations.
C06: Solving societal problems by applying concepts of microprocessors and microcontrollers.

III B. Tech. - I Semester
(16BT51502) **SYSTEMS SOFTWARE**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: A course on Operating Systems.
COURSE DESCRIPTION:
Kernel and Shell; The shell interpretive cycle ; Shell scripts; System calls for the File System - Open, Read, Write, File and record locking ; Process states and transitions;Process Creation; TCP/IP Basics; Resolving IP Addresses, Maintaining Security.
COURSE OUTCOMES:
On successful completion of this course, students will be able to
CO1. Demonstrate knowledge on commands for text processing and Files.
CO2. Analyze and Interpret process and System management techniques used in System Software
CO3. Use inbuilt UNIX system APIs to control system and its process.
CO4. Apply algorithms to manipulate the process context in system Software.
CO5. Perform effective troubleshooting using system error defines available with the operating system.

III B. Tech. – I Semester
(16BT30503) **PYTHON PROGRAMMING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on Object Oriented Programming through C++.
COURSE DESCRIPTION:
Data types and Expressions; Control Statements; Strings; Text Files; Lists; Dictionaries; Functions; Objects and their use; Exception Handling; Design with Classes; Graphical User Interface.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Demonstrate knowledge in:
- ☐ Data Types, Variables, Expressions
- ☐ Control statements, Strings and Text files.
- ☐ Lists, Dictionaries and Functions.
- ☐ Objects and Design with classes
- ☐ Exception Handling and GUI

CO2. Analyze complex computational problems.
CO3. Design solutions for real life computational problems
CO4. Solve complex problems using python scripting constructs.
CO5. Implement python scripts using Integrated Development Environment.
CO6. Apply Python programming knowledge to solve problems related to societal applications like Medical and Weather Forecasting.

III B. Tech. – I Semester
(16BT71203) **INFORMATION RETRIEVAL SYSTEMS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Data Structures and Database Management Systems.
COURSE DESCRIPTION: Architecture of Information Retrieval Systems; Functional Capabilities; Data Structures; Mathematical Algorithms; Indexing; Similarity and Clustering; Human Perception and Presentation; Text Search Techniques and Evaluation Measures.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Demonstrate knowledge on:
- ☐ Information Retrieval System Architecture

- ☐ Functional capabilities
- ☐ Indexing and data presentation methods.
- ☐ Evaluation measures of Information Retrieval Systems.

CO2. Analyze indexing methods and clustering algorithms to group similar data items for efficient search.
CO3. Design and develop data structures used to store and retrieve data items.
CO4. Demonstrate problem solving skills in the usage of mathematical algorithms for information retrieval.
CO5. Use text search algorithms and collaborative filtering techniques for information retrieval and visualization methods for information presentation.

III B. Tech. - I Semester
(16BT51503) **INTELLIGENT COMPUTING SYSTEMS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:
Courses on Discrete Mathematical Structures and Design and Analysis of Algorithms
COURSE DESCRIPTION: AI Problems; Problem Characteristics Search Algorithms; Inference in Propositional Logic; Forward and Backward Chaining Algorithms; Truth Maintenance Systems; Basic Probability Notations; Forms of Learning; Evolutionary Computing.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Demonstrate Knowledge on
- ☐ Artificial Intelligent Techniques
- ☐ Searching algorithms
- ☐ Inference in Propositional and First Order Logic
- ☐ Evolutionary Computing

CO2. Analyze and solve problems involving search algorithms.
CO3. Design and develop knowledge based solutions for AI based systems.
CO4. Apply knowledge representation, reasoning, and machine learning techniques to solve real world problems.
CO5. Use appropriate evolutionary algorithms in intelligent computing systems.
CO6**.** Demonstrate the use of intelligent systems' principles in societal context to solve diverse problems.

III B. Tech. – I Semester
(16BT40501) COMPUTER GRAPHICS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Matrices and Numerical Methods and Programming in C.
COURSE DESCRIPTION:
Introduction to Computer Graphics; Output Primitives; 2-D Geometric Transformations and Viewing; 3-D Geometric Transformations and Viewing; 3-D Object Representation; Visible Surface Detection Methods and Rendering Methods.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Demonstrate knowledge on
- ☐ Graphical interactive devices
- ☐ Viewing transformations
- ☐ 2-D & 3-D object representations and
- ☐ Surface detection methods

CO2. Analyze Transformations and Clipping algorithms for 2-D and 3-D objects.
CO3. Design algorithms to generate points, lines, and polygons for 2-D and 3-D objects.
CO4. Develop innovative methods and techniques for 2-D and 3-D modeling.
CO5. Apply appropriate techniques and tools for surface detection and rendering methods.
CO6. Use contextual knowledge to solve problems related to societal issues.

III B. Tech. – I Semester
(16BT50531) **COMPUTER NETWORKS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: A course on Computer Networks
COURSE DESCRIPTION:
Hands on Practice on Data Link Layer Framing Methods; Routing Algorithms; Congestion Control Algorithms; Connection Management in Transport Layer;
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Demonstrate Knowledge on:
- Framing methods for data link layer,
- Shortest path using Dijkstra's routing algorithms

CO2. Identify suitable algorithm to find shortest path in a given network
CO3. Design and compute subnet masks and addresses for networking Requirements.
CO4. Solve problems related to Flow control, Error control, congestion control and Network Routing.
CO5. Apply Latest software tools and technologies for designing simple to complex applications in computer networks.
CO6. Assess the impact of wired and wireless Networks in the context of societal applications like VoIP, Multi-user Network Games, Internet of Things.
CO7. Work effectively as an individual to implement mini-project.
CO8. Demonstrate communication skills both oral and written for preparing and generating reports.

III B. Tech. - I Semester
(16BT50451) **MICROPROCESSORS AND INTERFACING LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITE: Course on Microprocessors and interfacing.
COURSE DESCRIPTION:
Assembly language Programming for Intel 8086 & 8051; Programming of Interfacing standard peripherals - DAC, Stepper Motor, ADC, Logic Controller, Keyboard, Seven Segment Display.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1 Demonstrate knowledge on microcomputer & microcontroller based systems.
CO2. Analyze various programming alternatives, interfacing methods & usage of various on-chip resources like Displays, logic controllers ADC, DAC, Keyboard interfacing and Stepper Motor to build stand alone systems.
CO3. Design and develop microcomputer and microcontroller based system to suit market requirements.
CO4. Solve engineering problems by proposing potential solutions using microprocessors and microcontrollers.
CO5. Apply appropriate techniques, resources, and tools for modeling microcomputer and microcontroller based systems with understanding of limitations.
CO6. Work effectively as individual and as a team member in the area of microprocessors.
CO7. Communicate in oral and written form in the area of microprocessors.

III B. Tech. - I Semester
(16BT51531) **SYSTEMS SOFTWARE LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Courses on Programming in C and Operating Systems
COURSE DESCRIPTION: Hands on Implementation of copy of a file using standard I/O and system calls; emulate the UNIX commands; Access Permissions; Loops in Directory hierarchy; Displaying time of day for every 60 seconds; Print all error messages; Running two programs in pipeline.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Demonstrate and interpret the working of commands available in UNIX.
CO2. Recognize different types of file supported by UNIX operating system.
CO3. Design and implement system-level applications for open-source operating systems.
CO4. Select and make use of the OS kernel functions and their APIs, standard programming Languages and utility tools.
CO5**.** Use different APIs for System Software design.

III B. Tech. - II Semester
(16BT3HS02) **MANAGERIAL ECONOMICS AND PRINCIPLES OF ACCOUNTANCY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE- REQUISITE: —
COURSE DESCRIPTION: Managerial Economics; Demand and Elasticity of Demand; Production Functions; Markets and Pricing Policies; Formation of different types of Business Organizations; Basic concepts of Accounting (Journal, Ledger and Trial balance); Trading Account, Profit and Loss Account and Balance sheet with simple adjustments; Computerized Accounting.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Acquire Knowledge in
- a) Tools and concepts of Micro Economics.
- b) Basic Principles and concepts of Accountancy.
- c) Provides life skills for effective utilization of scarce resources.
- d) Financial Accounting.
- e) Significance of Economics and Accountancy

CO2. Develop skills in managerial decision making of an organization.
CO3. Apply the Economic theories i.e., Demand, Production, Cost, Markets and Price.
CO4. Develop effective communication in Business and Accounting transactions.
CO5. Ascertain the profitability and soundness of an organization.
CO6. Practice Financial Accounting

III B. Tech. – II Semester
(16BT61501) **DATA WAREHOUSING AND DATA MINING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: A course on Database Management Systems.
COURSE DESCRIPTION: Data Mining Fundamentals; Data Preprocessing; Operational Database Systems and Data Warehouses; Mining Frequent Patterns; Classification and Prediction; Clustering; New Trends and Research Frontiers.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Demonstrate knowledge on Concepts of data warehousing and data mining.
CO2. Analyze using data mining techniques to find useful and potential Knowledge.
CO3. Design of Data Warehouse for OLAP applications and deployment.
CO4. Evaluate the usage of association mining techniques on complex data objects.
CO5. Select appropriate techniques to measure the interesting patterns from heterogeneous databases.
CO6. Apply appropriate evolutionary data mining algorithms to find solutions of Real time Applications.

III B. Tech. – II Semester
(16BT51203) **WEB TECHNOLOGIES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: A course on Java Programming.
COURSE DESCRIPTION: Hyper Text Markup Language (HTML); Features of HTML5; Cascading Style Sheets (CSS); JavaScript; JQuery; Bootstrap; Hypertext Preprocessor (PHP); MySQL.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Demonstrate knowledge on web page design elements, dynamic content and database interaction.
CO2. Analyze user requirements to develop web applications.
CO3. Design client-server applications using web technologies.
CO4. Demonstrate problem solving skills to develop enterprise web applications.
CO5. Use HTML, CSS, JavaScript, JQuery, Bootstrap and PHP technologies for device independent web application development.
CO6. Apply Web Technologies to develop interactive, dynamic and scalable web applications for societal needs.

III B. Tech. – II Semester
(16BT50341) **OPTIMIZATION TECHNIQUES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: A course on Multi-variable calculus and differential equations
COURSE DESCRIPTION:
Introduction to optimization; classical optimization techniques; classification of optimization problems; linear programming; transportation and assignment problem; non-linear programming; un-constrained non-linear programming; constrained non-linear programming; dynamic programming.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Demonstrate the knowledge on Optimization techniques for Linear, Non linear and Dynamic programming problems.
CO2. Analyze and quantify a system architecture or product design problem for selecting appropriate objective function, design variables, parameters and constraints.
CO3. Develop mathematical models for real time optimization problems.
CO4. Conduct investigations on complex problems and make recommendations based on solutions, analysis and limitations of models.
CO5. Use optimization techniques for solving complex problems of real time applications.
CO6. Optimize the resources in organizations for sustainable development.

III B. Tech. - II Semester
(16BT60404) **IMAGE PROCESSING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: —
COURSE DESCRIPTION:
Fundamentals of image processing; Image transforms; Image enhancement techniques in spatial and frequency domains; Restoration techniques; Image segmentation techniques; Image compression techniques.
COURSE OUTCOMES:
On successful completion of this course, students will be able to
CO1. Demonstarte knowledge in
- □□□Image Fundamentals
- □□□Image Enhancement & Restoration Techniques
- □□□Image Segmentation & Compression Techniques
- □□□Color image processing

CO2. Analyze different images using various processing techniques.
CO3. Design and Develop various image processing algorithms to process the images in various Real Time Applications.
CO4. Solve problems related to images for feasible and optimal solutions in the core area of Image Processing.
CO5. Apply appropriate techniques to complex engineering activities in the field of image processing.
CO6. Understand the impact of the image processing for societal needs.

III B. Tech. – II Semester
(16BT61201) **CLOUD COMPUTING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Computer Networks and Operating Systems.
COURSE DESCRIPTION: Virtualization, Virtualization Technologies; Cloud Computing Fundamentals, Deployment Models; Cloud Computing Architecture; Cloud Computing Mechanisms; Cloud Security, Cloud Disaster Recovery; Working with Clouds; and Case Studies.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Demonstrate knowledge on services, architecture, types of infrastructural models, disaster recovery and virtualization.
CO2. Analyze the issues in cloud computing Data, Network and Host security.
CO3. Apply API development skills in web applications for Cloud deployment.
CO4. Use research based knowledge to build cloud applications.
CO5. Use advanced programming languages to access cloud services.
CO6. Build cloud environment suitable for societal requirements.

III B. Tech. - II Semester
(16BT71204) **MOBILE COMPUTING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: A course on Computer Networks.
COURSE DESCRIPTION: Introduction to Mobile Computing, GSM; Medium Access Control, Wireless LAN; Mobile Network and Transport Layers; Data Dissemination; Mobile Ad-Hoc Networks (MANETs), Wireless Application Protocol (WAP).
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Demonstrate knowledge on:
- GSM, GPRS, 3G, 4G, Wireless LAN, MANETs.
- Protocols in Data Link, Network, Transport and Application layer.

CO2. Analyze the issues related to database design and data retrieval in mobile applications.
CO3. Apply routing algorithms for finding shortest path in MANETs.
CO4. Use protocols of Wireless Technologies for security implementation in mobile computing.
CO5**.** Follow standards in the usage of mobile communications.

III B. Tech. - II Semester
(16BT70505) HUMAN COMPUTER INTERACTION

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: —
COURSE DESCRIPTION:
Graphical User Interface; Design Process; Screen Designing; Windows; Components; Software Tools; Interaction Devices.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Demonstrate knowledge on principles, characteristics, tools and devices of Human Computer Interaction.
CO2. Analyze the user requirements, technological and physical characteristics of users for better interface design.
CO3. Design appropriate user interface for desktop and web applications.
C04. Conduct investigations on User requirements to provide an effective user interface.
CO5. Utilize user interface mockup tools and input, output and pointing devices for designing user interfaces.
CO6. Apply Contextual knowledge to develop interfaces for differently abled people.

III B. Tech. - II Semester
(16BT61502) **NETWORK SECURITY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: A course on Computer Networks
COURSE DESCRIPTION:
Foundations of Network Security; Security Technologies; Symmetric and Asymmetric key encryption algorithms; System Security with Firewalls; Intrusion Detection.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Demonstrate knowledge on types of attacks, firewalls, Symmetric encryption, Cryptography, message authentication and confidentiality
CO2. Analyze the principles of symmetric and public key cryptographic algorithms
CO3. Design appropriate algorithms suiting the security needs of the network.
CO4. Apply security schemes in firewall design to protect the organization’s internet/ network systems.
CO5. Use modern engineering techniques to identify Intrusion Detection, types of malicious software and apply suitable counter measures.
CO6. Apply ethical means to integrate network operations, administration and information assurance in a network.

III B. Tech. - II Semester
(16BT61503) SOFTWARE PROJECT MANAGEMENT

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: A course on Software Engineering.
COURSE DESCRIPTION:
Conventional Software Management; Evolution of Software Economics; Improving Software Economics; Lifecycle Phases; Artifacts of the Process; Workflow of the Process; Checkpoints of the Process; Software Economics; Iterative Process Planning; Project Organization and Responsibilities; Project Control and Project Instrumentation; Agile Overview.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Demonstrate knowledge on software effort estimation techniques, Agile life cycle, project control and instrumentation.
CO2. Analyze the major and minor milestones, artifacts, metrics from management and technical perspectives.
CO3. Design and develop software products using conventional and modern principles of software project management.
CO4. Effectively implement project management through appropriate planning of Work flows and Work Breakdown Structures of the process.
CO5. Select appropriate techniques to evaluate progress of software project in terms of milestones and check points.
CO6. Apply appropriate ethical principles to be followed in management of software economics.

III B. Tech. - II Semester
(16BT61504) **WINDOWS PROGRAMMING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: A course on Operating Systems.
COURSE DESCRIPTION:
Windows File Processing; Advanced File and Exception Handling; Memory Management; Process Management; Inter-process Communication; Network programming with Windows Sockets.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Acquire knowledge on Windows File processing and Exception Handling.
CO2. Analyze and Interpret process management techniques used in System Software.
CO3. Design and Develop memory mapping techniques for sequential files and Dynamic Link Libraries
CO4. Use contextual knowledge for implementing Inter-Process Communication and Network Programming With Sockets.
CO5. Apply Win32 programming techniques for Heap memory management and Parallel pattern searching.
CO6**.** Exhibit professional ethics and responsibilities by understanding Windows Programming standards compared to open standards.

III B. Tech. - II Semester
(16BT61531) **DATA WAREHOUSING AND DATA MINING LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITE: A course on Data warehousing and Data Mining
COURSE DESCRIPTION: Hands on practical experience on Warehouse design; OLAP operation; Data pre-processing techniques; Association rule mining; classification of data; Naïve Bayes classifier; Decision tree; Clustering technique using WEKA-Open source machine learning tool.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Demonstrate knowledge on the creation and usage of data warehouses.
CO2. Analyze and interpret the results using data mining techniques.
CO3. Design and develop transformations such as filter, join and rank on data warehouses.
CO4. Use classification and clustering techniques to find interesting patterns in large databases.
CO5. Choose and deploy modern tools to handle large, missing and noisy data in datasets.
CO6. Use appropriate data mining algorithms to find solutions for real time societal applications.
CO7. Function effectively as an individual to perform operations on different databases using Informatica.
CO8. Communicate effectively using report generation tools on business data.

III B. Tech. – II Semester
(16BT51233) **WEB TECHNOLOGIES LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITE: A course on Web Technologies.
COURSE DESCRIPTION: Hands-on experience on HTML5; CSS; JavaScript; JQuery; Bootstrap; PHP and MySQL.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Demonstrate knowledge on web page design elements, dynamic content and database Interaction.
CO2. Analyze user requirements to develop web applications.
CO3. Design client-server applications using web technologies.
CO4. Demonstrate problem solving skills to develop enterprise web applications.
CO5. Use HTML, CSS, JavaScript, JQuery, Bootstrap and PHP technologies for device independent web application development.
CO6. Apply web technologies to develop interactive, dynamic and scalable web applications for societal needs.
CO7. Work effectively as an individual and as a member in team for mini-project implementation.
CO8. Demonstrate communication skills, both oral and written for preparing and presenting reports.

III B. Tech.– II Semester
(16BT61532) **SEMINAR**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
	100	100	-	-	-	2

PRE-REQUISITES: All the courses of the program up to III B. Tech. – I Semester.
COURSE DESCRIPTION:
Identification of the topic for the seminar; Literature survey; Performing critical study and analysis of the topic identified; Preparation of report and presentation.
COURSE OUTCOMES:
Completion of the seminar work enables a successful student to demonstrate:
CO1. Knowledge on the seminar topic.
CO2. Analytical ability exercised during the seminar work.
CO3. Ability to investigate and solve complex engineering problems faced during the seminar work.
CO4. Ability to apply techniques to complex engineering activities with an understanding of limitations as applied in the seminar work.
CO5. Ability to function effectively as an individual as experienced during the seminar work.
CO6. Ability to present views cogently and precisely on the seminar topic.
CO7. Ability to engage in life-long leaning as experience during the seminar work.

III B.Tech. – II Semester
(16BT6HS01) **BANKING AND INSURANCE**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE REQUISITES: -
COURSE DESCRIPTION: Origin of Banking; Functions of Banking; Role & Functions of RBI; Bank-Customer Relationship; Deposit and Loan Services of Banks; Banking Procedures; Electronic Payment Mechanisms; Business Models; Concepts of Risk and Uncertainty; Fundamentals of Insurance; Principles of Insurance; Essentials of Insurance Contracts; Insurance players in India.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate Knowledge in
- a) Tools and concepts of Banking and Insurance.
- b) Basic Principles and concepts of Insurance and Banking.
- c) e-fund transfers, e-payments and e-business models.

CO2. Develop skills in providing solutions for
- a) Online banking and e – payments.
- b) Risk Management through insurance benefits the society at large.
- c) Money management by leveraging on technology, banking and insurance services.

CO3. Exhibit conceptual soundness about banking and insurance, this would contribute to more employment opportunities.
CO4. Provide life skills for effective utilization of Banking and Insurance facilities.

III B. Tech. – II Semester
(16BT6HS02) **BUSINESS COMMUNICATION AND CAREER SKILLS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Technical English or English at Diploma level
COURSE DESCRIPTION: Nature and Scope of Communication; Corporate Communication; Writing Business Documents; Careers and Resumes; Interviews.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate knowledge in
  a) Corporate Communication
  b) Main Stages of Writing Messages
  c) Career Building
CO2. Analyze the possibilities and limitations of language in
  a) Communication Networks
  b) Crisis Management/Communication
CO3. Design and develop the functional skills for professional practice in
  a) Business Presentations & Speeches
CO4. Apply written and oral communication techniques in preparing and presenting various documents in technical writing.
CO5. Function effectively as an individual and as a member in diverse teams.
CO6. Communicate effectively with the engineering community and society in formal and informal situations.

III B.Tech. – II Semester
(16BT6HS03) **COST ACCOUNTING AND FINANCIAL MANAGEMENT**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE REQUISITES: -
COURSE DESCRIPTION: Scope, Objectives and Elements of Cost Accounting; Cost Sheet and Tender Quotations; Variance Analysis: Material variances, Labor variances; Meaning and Scope, Liquidity, Profitability Ratios: Concept of Risk and Return on Investment.
Course outcomes: On successful completion of this course, the students will be able to:
CO1. Acquire Knowledge in
  a) Elements of Costing.
  b) Basic concepts of Financial Management.
  c) Risk and Return
  d) Significance of Cost Accountancy
  e) Behavioral Finance
CO2. Develop skills in
a) Material, Labor, Overheads control.
  b) Excellence and ability to minimize the cost of the organization
CO3. Develop effective Communication in Cost control and Financial Management.
CO4. Provide solutions for effective investment decisions.

III B.Tech. – II Semester
(16BT6HS04) **ENTREPRENEURSHIP FOR MICRO, SMALL AND MEDIUM ENTERPRISES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE REQUISITE: -
COURSE DESCRIPTION: Introduction to Entrepreneur Development; Idea generation and formation of Business Plan; Micro and Small Enterprises; Institutional Finance and Support to Entrepreneur; Woman Entrepreneurship.
Course outcomes: On successful completion of this course, the students will be able to:
CO1. Acquire Knowledge in
  a) Schemes and institutions encouraging entrepreneurship
  b) Basic Principles and concepts of Accountancy
  c) Significance of entrepreneurship
CO2. Develop skills in providing solutions for
  a) Personal excellence through financial and professional freedom
  b) Women entrepreneurship serving as contrivance in societal development
CO3. Develop Critical thinking and evaluation ability.
CO4. Widens knowledge and build up attitude towards trouble shooting.
CO5. Demonstrate business acumen.

III B.Tech. – II Semester
(16BT6HS05) **FRENCH LANGUAGE (La Langue Francais)**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Oral communications; Basic grmmar; Advanced grammar; Basic writing; Business French (La Francais Commercial).
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate knowledge in
- a) Process of communication
- b) Modes of listening
- c) Paralinguistic features
- d) Skimming and Scanning
- e) Elements of style in writing

CO2. Analyze the possibilities and limitations of language, understanding
- a) Barriers to Communication
- b) Barriers to Effective Listening
- c) Barriers to Speaking
- d) Formal and metaphorical language

CO3. Design and develop language skills for professional practice**.**
CO4. Apply basic writing skills in writing Emails and understanding wide range of technical terminologies.
CO5. Understand French culture and civilization.
CO6. Communicate effectively with the native French in day to day situation

III B.Tech. – II Semester
(16BT6HS06) **GERMAN LANGUAGE (Deutsch alsFremdsprache)**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Oral communication; Basic grammar; Advanced grammar; Basic writing; Berufsdeutcsch (Business German)
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate knowledge in
- a) Process of communication
- b) Modes of listening
- c) Paralinguistic features
- d) Skimming and Scanning
- e) Elements of style in writing

CO2. Analyze the possibilities and limitations of language, understanding
- a) Barriers to Communication
- b) Barriers to Effective Listening
- c) Barriers to Speaking
- d) Formal and metaphorical language

CO3. Design and develop language skills for professional practice**.**
CO4. Apply basic writing skills in writing Emails and understanding wide range of technical terminologies.
CO5. UnderstandGerman culture and civilization.
CO6. Communicate effectively with the native German in day to day situation**.**

III B.Tech. – II Semester
(16BT6HS07) **INDIAN CONSTITUTION**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Elements, functions and functionaries according to Indian Constitution, Understanding for better professional practice and good citizenry.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Gain knowledge in
- a) parliamentary proceedings, laws, legislature, administration and its philosophy
- b) federal system and judiciary of India

c) socials problems and public services like central civil services and state civil services
d) Indian and international political aspects and dynamics

CO2. Develop etiquette and professional behavior in line with the constitution of India for becoming a responsible citizen.

III B.Tech. – II Semester
(16BT6HS08) **INDIAN ECONOMY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Introduction; Time Value of Money; Elementary Economic Analysis; Value analysis, Value Engineering; Economic Planning.
COURSE OUTCOMES: On successful completion of this course, the students will be able to

CO1. Acquire the knowledge in
a) Micro and Macro Economics.
b) Traditional and Modern methods of Capital Budgeting.
c) Five year plans and NITI Aayog.

CO2. Analyze
a) Capital Budgeting.
b) Value Analysis and Value Engineering.
c) Economic analysis
d) Law of supply and demand

CO3. Understand the nuances of project management and finance.

III B.Tech. - II Semester
(16BT6HS09) **INDIAN HERITAGE AND CULTURE**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Basic traits of Indian Culture; Humanistic Reforms under Jainism and Buddhism; Culture in the medieval period; Socio Religious reforms in Indian Culture; Reform movements for harmonious relations.
COURSE OUTCOMES: On successful completion of this course, the students will be able to

CO1. Acquaint knowledge in
a) human aspirations and values in Vedic culture.
b) cultural aspects of Buddhism and Jainism
c) unification of our country under Mourya's and Gupta's administrations
d) socio Religious aspects of Indian culture
e) reform movements and harmonious relations.

CO2. Apply ethical principles and reforms as models for the upliftment of the societal status in the present cultural contexts.

III B.Tech. – II Semester
(16BT6HS10) **INDIAN HISTORY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Introduction; Ancient India; Classical and Medieval era; Modern India; India after independence.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Gain knowledge on evolution and history of India as a nation.
CO2. Analyze social and political situations of past and current periods.
CO3. Practice in career or at other social institutions morally and ethically.

III B.Tech. – II Semester
(16BT6HS11) **PERSONALITY DEVELOPMENT**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Soft Skills Lab
COURSE DESCRIPTION: Self-esteem & Self-improvement; Developing Positive Attitudes; Self-Motivation & Self-Management; Getting Along with the Supervisor; Workplace Success.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate knowledge in
  a) Self-Management
  b) Planning Career
CO2. Analyze the situations based on
  a) Attitudes
  b) Thinking strategies
CO3. Design and develop the functional skills for professional practice in
CO4. Function effectively as an individual and as a member in diverse teams.
CO5. Communicate effectively in public speaking in formal and informal situations.

III B.Tech. – II Semester
(16BT6HS12) **PHILOSOPHY OF EDUCATION**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Introduction to Philosophy and Engineering Education; Philosophical methods and their implications in engineering; Philosophical education in India; Values and Engineering education; Outcome based education.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Acquire knowledge in
  a) Philosophy of engineering education.
  b) Philosophical methods.
  c) Knowledge acquiring methods.
  d) Engineering education and responsibilities.
CO2. Understand the impact of Outcome Based Education for effective educational Outcomes.
CO3. Apply reasoning to assess societal issues with the contextual knowledge of engineering education and responsibilities.

III B.Tech. – II Semester
(16BT6HS13) **PUBLIC ADMINISTRATION**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Introduction; Public Policy; Good Governance; E-Governance; Development Administration.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Acquire knowledge in
  a) Public Policy.
  b) Good Governance.
  c) E-governance.
  d) Development Administration.
CO2. Analyze the possibilities and limitations ofexisting policies through Good Governance perspective.
CO3. Design and develop solutions in e-governance modelsto find and provide opportunities in e-governance.
CO4. Adopt principles of e-governance in addressing the existing issues and challenges in e-governance sector.
CO5. Understand the significance of Administrative Development in finding professional engineering solutions by probing
  a) Bureaucracy.
  b) Role of civil society.

III B.Tech. – II Semester
(16BT60112) **BUILDING MAINTENANCE AND REPAIR**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Durability of buildings, Failure and repair of buildings, Material Techniques for repair, Maintenance of buildings, Conservation and recycling.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Acquire basic knowledge on durability and serviceability, failures, repair and rehabilitation of buildings.
CO2. Analyze failures, repair and rehabilitation techniques.
CO3. Solve complex building maintenance problems through proper investigations and interpretation.
CO4. Use modern tools and techniques for various repairs and rehabilitation of structures.
CO5. Provide solutions for building maintenance and repair problems considering health and safety.
CO6. Consider environmental sustainability in building maintenance and repair.
CO7. Maintain ethical standards for quality in repairs and rehabilitation of structures.
CO8. Evaluate specifications and perform cost analysis of building components while repair and rehabilitation.

III B.Tech. – II Semester
(16BT60113) **CONTRACT LAWS AND REGULATIONS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Construction contracts; Tenders; Arbitration; Legal requirements; Labour regulations.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate basic Knowledge on construction contracts, tenders, arbitration, legal requirements and labour regulations.
CO2. Analyze contracts and tenders.
CO3. Address the legal issues in contracts and tenders.
CO4. Follow laws and regulations in the preparation of contracts and tenders.
CO5. Prepare contract and tender documents as per the standards.
CO6. Consider project schedule, cost, quality and risk in the preparation of contracts and tenders.

III B.Tech. - II Semester
(16BT60114) **DISASTER MITIGATION AND MANAGEMENT**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:
COURSE DESCRIPTION: Disasters; Earthquakes; Floods; Cyclones; Droughts; Landslides; Disaster management.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate knowledge on disasters, their vulnerability and mitigation measures.
CO2. Analyze disasters and their vulnerability.
CO3. Design strategies for effective disaster mitigation.
CO4. Address pre and post disaster issues for better preparedness and mitigation measures, through proper analysis and interpretation.
CO5. Use appropriate methods in disaster mitigation and management.
CO6. Use historical data of disasters to inform the people over preparedness and mitigation measures.
CO7. Solve disaster related issues considering environment.
CO8. Consider economical issues in disaster management.

III B.Tech - II Semester
(16BT60115) **ENVIRONMENTAL POLLUTION AND CONTROL**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Fundamentals of air pollution; Dispersion of pollutants; Effects and control of air pollution; Water pollution; Soil pollution and control; Municipal solid waste management.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate knowledge on air, water, soil pollution and their control and solid waste management.
CO2. Analyze causes and effects of air, water and soil pollution and their remedial measures.

CO3. Recommend suitable solutions to complex environmental pollution problems.
CO4. Use appropriate remedial technique to solve environmental pollution problems.
CO5. Understand the effects of environmental pollutionon human health and vegetation.
CO6. Encourage sustainable development through implementation of pollution control measures.
CO7. Maintain IS Codes for environmental quality control.

III B.Tech - II Semester
(16BT60116) **PLANNING FOR SUSTAINABLE DEVELOPMENT**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:-
COURSE DESCRIPTION: Sustainable development; Environmental impact; Sustainable Policies; Governance; Theories and strategies; Media and education for sustainability.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate the knowledge on sustainable development, environmental impact, sustainable policies, governance, systems and strategies, media and education for sustainability.
CO2. Analyze theories, environmental impact, policies, systems and strategies for sustainable development.
CO3. Develop suitable methods and systems for sustainable development.
CO4. Use appropriate techniques in solving issues related to sustainable development.
CO5. Provide solutions to problems associated with sustainable development considering society.
CO6. Consider environment while planning sustainable development.
CO7. Communicate effectively on sustainable development issues through media and education.
CO8. Consider economical issues while planning for sustainable development.

III B.Tech. – II Semester
(16BT60117) **PROFESSIONAL ETHICS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Engineering ethics; Professional ideals and virtues; Engineering as social experimentation; Responsibilities and rights; Global issues.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate the principles of ethics, importance of professional values and social responsibility.
CO2. Analyze the problems in the implementation of moral autonomy and use ethical theories in resolving moral dilemmas.
CO3. Develop suitable strategies to resolve problems arise in practicing professional ethics.
CO4. Provide solutions to complex problems associated with professional ethics by proper analysis and interpretation.
CO5. Use appropriate theories in resolving issues pertain to professional ethics.
CO6. Understand the impact of professional ethics on society and address the limitations of codes of ethics.
CO7. Practice engineering with professionalism, accountability and ethics.
CO8. Function as a member, consultant, manager, advisor and leader in multi-disciplinary teams.
CO9. Write reports without bias and give instructions to follow ethics.

III B.Tech. - II Semester
(16BT60118) **RURAL TECHNOLOGY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: -
COURSE DESCRIPTION: Rural technology; Non conventional energy; Technologies for rural development; Community development; IT in rural development.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate the knowledge on technologies for rural development.
CO2. Analyze various technologies available which are appropriate for rural development.
CO3. Carryout feasibility study on the public and private partnership for rural development.
CO4. Develop and use latest technologies for rural development.
CO5. Address health and safety issues while choosing technologies for rural development.
CO6. Educate the rural populace on the positive impacts of biofertilisers and usage of agromachinery in agriculture.

III B.Tech - II Semester
(16BT60308) **GLOBAL STRATEGY AND TECHNOLOGY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: -
COURSE DESCRIPTION: Introduction to strategic management; Strategic management process; Principles of good strategy; Globalization strategies; Research and Development strategies; Technology Management and Transfer; Elements of Transfer Process; Corporate Governance in the Indian scenario.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate the knowledge on Strategic management, Research & Development strategies, Technology management and transfer, Globalization and Corporate governance.
CO2. Indentify and analyze crucial problems in strategic management to improve performance of the organizations.
CO3. Develop the products and production process by using research and development strategies.
CO4. Conduct investigations on the impact of globalization in current scenario in the context of corporate governance.
CO5. Appraise the resources and capabilities of the firm in terms of their ability to confer sustainable development.
CO6. Apply ethics in strategic decision making.

III B.Tech - II Semester
(16BT60309) **INTELLECTUAL PROPERTY RIGHTS AND MANAGEMENT**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION:
Protection of ideas; innovation and artistic endeavors; Acts and procedure related to patents, trademarks, copy right, design registration, trade secrets and cyber laws; Infringement; Commercialization of intellectual property rights; Case studies in each.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate knowledge on intellectual property rights, patents, trademarks, copyrights, trade secrets and commercialization of intellectual property.
CO2. Analyse the commercial significance of discoveries and developments and to assist in bringing these into public use.
CO3. Investigate and ensure smooth transition from concept to final product by following National & International Laws of Intellectual Property.
CO4. Utilize the various policies and procedures related to patents, trademarks and copyrights relating to IPR.
CO5. Safeguard, review and manage the intellectual property so that it may receive adequate and appropriate legal protection against unauthorized use.
CO6. Follow ethical standards in capacity building and work as a platform for development, promotion, protection, compliance, and enforcement of intellectual property and knowledge.
CO7. Prepare documents and fill applications needed for filing a patent, design, copyright and trade mark.

III B.Tech – II Semester
(16BT60310) **MANAGING INNOVATION AND ENTREPRENEURSHIP**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Evolution of entrepreneurship from economic theory Managerial and entrepreneurial competencies; Concepts of Shifting Composition of the Economy Purposeful Innovation & Sources of Innovative Opportunity; The Innovation Process; Innovative Strategies; Entrepreneurial Motivation; Entrepreneurs versus inventors; Ethics and International Entrepreneurship; Strategic Issues in International Entrepreneurship; Problem solving Innovation and Diversification.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1: Demonstrate the principles of business innovation and entrepreneurship for establishing industrial ventures.
CO2: Analyze business plans for potential investors and stakeholders and effectively answer probabilistic questions on the substance of plan.
CO3: Develop a comprehensive and well planned business structure for a new venture.

CO4: Conduct investigation on complex problems, towards the development of Project.
CO5: Apply modern statistical and mathematical tools to design projects and subsequent work procedures.
CO6: Apply ethics in constructive innovation framework.
CO7: Exhibit professionalism by employing modern project management and financial tools.

III B. Tech – II Semester
(16BT60311) **MATERIALS SCIENCE**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Structure and Bonding in metals; Steels, Cast Irons and Non Ferrous alloys; Material Selection for conductors, Insulators and semi conductors; Strengthening mechanisms of metals; Plastics and Ceramics as Insulators; AC and DC properties of Insulators; Semiconductors and Magnetic materials; Composite materials in Electrical and Electronics engineering; Material Selection and manufacturing of Optical fibers.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate the knowledge on concepts of fundamental science and Engineering principles relevant to materials.
CO2. Analyze the structures of various types of Ferrous, Non ferrous alloys influencing various engineering applications.
CO3. Conduct investigations to select suitable materials with desired properties for engineering applications.
CO4. Use phase diagrams to interpret the data regarding microstructure of materials.
CO5. Consider health and safety issues while providing materials to real time applications.
CO6. Use composite materials that reduce material waste in design and manufacturing for sustainability.

III B.Tech - II Semester
(16BT70412) **GREEN TECHNOLOGIES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Principles of green engineering; Green communications; Green energy; Green computing; Green construction; Green manufacturing.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Deploy conceptual knowledge in green technologies pertaining to engineering practice.
CO2. Analyze various green technologies for engineering practice.
CO3. Provide green solutions to engineering problems.
CO4. Apply various green techniques in the engineering practice.
CO5. Consider health and safety issues while providing green solutions to the society.
CO6. Understand issues related to environment sustainability.
CO7. Apply ethical standards for environmental sustainability in the engineering practice.

III B.Tech. - II Semester
(16BT70413) **INTRODUCTION TO NANOSCIENCE AND NANOTECHNOLOGY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Introduction to the concept of nano; Description of nanomaterial; Nanostructure characterization tools; Classification of nanomaterials; Fabrication of nanomaterial; Different applications of nanostructures and nanomaterials.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate knowledge in
  a) Nanoscale technology.
  b) Difference between micro and nanotechnology
  c) Classification of Nanostructure and Nanomaterial
  d) Fabrication of various nanomaterials and nanostructures.
CO2. Analyze numerical and analytical problems in
  a) Nanomaterial size by using Scanning Electron Microscope and X-Ray diffraction
CO3. Design and fabricate devices based on nanostructures like

a) Nano solar cell
b) Nano cantilever
c) Nano bio-sensor

CO4. Synthesize nano particle of different materials to solve the problems related to fabrication of nanostructures.
CO5. Select appropriate technique for fabrication of nanostructures and nanocomposites.
CO6. Apply ethical standards and legal issues while using chemical substances in fabrication of new nanostructures.

III B.Tech. – II Semester
(16BT60505) **ENGINEERING SYSTEM ANALYSIS AND DESIGN**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION:
Systems Process; Technologies for Systems; System Development Life Cycle; System Analysis and Modeling; Levels of Management; Project Management; Systems Implementation and Importance of UML Prototyping; Maintaining and Managing the Systems Output Process.
COURSE OUTCOMES: On successful completion of this course, the student will be able to:
CO1. Demonstrate knowledge in
a)Systems Process and System Design
b)Systems Analysis and Modeling
c)System Development Life Cycle
d)Design Management and Maintenance Tools.
CO2. Analyze System Process and estimate the given models by using case tools.
CO3. Design and Develop a model to the organizational systems.
CO4. Solve complex problems related to engineering systems and produce accurate results.
CO5. Apply object oriented techniques for modeling dynamic systems.
CO6. Contribute towards societal issues and responsibilities in designing, modeling and developing of organizational systems.

III B.Tech. – II Semester
(16BT71011) **MICRO-ELECTRO-MECHANICAL SYSTEMS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Overview of Micro Electro Mechanical Systems (MEMS); scaling laws; working principles of microsensors and microactuators; materials; microfabrication processes; packaging of Microsystems.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1.Demonstrate knowledge on MEMS devices, scaling laws, microsensors and microactuators.
CO2.Analyze the properties of materials and identify its suitability for MEMS devices.
CO3.Design MEMS devices that meet desired specifications and requirements.
CO4.Analyze and synthesize the information to provide effective solution to engineering problems with MEMS devices.
CO5.Use modern techniques in micro manufacturing process.
CO6.Develop efficient and cost effective MEMS based products for society.

III B.Tech. – II Semester
(16BT61205) **CYBER SECURITY AND LAWS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Cyber Crimes and Indian IT Act; Cyber Offenses; Tools and Methods used in Cyber Crime; Phishing ad Identity Theft; Indian and Global Perspective on Cyber Crimes and Cyber Security; Organizational Implications on Cyber Security; IPR Issues; Cyber Crime and Terrorism; Cyber Crime Illustrations.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate knowledge in Cyber security, Cyber crimes and its related laws in Indian and Global Act.
CO2. Analyze the legal perspectives and laws related to cyber crimes in Indian context.

CO3. Apply security and privacy methods in development of modern applications and in organizations to protect people and to prevent cyber crimes.
CO4. Solve Cyber security issues using privacy policies.
CO5. Use antivirus tools to minimize the impact of cyber threats.
CO6. Follow security standards for the implementation of Cyber Security and laws

III B.Tech. – II Semester
(16BT61505) **BIOINFORMATICS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: -
COURSE DESCRIPTION: Introduction to Bioinformatics; Biology and Information; Sequence alignment and dynamic programming; Biological Database; Homology Modeling; Structure Prediction; Molecular Dynamics
COURSE OUTCOMES: After successful completion of this course, the students will be able to:
CO1. Demonstrate knowledge on concepts of biological databases, Genome and proteome.
CO2. Analyze biological sequences for Homology Modeling.
CO3. Apply clustering methods for Phylogenetic trees.
CO4. Solve bio sequencing problems using dynamic programming.
CO5. Select and apply appropriate techniques and tools to structure Prediction

IV B. Tech. - I Semester
(16BT71501) **SYSTEM MODELING AND SIMULATION**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Programming in C and Probability Distributions and Statistical Methods.
COURSE DESCRIPTION:
Discrete event simulation; R Studio Operations; Useful statistical models; Queueing systems; Properties of random numbers, Test for random numbers; Data collection, Types of simulations with respect to output analysis.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Demonstrate knowledge on functional modeling of system design.
CO2. Analyze the performance of Queueing systems in real world applications.
CO3. Design dynamic system operations using simulation results using R.
CO4. Apply mathematical foundations and computer science theory in the modeling and design of experiments for real time systems.
CO5. Select suitable tools and simulation software for simulating computer based systems.
CO6**.** Relate appropriate professional principles of engineering practice for designing simulation models.

IV B. Tech. I Semester
(16BT70402) **EMBEDDED SYSTEMS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Digital Logic Design and Microprocessors and Interfacing
COURSE DESCRIPTION:
Embedded system design approaches; MSP430 Architecture; Instruction Set; On-Chip Resources; Programming; Communication with peripherals; Internet of Things related Issues.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Apply knowledge in
- MSP430 Architecture, Pin out, Instruction set
- High level programming
- Usage of On-chip resources like ADC, DAC, Timers
- Internet of Things related issues

CO2. Analyze various design issues regarding
- Usage of on chip resources
- Low power modes
- Communication support

CO3. Design embedded systems using MSP430 series microcontrollers to suit market requirements.
CO4. Solve engineering problems and arrive at solutions in designing embedded systems to support interconnectivity.
C05. Apply techniques, program skills, On-Chip resources to design networked embedded systems with an understanding of limitations.
CO6. Reason out and practice professional engineering to deliver efficient and cost effective embedded based products to society.

IV B. Tech. - I Semester
(16BT71502) **SYSTEMS ENGINEERING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: A course on Software Engineering.
COURSE DESCRIPTION: Foundations of System Engineering; Complex Systems structure; System Engineering Management and Development.
COURSE OUTCOMES:
On the Successful Completion of this Course, students will be able to:
CO1. Demonstrate Knowledge on:
· System Engineering foundation
· Structure of Complex Systems
· System Engineering management and Development
CO2. Analyze the requirements for the development of structures of a system.
CO3. Design system engineering management plan for complex integrated systems and evaluate them in operational environment.
CO4. Use appropriate system engineering methods in iterative system development process
C05. Use appropriate methods to support the phases of Production, operation and maintenance in system development.
CO6. Apply ethical principles of System engineering for addressing the issues in modeling, simulation and trade-off analysis for complex systems development**.**

IV B. Tech. - I Semester
(16BT71503) **DATA ANALYTICS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: A course on Data Warehousing and Data Mining
COURSE DESCRIPTION: Introduction to Data Analytics; Analytic Processes and Tools; Cluster Analysis; Big Data; Hadoop;
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Demonstrate knowledge on concepts of Data Analytics Characteristics, Hadoop Framework ecosystem components and Cluster Analysis.
CO2. Identify appropriate solutions through analysis for problems of Big data and Hadoop.
CO3. Design and model an effective sustainable Database system for better performance using Data Analytic techniques.
CO4. Appropriately use database models for storing, accessing and analyzing large data sets.
CO5. Apply Hadoop Framework for data processing.
CO6. Recognize the need for using Hadoop environment for solving complex engineering problems.

IV B. Tech. - I Semester
(16BT71504) **PERFORMANCE EVALUATION OF COMPUTER SYSTEMS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: A course on Probability Distributions and Statistical Methods.
COURSE DESCRIPTION: Performance Evaluation Systems; Workload characterization; Hardware and software monitors; Summarization of data, Linear regression models; Experimental Design.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge on Performance Metrics, workload selection and Monitors.
CO2. Analyze and interpret the data using summarization techniques.

CO3. Design and develop Factorial Experimental models for evaluating the performance of a computer based systems.
CO4. Use statistical methods for interpretation of data in simulation based systems.
CO5. Select appropriate techniques for prediction of variability and index of dispersion.
CO6. Apply contextual knowledge to asses experimental errors in Factorial designs.

IV B. Tech. - I Semester
(16BT71505) **NETWORK PROGRAMMING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: A course on Computer Networks
COURSE DESCRIPTION:
OSI model, Unix standards; Normal startup, terminate and signal handling server process termination; lost datagram, summary of UDP example, Lack of flow control with UDP; Function and IPV6 support, uname function, IPv4 Client- IPv6 Server ;FIFO’s, streams and messages, RPC.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Demonstrate knowledge on concepts of sockets, inter process communication and remote login.
CO2. Identify appropriate TCP Echo server functions and Socket options used in Network based systems.
CO3. Analyze networking protocols such as TCP and UDP for connection establishment between client and server.
CO4. Design appropriate solutions for network applications based on UNIX.
CO5. Apply modern tools to create cooperating processes in network based Systems.
CO6. Relate suitable ethical principles to design and develop applications related to Network Traffic Monitoring.

IV B. Tech. - I Semester
(16BT71506) **SOFTWARE ARCHITECTURE AND DESIGN PATTERNS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: A course on Software Engineering.
COURSE DESCRIPTION: Architecture Business Cycle; Documenting Architecture; Layered Systems; Heterogeneous Architectures; Architectural Structures For Shared Information Systems; Formalizing Architectural Design Space; Selection and Usage Patterns;
COURSE OUTCOMES
On successful completion of this course, students will be able to:
CO1. Demonstrate knowledge in software architecture, styles, patterns and frameworks.
CO2. Analyze and select appropriate architectural patterns for software design
CO3. Design appropriate software architectures for software Project implementation.
CO4. Apply Skills for designing Architectural solutions using Formal Models and Specification.
CO5. Select appropriate techniques for designing and evaluating a system’s architecture.

IV B. Tech. - I Semester
(16BT71507) **BUSINESS ANALYTICS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: A course on Database Management Systems
COURSE DESCRIPTION:
Analytics on Spreadsheets; Visualizing and Exploring Data; Descriptive Statistical Measures; Predictive Modeling and Analysis; Regression Analysis; Linear Optimization; Applications of Linear Optimization; Decision Analysis.
COURSE OUTCOMES:
On Successful Completion of this course, students will be able to:
CO1. Demonstrate knowledge on techniques involved in business analytics.
CO2. Analyze the techniques involved in classifying massive and opportunistic data.
CO3. Design solutions by evaluating business problems and determine suitable analytical methods.
CO4. Plan, organize and evaluate methods to prepare raw data for different analytical techniques.
CO5. Collect, manage, and interpret data to identify issues in the workplace and develop measures for solving them.
CO6. Apply ethical principles and commit to business decisions by using data analytic techniques.

IV B. Tech. – I Semester
(16BT71202) **MOBILE APPLICATION DEVELOPMENT**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Java Programming and Web Technologies.
COURSE DESCRIPTION: Mobile platforms; Mobile User Interface and tools; Introduction to Android; Activities; Views; Menus; Database Storage; SMS; e-mail; Displaying Maps; Building a Location Tracker Web Services Using HTTP; Sockets Programming; Communication between a Service and an Activity; Introduction to iOS.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Demonstrate knowledge on:
- Mobile platforms and Mobile User Interface
- Android Activities and Intents
- Messaging, Networking, Location based Services, Android Services
- Basics of iOS

CO2. Analyze the context of complex problems and identify user interface design requirements.
CO3. Design and develop solutions for real world problems with android mobile applications.
CO4. Demonstrate problem solving skills to create applications for mobile devices.
CO5. Apply Android studio and iOS tools to develop mobile applications.
CO6. Create mobile applications as per societal needs.

IV B. Tech. - I Semester
(16BT60502) **SOFT COMPUTING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: —
COURSE DESCRIPTION:
Concepts on Soft Computing Techniques; Artificial Neural Networks; Supervised Learning; Unsupervised Learning; Fuzzy logic; Genetic Algorithms.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Demonstrate knowledge in
- Artificial Neural Networks
- Supervised Learning Networks
- Unsupervised Learning Networks
- Fuzzy sets, relations and measures
- Genetic Operators

CO2. Analyze neural network architectures, Fuzzy systems and Genetic algorithms.
CO3. Design soft computing solutions for real life computational problems.
CO4. Use soft computing techniques to solve complex computational problems.
CO5. Create algorithms using soft computing techniques.
CO6. Apply contextual knowledge to solve problems related to societal issues like Business Intelligence, Forecasting.

IV B. Tech. – I Semester
(16BT60501) **SOFTWARE TESTING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: A course on Software Engineering.
COURSE DESCRIPTION:
Software Testing Basics: Goals, Defects, Terminology, Methodology, STLC in SDLC, Verification & Validation; Software Testing Techniques: White box testing, Black Box Testing, Regression testing; Test Management: Test Planning, Design & Specifications; Test Automation: Tool selection & Guidelines.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Demonstrate knowledge on
- Software Testing Life Cycle.
- Testing Techniques.

- Test Management & Metrics.
- Regression Testing
- Test Automation

CO2. Analyze testing circumstances and their resultants in software development.
CO3. Design and develop the appropriate test cases in accordance to the software development model.
CO4. Use problem solving skills to control and monitor the testing process
CO5. Apply testing tools for testing the software quality.
CO6. Apply contextual knowledge to perform testing on software related to societal applications

IV B. Tech. – I Semester
(16BT71210) **HIGH PERFORMANCE COMPUTING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: A course on Computer Organization.
COURSE DESCRIPTION: Cache-based Microprocessor Architecture; Memory Hierarchies; Multithreaded Processors; Common Sense Optimizations; The Role of Compilers; Data Access Optimization; Shared-memory Computers; Parallel Scalability; Introduction to OpenMP; Parallel Jacobi Algorithm; Introduction to MPI; MPI Performance Tools; MPI Parallelization of Jacobi Solver.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Demonstrate knowledge on:
- Modern Processors and code Optimization.
- Parallel computing paradigms.

CO2. Analyze computation problems and identify the suitable parallel processing approaches to achieve optimum computation.
CO3. Design Parallel processing algorithms for achieving high performance computing.
CO4. Solve shared memory problems using Parallel Programming.
CO5. Use OpenMP and MPI tools in Parallel Programming.

IV B. Tech. - I Semester
(16BT71508) **INTERNET OF THINGS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: A course on Computer Networks
COURSE DESCRIPTION:
Internet of Things Components; Communication models; Prototyping; Hardware; Design models; Analytics for IoT.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Demonstrate knowledge on Protocols, functional blocks and communication models of Internet of things.
CO2. Identify appropriate sensors and communication modes used in IoT based systems.
CO3. Design appropriate solutions for IoT applications using Raspberry Pi and Arduino kits.
CO4. Appropriately synthesize the models and applications for usage in Home automation and cities.
CO5. Apply evolutionary techniques to perform analytics on the data integrated from IoT based systems.
CO6. Use advances in IoT technology to design and develop applications.

IV B. Tech. -I Semester
(16BT71509) **SECURE SOFTWARE ENGINEERING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: A course on Software Engineering
COURSE DESCRIPTION:
Security in software; Requirements engineering for secure software; Secure software architecture & design, secure coding & testing; and Governance & managing.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Demonstrate knowledge on security issues in:
- Requirements Engineering
- Architecture and Design

- Coding and Testing
- System Assembling

CO2. Analyze complex software projects to describe security risks and its mitigation techniques.
CO3. Design secure software system with minimal risks and attacks.
CO4. Use statistical methods to collect metrics for assessing and improving the security of a product, process, and project objectives.
CO5. Create software solutions for secure access and protection of data.
CO6. Apply ethical principles and methods for secure software system design.

IV B. Tech. – I Semester
(16BT60503) **WIRELESS NETWORKS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: A course on Computer Networks
COURSE DESCRIPTION:
Generations of Wireless Networks; Voice and Data Processing; Wireless Network Topology; GSM; TDMA; CDMA; Wireless LANs; Wireless WANs; Wireless PAN;
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Demonstrate knowledge on
- Wireless Medium Access methods.
- Network Topology
- Wireless LAN, HIPERLAN
- GSM, CDMA, GPRS

CO2. Analyze the network topologies in Wireless Networks
CO3. Design solutions for network communications at physical and transport layers
CO4. Solve complex problems related to network communications and wireless networks
CO5. Apply GSM, CDMA, GPRS and Bluetooth to create Home Access Networks and wireless Personal Area Network.
CO6. Apply contextual knowledge to solve problems using societal applications like health care devices, Internet of Things.

IV B. Tech. I Semester
(16BT70432) **EMBEDDED SYSTEMS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITE: A course on Embedded systems.
COURSE DESCRIPTION:
IDE for Embedded System Design using MSP430; Interfacing Switch & LED; Timers-WDT, Configuring, Programming; ADC-usage; Power down modes; DAC; PWM Generator; Networking – SPI, Wi-Fi.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Demonstrate knowledge in designing complex energy efficient embedded systems.
CO2. Analyze usage of various on-chip resources like GPIO, Timers, Interrupts, ADC, DAC, Comparator, SPI.
CO3. Design embedded systems to suit market requirements.
CO4. Solve engineering problems by proposing potential solutions using industry choice advanced Microcontrollers.
CO5. Apply appropriate techniques, resources, and CCSV6 based IDE for modeling embedded systems with understanding of limitations.
CO6. Provide embedded system solutions for societal needs.
CO7. Work individually and in a group to develop embedded systems.
CO8. Communicate effectively in oral and written form in the field of embedded systems.

IV B. Tech. - I Semester
(16BT71531) **SYSTEM MODELING AND SIMULATION LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: A course on Programming in C Lab and System Modeling and Simulation
COURSE DESCRIPTION:
Hands on Experience on Generation of random numbers; Input Modeling; Queuing System; Simulation models.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1. Demonstrate Knowledge to solve complex engineering problems using Modeling and simulation.
CO2. Analyze the problems to develop models for applications to meet requirements of the system.
CO3. Design and develop solutions through modeling for computer based systems.
CO4. Apply simulation methods to interpret data and provide valid conclusions for problems in systems engineering
CO5. Use modern engineering techniques in modeling systems to provide effective solutions for real world problems.
CO6**.** Apply appropriate ethics and follow principles to model systems incrementally.

IV B. Tech. – I Semester
(16BT71532) **COMPREHENSIVE ASSESSMENT**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
	100	100	-	-	-	2

PRE-REQUISITES: All the courses of the program.
COURSE DESCRIPTION: Assessment of student learning outcomes in the courses of the program.
COURSE OUTCOMES:
Comprehensive Assessment enables a successful student to demonstrate:
CO1. Knowledge on the courses of the program.
CO2. Analytical ability in the courses of the program.
CO3. Design skills in the courses of the program.
CO4. Ability to investigate and solve complex engineering problems in the courses of the program.
CO5. Ability to apply tools and techniques to complex engineering activities with an understanding of limitations in the courses of the program.
CO6. Ability to provide solutions as per societal needs with consideration to health, safety, legal and cultural issues in the courses of the program.
CO7. Understanding of the impact of the professional engineering solutions in environmental context and need for sustainable development in the courses of the program.
CO8. Ability to apply ethics and norms of the engineering practice in the courses of the program.
CO9. Ability to function effectively as an individual in the courses of the program.
CO10. Ability to present views cogently and precisely in the courses of the program.
CO11. Ability to engage in life-long leaning in the courses of the program.

IV B. Tech. – II Semester
(16BT81531) **PROJECT WORK**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
100	100	200	-	-	-	12

PRE-REQUISITES: All the courses of the program.
COURSE DESCRIPTION:
Identification of topic for the project work; Literature survey; Collection of preliminary data; Identification of implementation tools and methodologies; Performing critical study and analysis of the topic identified; Time and cost analysis; Implementation of the project work; Preparation of thesis and presentation.
COURSE OUTCOMES:
Completion of the project work enables a successful student to demonstrate:
CO1. Knowledge on the project topic.
CO2. Analytical ability exercised in the project work.
CO3. Design skills applied on the project topic.
CO4. Ability to investigate and solve complex engineering problems faced during the project work.
CO5. Ability to apply tools and techniques to complex engineering activities with an understanding of limitations in the project work.

CO6. Ability to provide solutions as per societal needs with consideration to health, safety, legal and cultural issues considered in the project work.
CO7. Understanding of the impact of the professional engineering solutions in environmental context and need for sustainable development experienced during the project work.
CO8. Ability to apply ethics and norms of the engineering practice as applied in the project work.
CO9. Ability to function effectively as an individual as experienced during the project work.
CO10. Ability to present views cogently and precisely on the project work.
CO11. Project management skills as applied in the project work.
CO12. Ability to engage in life-long leaning as experience during the project work.

Program: B.Tech. MECHANICAL ENGINEERING

I B. Tech. - I Semester
(16BT1HS01) TECHNICAL ENGLISH

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Intermediate English.
COURSE DESCRIPTION: Introduction to Communication; Active Listening; Effective Speaking; Reading; and Writing.
COURSE OUTCOMES:
After successful completion of this course, the student will be able to:
CO1: Demonstrate knowledge in
- Process of communication.
- Modes of listening.
- Paralinguistic features.
- Skimming and Scanning.
- Elements of style in writin.

CO2: Analyze the possibilities and limitations of language for understanding
- Barriers to Communication.
- Barriers to Effective Listening.
- Barriers to Speaking.
- Formal and metaphorical language.

CO3: Design and develop functional skills for professional practice.
CO4: Apply writing skills in preparing and presenting documents.
CO5: Function effectively as an individual and as a member in diverse teams.
CO6: Communicate effectively with the engineering community and society in formal and informal situations.

I B. Tech. - I Semester
(16BT1BS01) ENGINEERING CHEMISTRY

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE REQUISITE: Intermediate/Senior Secondary Chemistry
COURSE DESCRIPTION: Water technology, Chemistry of Engineering materials, Nanochemistry, Green Chemistry, Electro chemical cells, Sensors, Corrosion and Lubricants.
COURSE OUTCOMES:
After completion of the course, a successful student is able to:
CO1: Acquire basic knowledge in water technology, engineering plastics, conducting polymers, composites, Electro chemical cells, Nano Chemistry, principles of Green Chemistry, corrosion phenomenon and lubricants.
CO2: Develop analytical skills in:
- Determination of hardness of water.
- Determination of viscosity, flame and fire points, cloud and pour points.

CO3: Develop designing skills in:
- Synthesis of engineering plastics.
- Chemical methods for the synthesis of Nano materials.

CO4: Develop skills for providing solutions through:
- Mitigation of hardness of water.
- Newer Nanomaterials and engineering plastics for specific applications

CO5: Acquire awareness to practice engineering in compliance to modern techniques such as:
- Nalgonda technique for defluoridation of water.
- Electroplating technique for control of corrosion.

CO6: Acquire awareness to societal issues on:
- Quality of water.
- Bio-diesel.
- Chemical materials utility and their impact.

I B. Tech. - I Semester

(16BT1BS03) **MATRICES AND NUMERICAL METHODS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Intermediate /Senior secondary mathematics

COURSE DESCRIPTION: Fundamentals of matrix theory; numerical solutions of equations, curve fitting; interpolation; numerical differentiation and integration; numerical solutions of ordinary differential equations.

COURSE OUTCOMES: After completion of the course a successful student is able to

CO1: Acquire basic knowledge in
- Finding the rank of matrices and analyzing them.
- Solving algebraic and transcendental equations by various numerical methods.
- Fitting of various types of curves to the experimental data.
- Estimating the missing data through interpolation methods.
- Identification of errors in the experimental data
- Finding the values of derivatives and integrals through various numerical methods.
- Solving differential equations numerically when analytical methods fail.

CO2: Develop skills in analyzing the
- methods of interpolating a given data
- properties of interpolating polynomials and derive conclusions
- properties of curves of best fit to the given data
- algebraic and transcendental equations through their solutions
- properties of functions through numerical differentiation and integration
- properties of numerical solutions of differential equations

CO3: Develop skills in designing mathematical models for
- Fitting geometrical curves to the given data
- Solving differential equations
- Constructing polynomials to the given data and drawing inferences.

CO4: Develop numerical skills in solving the problems involving
- Systems of linear equations
- Fitting of polynomials and different types of equations to the experimental data
- Derivatives and integrals
- Ordinary differential equations

CO5: Use relevant numerical techniques for
- Diagonalising the matrices of quadratic forms
- Interpolation of data and fitting interpolation polynomials
- Fitting of different types of curves to experimental data
- obtaining derivatives of required order for given experimental data
- Expressing the functions as sum of partial fractions

I B. Tech. - I Semester

(16BT1BS04) **MULTI-VARIABLE CALCULUS AND DIFFERENTIAL EQUATIONS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Intermediate /Senior secondary mathematics

COURSE DESCRIPTION: First order differential equations; higher order linear differential equations; functions of several variables; applications of integration; multiple integrals; vector calculus.

COURSE OUTCOMES: After completion of the course a successful student is able to

CO1: Acquire knowledge in
- Higher order Differential equations
- Maximum and minimum values for the functions of several variables
- Double and triple integrals
- Differentiation and integration of vector functions.
- Line and surface volume

- transforming integrals from three dimensional surfaces and volumes on to plane surfaces

CO2: Develop skills in analyzing the
- Methods for differential equation for obtaining appropriate solutions,
- Properties of oscillatory electrical circuits and heat transfer in engineering systems
- The variations in the properties of functions near their stationary values
- Flow patterns of fluids, electrical and magnetic flux and related aspects

CO3: Develop skills in designing mathematical models for
- R-C and L-R-C oscillatory electrical circuits
- Heat transfer and Newton's law of cooling
- Engineering concepts involving lengths of curves and areas of planes, Flux across surfaces

CO4: Develop analytical skills in solving the problems involving
- Newton's law of cooling
- non homogeneous linear differential equations
- maximum and minimum values for the functions
- lengths of curves, areas of surfaces and volumes of solids in engineering
- transformation of integrals from three dimensional surfaces and volumes on to plane surfaces

CO5: Use relevant mathematical techniques for evaluating
- various types of particular integrals in differential equations
- stationary values for multi variable functions
- multiple integrals in change of variables
- integrations of vector functions.

I B. Tech. - I Semester
(16BT10501) **PROGRAMMING IN C**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: NIL

COURSE DESCRIPTION:
Program design; Operators and Expressions; Data Input and Output; Control Statements; Functions; Arrays; Strings; Pointers; Structures & Unions and File handling Techniques;

COURSE OUTCOMES:
After successful completion of the course, students will be able to:

CO1: Demonstrate knowledge in:
- Elements of C Language
- Selection and Repetition statements.
- Arrays, Strings and Functional statements.
- Derived data types, Files and Pointers

CO2: Analyze complex engineering problems to develop suitable solutions
CO3: Design algorithms for specified engineering problems
CO4: Use appropriate 'C' language constructs for solving engineering problems
CO5: Write programs using 'C' language to implement algorithms

I B. Tech. - I Semester
(16BT1HS31) **ENGLISH LANGUAGE LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: English at intermediate or equivalent level.

COURSE DESCRIPTION: Phonetics; Vocabulary Building; Functional Grammar; Just a Minute; Elocution/Impromptu; Giving Directions/Conversation Starters; Role Play; Public Speaking; Describing People, Places, Objects and Events; Reading Comprehension; Listening Comprehension; Information Transfer.

COURSE OUTCOMES:
On successful completion of this course the students will be able to:

CO1: Demonstrate knowledge in
- Phonetics
- Information Transfer

CO2: Analyze the situations in professional context by using
- Vocabulary
- Grammar

CO3: Design and develop functional skills for professional practice.

CO4: Apply the techniques of Listening and Reading skills to comprehend Listening and Reading comprehension.

CO5: Function effectively as an individual and as a member in diverse teams through
- Extempore talk and
- Role Play

CO6: Communicate effectively in public speaking in formal and informal situations.

CO7: Recognize the need to engage in lifelong learning to upgrade competence of knowledge and communication.

I B. Tech. - I Semester
(16BT1BS31) ENGINEERING CHEMISTRY LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE REQUISITE: Intermediate/Senior Secondary Chemistry

COURSE DESCRIPTION: Estimation of hardness, alkalinity, dissolved oxygen of water samples and estimation of Iron by volumetric methods, determination of effect of P^H on rate of corrosion, measurement of viscosity of lubricants; Instrumental methods like potentiometer, conductivity meter, P^H meter and colorimeter; synthesis of Polymers and Nano materials.

COURSE OUTCOMES:
After completion of the course, a successful student is able to:

CO1: Acquire basic Knowledge about the volumetric analysis and synthesis of materials used for engineering applications.

CO2: Acquire analytical skills in the estimation of hardness of water, alkalinity of water, dissolved oxygen in water and estimation of Iron through wet laboratory methods.

CO3: Develop designing skills for the synthesis of polymers and Nanomaterials.

CO4: Acquire skills to use instrumental techniques for the determination of Electrical conductance of electrolytes, EMF of a cell, PH of a solution, determination of viscosity of lubricants and estimation of iron in cement.

CO5: Provide solutions for environmental issues through determination of quality of water.

I B. Tech. - I Semester
(16BT10331) COMPUTER AIDED ENGINEERING DRAWING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	1	6	3

PRE-REQUISITES: --

COURSE DESCRIPTION:
Engineering drawing conventions; importance of engineering drawing; fundamental concepts of sketching; computed aided drafting and different types of projections of geometric entities (both 2D and 3D) through computer aided drafting packages.

COURSE OUTCOMES:
After completion of the course, a successful student is able to:

CO1: Understand, write and read the language of engineering drawing in industry through International System of Standards.

CO2: Develop the imagination and mental visualization ability for interpreting the geometrical details of engineering objects.
CO3: Produce different views and projection in drawing.
CO4: Use modern CAD software for design and drafting of drawings.
CO5: Create multi-view drawings suitable for presentation to Engineering community.
CO6: Introduce and communicate universally accepted conventions and symbols for their usage in technical drawing.

I B. Tech. - I Semester

(16BT10531) PROGRAMMING IN C LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: A course on "Programming in C"
COURSE DESCRIPTION: Hands on practice in developing and executing simple programs using C Programming constructs– Conditional statements, Loops, Arrays, Strings, Functions, Structures, Pointers and Functions.
COURSE OUTCOMES:
After successful completion of this course, the student will be able to:
CO1: Demonstrate practical knowledge of using C language constructs:
- Selection and Repetition statements.
- Arrays, Strings and Functional statements.
- Derived data types, Files and Pointers

CO2: Analyze problems to develop suitable algorithmic solutions.
CO3: Design Solutions for specified engineering problems.
CO4: Use appropriate 'C' language constructs for solving engineering problems.
CO5: Implement and execute programs using 'C' language
CO6: Document programs and communicate effectively while conducting Professional transactions.

I B. Tech. - II Semester

(16BT1BS02) ENGINEERING PHYSICS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Intermediate / senior secondary Physics.
COURSE DESCRIPTION: Lasers; optical fibers; principles of quantum mechanics; band theory of solids; semiconductors; dielectric properties of materials; acoustics of buildings; superconductors; crystallography and nanomaterials.
COURSE OUTCOMES:
After successful completion of this course, the student will be able to:
CO1: Acquire basic knowledge of lasers, optical fibers, quantum mechanics, dielectrics, semiconductors and superconductors, acoustic of buildings, crystallography and nanomaterials.
CO2: Analyze the construction and working of various laser systems, semiconductor devices, various types of optical fibers and its communication system and nano materials properties.
CO3: Gain skills in designing lasers, optical fiber cable, semiconductor devices, acoustically good halls and nanomaterials.
CO4: Develop problem solving skills in engineering context.
CO5: Use relevant techniques for assessing ball milling, pulsed laser deposition, p-n junction and Laser.

I B. Tech. - II Semester

(16BT2BS01) **TRANSFORMATION TECHNIQUES AND PARTIAL DIFFERENTIAL EQUATIONS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE REQUISITE: Intermediate /Senior secondary mathematics

COURSE DESCRIPTION: Fourier series; Fourier integrals and transforms; Laplace transforms; z – transforms; partial differential equations.

COURSE OUTCOMES:

After completion of the course a successful student is able to

CO1: Acquire basic knowledge in
- Fourier series and Fourier transforms
- Fourier integrals
- Laplace transforms and their applications
- z- transforms and their applications
- Solving partial differential equations

CO2: Develop skills in analyzing the
- Properties of Fourier series for a given function
- Partial differential equations through different evaluation methods
- Difference equations through z – transforms
- Engineering systems and processes involving wave forms and heat transfer

CO3: Develop skills in designing mathematical models for
- Problems involving heat transfer and wave forms
- Engineering concepts involving, Fourier transforms, Fourier integrals, Laplace transforms, z-transforms and difference equations

CO4: Develop analytical skills in solving the problems involving
- Fourier series and Fourier transforms
- Laplace transforms
- Z-transforms and difference equations
- Heat transfer and wave motion

CO5: Use relevant transformation techniques for
- Obtaining Fourier transforms for different types of functions
- Laplace transforms
- Z- transforms
- Partial differential equations

I B. Tech. - II Semester

(16BT20102) **ENGINEERING MECHANICS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	4	1	-	4

PRE-REQUISITES: Intermediate Mathematics and Physics.

COURSE DESCRIPTIONS: statics of particles and rigid bodies; support reactions; analysis of perfect frames; friction; centroid, centre of gravity and moment of inertia; kinematics and kinetics.

COURSE OUTCOMES:

After successful completion of this course, the student will be able to:

CO1: Apply the knowledge of engineering mechanics fundamentals to the solutions of basic engineering problems.

CO2: Analyze
- Multi-body systems under equilibrium and dynamic conditions.
- Systems involving dry friction and computing the efficiency of the system of forces in frames under suitable assumptions.
- Sectional properties of surfaces and solids.

CO3: Design sustainable solutions to complex engineering problems using first principles of engineering mechanics.
CO4: Exercise awareness to assess the safety of system related to engineering mechanics.
CO5: Communicate effectively engineering and allied information through free body diagram.
CO6: Sustain interest in engineering mechanics to upgrade knowledge and skills through self learning concepts in mechanics.

I B. Tech. - II Semester
(16BT20241) BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Intermediate Mathematics and Physics.
COURSE DESCRIPTION: Basics of electrical DC and AC circuits; principle of operation and applications of DC machines, transformers, and induction motors; Transducers and measuring instruments; rectifier devices; bipolar transistors and its characteristics.
COURSE OUTCOMES:
After successful completion of this course, the student will be able to:
CO1: Demonstrate knowledge on
- Electrical and electronic circuits.
- Construction and operation of electrical machines, electrical and electronic instruments.

CO2: Analyze various electrical & electronic circuits and different transducers.
CO3: Evaluate the electrical and electronic circuit parameters and performance of electrical machines.
CO4: Select and apply various machines and transducers.

I B. Tech. - II Semester
(16BT20301) ENGINEERING MATERIALS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Intermediate Physics, Engineering Chemistry.
COURSE DESCRIPTION: Classification, properties and applications of materials; atomic and crystal structure of metals; formation of alloys; structure and properties of ferrous and non-ferrous metals; properties and applications of ceramics and composite materials; testing of materials.
COURSE OUTCOMES:
After successful completion of this course, the student will be able to:
CO1: Gain basic knowledge on engineering materials such as,
- Classification.
- Structure, properties and applications.
- Various testing procedures.

CO2: Analyze
- Material microstructure.
- Characterization and properties of various materials.

CO3: Design a crystallographic model of a material at microscopic level.
CO4: Use modern material testing instruments such as ultrasonic flaw detector, Radiography.
CO5: Identify the impact of materials on the environmental issues.

I B. Tech. - II Semester
(16BT1BS32) **ENGINEERING PHYSICS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Intermediate / senior secondary Physics.
COURSE DESCRIPTION:
Characteristics of p-n junction diode, Photodiode, LED, and semiconductor laser diode. Experimental determination of carrier concentration and energy gap of a semiconductor material, wave length of a laser source, size of fine particle, numerical aperture and acceptance angle of optical fiber. Determination of frequency of electrically vibrating tuning fork and A.C source using A.C sonometer, magnetic field along axial line of a current carrying coil and rigidity modulus of material of a wire using torsional pendulum.
COURSE OUTCOMES:
After completion of the course, a successful student will be able to:
CO1: Acquire basic knowledge about semiconductor materials, magnetic materials and lasers.
CO2: Acquire analytical skills in the estimation of carrier concentration of semiconductor materials and characterization of p-n junction.
CO3: Develop skills in designing electronic circuits using semiconductor components.
CO4: Acquire skills to use instrumental techniques in A.C sonometer and Melde's experiment.
CO5: Apply diffraction techniques for determination of sizeof tiny particles and wave length of lasers.

I B. Tech. - II Semester
(16BT20251) **ELECTRICAL AND ELECTRONICS ENGINEERING LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Physics.
COURSE DESCRIPTION: Verification of Kirchhoff's laws; study performance of AC/DC motors; various tests on DC shunt motors; brake test on 3-phase induction motors; V-I characteristics of diode, Half wave rectifier with/without capacitive filter; bipolar junction transistor amplifier.
COURSE OUTCOMES:
After successful completion of this course, the student will be able to:
CO1: Employ knowledge acquired to determine appropriate type of electrical machine or circuit to be used in a given situation.
CO2: Analyzing the performance of electrical machines, rectifiers and amplifiers.
CO3: Develop skills in selecting and developing suitable rectifiers and amplifiers for a specific use.
CO4: Function effectively as individual and as a member in a team.
CO5: Communicate effectively in both oral and written forms.

I B. Tech. - II Semester
(16BT20331) **ENGINEERING WORKSHOP PRACTICE**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: None
COURSE DESCRIPTION: Knowledge on various workshop hand and power tools; utilization in different manufacturing trades such as carpentry, fitting, house wiring, sheet metal forming, foundry; overview of metal cutting processes, plumbing and welding through live demonstrations.

COURSE OUTCOMES:
After successful completion of this course, the student will be able to:
CO1: Acquire knowledge on utilization of hand and power tools for engineering applications.
CO2: Employ analytical skills for the production of a component for real time applications.
CO3: Design and model different prototypes in the carpentry, fitting and sheet metal operations.
CO4: Comprehend the usage of modern power tools.
CO5: Abide by workshop safety regulations and adopt environmentally safe practices.
CO6: Engage in self study for solving engineering related problems.

I B. Tech. - II Semester
(16BT20332) MATERIALS SCIENCE LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Intermediate Physics, Engineering Chemistry
COURSE DESCRIPTION: Characterization of microstructures of steels, cast irons and non-ferrous metals; heat treatment procedures; data acquisition and recording; grain size analysis; phase segmentation; non-destructive tests; metal powder preparation.
COURSE OUTCOMES:
After successful completion of this course, the student will be able to:
CO1: Acquire knowledge in preparing metallographic specimen and various non-destructive testing methods.
CO2: Analyze the material for
- Material Microstructure.
- Phase distribution.
- Grain size.

CO3: Model appropriate material suitable for engineering applications.
CO4: Use the advanced software testing tool 'Material Plus' for detailed characterization of metal.
CO5: Choose acceptable engineering material for societal and industrial needs.

II B. Tech. – I Semester
(16BT3BS01) PROBABILITY DISTRIBUTIONS AND STATISTICAL METHODS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE -REQUISITE: Course on Intermediate/Senior Secondary Mathematics
COURSE DESCRIPTION: Random variables; mathematical expectations; probability distributions; correlation and regressions; statistical quality control; sampling distributions; tests for small and large samples and their significances.
COURSE OUTCOMES: On successful completion of this course, students will be able to:
CO1: Acquire basic knowledge in
- Probability distributions, correlation and regressions
- Statistical quality control and testing of hypotheses
- Simple linear regression
- Tests of significance for small and large samples

CO2: Develop skills for analyzing the data with
- Mathematical expectations for realistic results
- Probability distributions for practical situations.
- Control charts of statistical quality control
- Correlation and regression concepts
- Suitable tests of significance for practical situations.

CO3: Develop skills in designing
- Probability distributions

- Limitations of statistical quality control
- Control charts,
- X, R, np, and c charts

CO4: Develop analytical skills forsolvingproblems involving

- Probability distributions, means,variances and standard deviations
- Statistical techniques employed for quality
- Sampling techniques for decision making
- Tests of significances for small and large samples

CO5: Use relevant probability and statistical techniques for

- Mathematical expectations of desired results
- Fitting probability distributions for experimental data.
- Quality control and testing of hypothesis.

II B.Tech. - I Semester
(16BT30301) ENGINEERING METALLURGY

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Engineering Materials.
COURSE DESCRIPTION: Extraction of metals from the ores; Different melting techniques; Phase diagrams; Heat treatment procedures and their influence on Mechanical properties; Surface hardening methods; Modern material characterization techniques; Production of metal powders.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1: Demonstrate the knowledge of engineering metallurgy in extraction of materials by various melting techniques.
CO2: Analyze the structures of various metals influencing various engineering applications.
CO3: Design a suitable heat treatment method to endow required mechanical behavior as per industrial requirements.
CO4: Interpret the data on microstructure of materials using phase diagram and modify the microstructure and properties using different heat treatments.
CO5: Select modern material characterization techniques for analyzing the properties of various materials.
CO6: Identify hazardous substances in metallurgical production and source of environment pollution and propose measures to protect the environment.

II B. Tech. – I Semester
(16BT30302) KINEMATICS OF MACHINERY

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Engineering Mechanics and Computer Aided Engineering Drawing.
COURSE DESCRIPTION: Basic concepts and description of various plane mechanisms; Calculation of Displacement; Velocity and acceleration of simple plane mechanisms; Straight line mechanisms; Steering mechanisms; Hook's joint; Preparation of cam profiles; Concepts of Gears and Gear trains.
COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1: Demonstrate various mechanisms and choose one best suited for a given situation.
CO2: Analyze a given mechanism and find motion characteristics.
CO3: Design suitable gear train mechanism for specific requirement.
CO4: Investigate problems associated with machine components such as gears, gear trains.
CO5: Apply appropriate techniques to design cam profiles.
CO6: Integrate the kinematic mechanisms to the societal needs within realistic constraints.

II B.Tech. – I Semester

(16BT30303) **MANUFACTURING TECHNOLOGY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Engineering Materials.

COURSE DESCRIPTION: Manufacturing Processes; Foundry and Special Casting Processes; Joining Processes; Gas Welding; Electric Arc Welding; Resistance Welding; Metal Forming Processes; Sheet Metal Operations and Plastic Processing.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1: Demonstrate the knowledge required for Manufacturing Process suitable for fabricating a product.

CO2: Analyze the components of moulds and select materials and allowances of patterns used in casting.

CO3: Design Core, Core Print and Gating System in Metal Casting Processes.

CO4: Conduct investigations on manufacturing process for a particular application.

CO5: Use methodology to manufacture components with less human effort.

II B.Tech. – I Semester

(16BT30304) **STRENGTH OF MATERIALS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Engineering Mechanics.

COURSE DESCRIPTION: Analysis of stresses and strains of mechanical and structural components; action of shear; bending and torsional stresses; deflection of beams due to axial and transverse loadings; thin and thick walled pressure vessels.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1: Demonstrate the basic behavior of materials when subject to external influences.

CO2: Analyze the internal and external behavior of members during loading.

CO3: Develop the solution for complex loading conditions by simplifying under suitable assumptions.

CO4: Investigate the behavioral changes of materials and provide valid conclusion.

CO5: Relate the contextual knowledge to access safety issues.

CO6: Communicate the mechanical properties under loading through graphical representation.

II B. Tech. – I Semester

(16BT30305)**THERMODYNAMICS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Engineering Physics and Engineering Chemistry.

COURSE DESCRIPTION: Thermodynamic system; Energy interactions; Heat and work Transfer in flow and non- flow systems; Laws of thermodynamics; Reversible and irreversible processes; Entropy; Equation of state; Pure substance and Gas power cycles.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1: Demonstrate the knowledge of thermodynamic systems, properties, laws of thermodynamics, entropy, pure substance and gas power cycles.

CO2: Identify, formulate and analyze various thermodynamic systems and provide analytical and numerical solutions.

CO3: Design and develop the solutions for the thermodynamic systems to achieve the required physical process parameters.

CO4: Conduct investigations and address the complex problems on availability, entropy and gas power cycles.

CO5: Use thermodynamic laws (exergy analysis) in estimating the performance of heat engines.

II B.Tech. - I Semester
(16BT30331) **COMPUTER AIDED MACHINE DRAWING LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Course on Computer Aided Engineering Drawing.

COURSE DESCRIPTION: Principles of machine drawing; Sectional views; Tolerances; Thread profiles; Bolted joints; Locking arrangements for nuts; Foundation bolts; Keys; Assembling and Disassembling; Part drawing;.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Read and infer a given CAD drawing.

CO2. Analyze features on a drawing part.

CO3. Develop suitable drawing views to represent part drawings of different machine parts in CAD software.

CO4. Investigate the requirements of complex components and interpret the implications of drawings of machine components.

CO5. Apply appropriate techniques, resources to complex engineering activities for modeling machine components with understanding of limitations.

CO6. Function effectively as an individual and as a member of team to combine various part components into a single assembly.

CO7. Communicate about the assemble and part drawings through the computer aided drawings.

II B. Tech. - I Semester
(16BT30332) **MANUFACTURING TECHNOLOGY LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Course on Manufacturing Technology.

COURSE DESCRIPTION: Use of hand tools; Power tools for various manufacturing methods; Provides skill on sand testing; Pattern making; Mould preparation; Metal casting; Mechanical press working; Welding; Sheet metal works; Plastic moulding.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the practical usage and utilization of hand and power tools for engineering applications.

CO2. Analyze the part to be fabricated and manufacture using a combination of the manufacturing techniques.

CO3. Design and develop different components in the casting, welding, press work and plastic moulding.

CO4. Conduct investigation and provide best sequence of operations to manufacture a complex component.

CO5. Use modern tools and methods to solve engineering problems.

CO6. Follow safe practices during work practice in laboratory.

CO7. Function effectively as an individual and as a member of team to perform various process in Manufacturing of products.

CO8. Communicate the information of the components through drawings.

II B.Tech. – I Semester
(16BT30132) **STRENGTH OF MATERIALS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Course on Strength of Materials.

COURSE DESCRIPTION: Tension test; Compression test; Bending test; Shear test; Torsion test; Hardness test; Maxwell reciprocal theorem.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Acquire the knowledge on conducting experiments for testing strength of materials such as steel, timber, metals, beams and springs.
CO2. Analyze test results on steel, timber, metals, beams and springs.
CO3. Recommend suitable materials for construction after interpreting test results.
CO4. Use appropriate method of testing construction materials.
CO5. Consider safety in construction material testing with societal perspective.
CO6. Follow ethics in reporting exact testing results.
CO7. Function effectively as an individual and as a team member in construction material testing.
CO8. Communicate effectively on construction material testing in written, oral and graphical forms.

II B.Tech. - II semester

(16BT3HS01) ENVIRONMENTAL STUDIES

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: Course on Engineering Chemistry

COURSE DESCRIPTION: Multidisciplinary nature of environment; Natural resources; Ecosystems; Biodiversity; Environment pollution and control; Social issues and environment; Human population and environment; Field studies.

COURSE OUTCOMES: On successful completion of this course, students will be able to

CO1. Acquire knowledge on nature of environment, natural resources, ecosystems, biodiversity, environmental pollution and control, social issues and human population.
CO2. Analyze natural resources, ecosystems, biodiversity, environmental pollution and control, social issues and human population.
CO3. Develop strategies for environmental pollution control and natural resource management.
CO4. Solve environmental problems through proper analysis and interpretation of environmental data.
CO5. Choose appropriate techniques in environmental pollution control and natural resource management.
CO6. Understand the impact of social issues and population on environment.
CO7. Provide solutions to individuals, industries and government for environmental sustainable development.
CO8. Follow environmental protection laws for sustainable development.
CO9. Communicate effectively on environmental issues in the form reports.

II B. Tech. – II Semester

(16BT40301) DESIGN OF MACHINE ELEMENTS-I

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Engineering Materials and Strength of Materials

COURSE DESCRIPTION: General considerations of design, design process; Manufacturing considerations, BIS codes of materials; Preferred numbers; Simple stresses, Combined stresses; theories of failure; Fatigue; Stress concentration; Goodman’s line, Soderberg’s line; design of welded joints; threaded joints; shafts; keys; sleeve or muff, and Flange couplings, Flexible couplings; spigot and socket cotter joint, Knuckle joint.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the knowledge on design of machine elements under different loading criteria.
CO2. Identify the design problems and analyze the stresses and strains induced in a machine element.
CO3. Design and develop the components for engineering problems.

CO4. Conduct investigations on complex problems in design of machine elements and provide suitable solutions.
CO5. Apply numerical techniques to determine the stress and strains induced in the components under mechanical loading.
CO6. Use the codes and standards of BIS, ASME and ISO in design procedures.

II B. Tech. - II Semester
(16BT40302) **DYNAMICS OF MACHINERY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Kinematics of Machinery.
COURSE DESCRIPTION: Clutches, brakes and dynamometers; Gyroscopic couple, Turning moment diagrams, flywheel design; Analysis and balancing of shaking forces in machines; Governors; Vibrations, single degree, Multi degrees of freedom vibrations, spring mass systems; transmissibility of forces, Dunkerley's method, Rayleigh's method; Whirling of shafts; isolation of systems.
COURSE OUTCOMES: On successful completion of this course, students will be able to:
CO1. Demonstrate the knowledge on dynamical analysis of machine elements for design process.
CO2. Analyze dynamic systems through systematic approach by identifying suitable sub systems.
CO3. Design dynamic systems involving imbalance, flywheel and gyroscopic effects.
CO4. Conduct investigations on the unbalanced forces in a multi-cylinder reciprocating engine.
CO5. Apply the various methods to reduce the vibration effects in the operation of mechanical components.

II B. Tech. – II Semester
(16BT40303) **FLUID MECHANICS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Engineering Mechanics.
COURSE DESCRIPTION: Properties of Fluids; Pressure Measurements; Types of flow; One-dimensional steady flow energy & momentum Equations; Flow measurements; Impact of jets on stationary & moving plate; Hydraulic turbines and its performance; Pumps; Components and phenomena of hydroelectric power stations.
COURSE OUTCOMES: On successful completion of this course, students will be able to:
CO1. Demonstrate the basic knowledge of hydraulics in finding fluid properties, performance parameters of hydraulic turbines and pumps.
CO2. Identify, formulate and analyze hydraulic machines to study the characteristics of various flow of fluids.
CO3. Develop feasible design solutions to the construction of efficient hydraulic turbines and pumps.
CO4. Conduct investigations and address the complex problems in fluid Mechanics.
CO5. Apply mathematical models for hydraulic systems to study their characteristics.
CO6. Design various Hydraulic systems as per requirements of society based on standard engineering norms and practices.

II B. Tech. – II Semester
(16BT40304) **MACHINE TOOLS AND MODERN MACHINING PROCESSES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Manufacturing Technology.
COURSE DESCRIPTION: Theory of Metal Cutting; Geometry of Cutting Tools; Merchants Force Diagram; Lathe Machine-Principle of Operation; Tools; Multi spindle lathes; shaping; slotting and planning machines; drilling; boring; jigboring; milling machine Specifications; grinding; lapping; honing.

COURSE OUTCOMES: On successful completion of this course, students will be able to:
CO1. Demonstrate the concepts of machining methods using various machine tools.
CO2. Identify various cutting tools used for different operations and analyze its behavior.
CO3. Design the cutting tools for appropriate machining operation.
CO4. Conduct investigation on complex problems during metal cutting operation.
CO5. Apply Modern Machining processes to produce intricate shapes.
CO6. Use the ORS and ASA system of standards in single point cutting tools for engineering practice.

II B. Tech. – II Semester
(16BT40305)**THERMAL ENGINEERING-I**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Thermodynamics.
COURSE DESCRIPTION: Comparison of air-standard and actual cycles; Components and working of 2-stroke and 4-stroke engines; Combustion phenomena in spark ignition and compression ignition engines; Performance parameters of an internal combustion engine; Estimating heat losses in an engine; Components and working of reciprocating and rotary compressors.
COURSE OUTCOMES: On successful completion of this course, students will be able to:
CO1. Demonstrate the basic knowledge of an engine and air compressor in developing the analytical models.
CO2. Analyze the combustion and performance parameters of SI engines and CI engines and analyze the performance of air compressors.
CO3. Provide solutions in the design of IC engine.
CO4. Conduct investigation on IC engines for performance improvement and emission reduction.
CO5. Apply new combustion techniques to analyze the combustion in IC Engines.

II B. Tech. - II Semester
(16BT40331) **FLUID MECHANICS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Course on Fluid Mechanics.
COURSE DESCRIPTION: The study and calibration of gauges, Orifice meter, Venturi meter. Determination of Darcy's coefficient; Performance test on Hydraulic Machines like Centrifugal Pump, Reciprocating pump, Francis Turbine, Kaplan Turbine, and Pelton wheel turbine; Study of Bernoulli's theorem verification, Head losses in pipes and impact of jet on vanes.
COURSE OUTCOMES: On successful completion of this course, students will be able to:
CO1. Demonstrate the knowledge on various flow measuring instruments.
CO2. Analyze the losses and discharge in pipes.
CO3. Design systems for evaluate the performance of hydraulic machineries
CO4. Conduct experiments, analyze the data and interpret results.
CO5. Provide solutions to various hydraulic systems by using computational tools.
CO6. Work with others to accomplish the common goals.
CO7. Communicate effectively and express the results with clarity.

II B. Tech. - II Semester
(16BT40332) **MACHINE TOOLS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Course on Machine Tools and Modern Machining Processes.
COURSE DESCRIPTION: Demonstration on lathe; drilling; milling; slotting machine; shaper; grinding machine; milling machine; provides skill on making products using machines tools.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate practical knowledge on utilization of machine tools for engineering and domestic applications

CO2. Analyze and perform step turning, taper turning, thread cutting, drilling and tapping operations on lathe, operations on shaper, planer and milling machines.

CO3. Design and model different components using machine tools .

CO4. Conduct experiments, investigate the products quality and interpret the results.

CO5. Select and apply relevant cutting tools for machining operations.

CO6. Relate knowledge based on standard engineering norms and practices to make products to cater the needs of the society.

CO7. Formulate the team to attain multidisciplinary settings.

CO8. Communicate effectively and present technical information in oral and written form

II B. Tech. - II Semester

(16BT4HS31) **SOFT SKILLS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Courses on English Language Laboratory in I B.Tech or English Laboratory at Diploma Level.

COURSE DESCRIPTION: This course covers Body Language; Assertiveness; Goal Setting; Creative Thinking; Interpersonal Skills; Team Work; Conflict Management; Etiquette; Report Writing; Group Discussions; Interviewing Skills.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Acquire knowledge in
- Goal Setting
- Creative Thinking
- Leadership Skills and
- Team Work

CO2. Analyse the situations and develop skills for
- Body Language
- Personality Development and
- Stress Management

CO3. Apply the techniques of soft skills in a problem situation enhanced through multimedia software.

CO4. Function effectively as an individual and as a member in diverse teams.

CO5. Communicate effectively in public speaking in formal and informal forums.

III B. Tech. - I semester

(16BT50301)**DESIGN OF MACHINE ELEMENTS -II**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Design of Machine Elements-I.

COURSE DESCRIPTION: Study, analysis and design of machine components such as Journal bearings - anti friction bearings; spur gears, helical gears; Design of helical and leaf springs; internal combustion engine parts such as piston, crank and connecting rod; Design of belt drives; Safety and reliability consideration in machine design; detailed design to define the shape, size and material.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge in design of machine elements to withstand the loads and deformations for a given application, while considering additional specifications.

CO2. Analyze the forces acting and stresses in the machine components for designed mechanical properties.

CO3. Design the bearing, gears, mechanical springs and IC engine parts.

CO4. Investigate the reasons for failure of machine elements and provide solutions/improvisation to improve trial designs.

CO5. Use empirical relationships for solving complex problems in the design of IC engine parts.

CO6. Apply the contextual knowledge to provide safe designs as per the standards and needs for real time applications.

III B. Tech. – I Semester
(16BT50302)INDUSTRIAL ENGINEERING AND MANAGEMENT

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —
COURSE DESCRIPTION: Concepts and functions of management and organization; selection and analysis of plant location and plant layout; method study and work measurement; inventory, stores and purchase management functions; techniques of statistical process control; Engineering ethics; industrial safety.
COURSE OUTCOMES: On successful completion of this course, students will be able to:
CO1. Demonstrate the knowledge of Industrial Engineering and Management concepts to the Solution of complex engineering problems in an industrial scenario.
CO2. Analyze Industrial problems, identify probable causes and suggest suitable solutions to increase the productivity by reducing the wastages using Principles of Management, and Industrial engineering concepts.
CO3. Design and develop integrated systems that include people, materials, information and equipment that meet the specified needs with appropriate considerations.
CO4. Investigate and employ systematic approach to simplify a complex problem in to a Manageable Sub problem for quicker solution.
CO5. Apply appropriate techniques such as method study, control charts, skills, resources, and modern engineering tools like TQM necessary for engineering practices with an understanding of the limitations.
CO6. Consider safety issues in the providing engineering solutions in industrial scenario.

III B. Tech. – I Semester
(16BT50303)METROLOGY AND MEASUREMENTS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Engineering Physics, Computer Aided Machine Drawing Lab and Machine Tools and Modern Machining Processes.
COURSE DESCRIPTION: Limits, Fits and Tolerances; Limit Gauges and Gauge Design; Comparators; Linear Measurement; Measurement of Angles and Tapers; Flatness Measurement, Surface Roughness Measurement; Measurement of Displacement; Measurement of Speed, Stress & Strain Measurements; Measurement of Temperature; Measurement of Pressure.
COURSE OUTCOMES: On successful completion of this course, students will be able to:
CO1. Demonstrate the knowledge on various instrument/measurement methods for a given application.
CO2. Identify, formulate and analyze complex problems related to metrology and measurements.
CO3. Design and Develop the solutions for real time problems related to measurements and its applications.
CO4. Conduct investigation on advanced measuring techniques for the Industrial applications.
CO5. Use modern tools and methods to solve engineering problems.

III B. Tech. – I Semester
(16BT50304) REFRIGERATION AND AIR – CONDITIONING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Thermodynamics and Fluid Mechanics.
COURSE DESCRIPTION: Refrigeration cycles; Application of thermodynamics; heat transfer to the refrigeration cycles; Analysis and design of various refrigeration systems; Study of components of

refrigeration system; refrigerants selection; Psychrometry; Heat gain and Heat loss calculations. Air conditioning equipment; load calculations.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the knowledge on the concepts and applications of RAC systems.

CO2. Identify the RAC problems and analyze refrigeration requirements to arrive at an outline configuration of the refrigeration system.

CO3. Design RAC systems for physical systems and predict their performance.

CO4. Conduct investigation on complex problems of RAC systems.

CO5. Apply Psychrometric charts and refrigeration charts in evaluate the performance of RAC systems.

CO6. Consider health and safety issues in the design of RAC systems for societal needs.

III B. Tech. – I Semester

(16BT50305) **THERMAL ENGINEERING-II**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Thermal Engineering-I.

COURSE DESCRIPTION: Concept of Rankine Cycle in Steam Power Plant; Working of Steam Boilers; Functions of Various Boiler Mountings and Accessories; Performance of Boiler parameters and Boiler Draught; Characteristics of flow through steam nozzles; Working of Steam Condensers and their performance; Steam turbines and their analysis; Introduction to gas turbines and jet propulsion.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the knowledge on components of thermal power plant and gas turbines.

CO2. Analyze the components of thermal power plants using thermodynamic cycles and velocity diagrams.

CO3. Provide suitable solutions by analyzing the various components of thermal power generation system.

CO4. Conduct an elementary energy audit and develop heat balance sheet for boilers.

CO5. Use Steam Tables and Mollier Chart in solving complex problems of Thermal Engineering.

III B. Tech. – I Semester

(16BT50306) **HUMAN RESOURCE MANAGEMENT**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: --

COURSE DESCRIPTION: Concepts of HRM; Environmental Scanning; Human Resource Planning; Job analysis; Job design; Job evaluation; Recruitment; Selection; Placement; Orientation; Training and Development; Performance appraisal; Merit rating; Compensation; Industrial relations; Trade unions; Industrial disputes; Ethical issues; Employee safety.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the knowledge on the principles, processes and practices of human resource management.

CO2. Analyze the key issues related to administering the human elements such as motivation, recruitment, training and development, compensation, appraisal, and career development.

CO3. Provide solutions to plan and manage human resource functions effectively within organization.

CO4. Apply HRM concepts and techniques in strategic planning to improve organizational effectiveness.

CO5. Evaluate HRM related social, cultural and safe responsibilities and issues in a global context.

CO6. Exercise discernment in following ethical code of conduct in human resource planning.

III B.Tech. - I Semester
(16BT50307) **INSTRUMENTATION AND CONTROL SYSTEMS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Basic Electrical and Electronics Engineering.
COURSE DESCRIPTION: Fundamentals of instrumentation; Static and Dynamic characteristics; Working principle of instruments used for measurement of level and flow; Basic elements of control systems; Electrical analogue of mechanical, thermal, hydraulic and pneumatic systems; Process contol; PID controllers; Data acquisition systems; Programmable Logic Controllers; SCADA system.
COURSE OUTCOMES: On successful completion of this course, students will be able to:
CO1. Demonstrate the knowledge of fundamentals of instrumentation, measurement and control systems.
CO2. Select the instruments based on the physical considerations for a particular application.
CO3. Build mathematical models of simple physical systems using transfer functions and design logical control systems.
CO4. Investigate the suitable calibration methodology and error analysis related to measuring instruments for real time applications.
CO5. Apply control engineering techniques to the automatic control systems found in modern mechanical systems.

III B. Tech. – I Semester
(16BT50308) **MECHATRONICS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Basic Electrical and Electronics Engineering and Programming in C.
COURSE DESCRIPTION: Mechatronics system; Sensors; Transducers; Actuating systems; DC Motors; Micro controller; Signal Conditioning; Programmable Logic Controllers; Programmable Motion Controllers; Design Approach; Case Studies.
COURSE OUTCOMES: On successful completion of this course, students will be able to:
CO1. Demonstrate the knowledge on integrative nature of Mechatronics and different components of mechatronics systems.
CO2. Select the appropriate sensors and actuators required for a system by identifying and analyzing real life engineering problems thoroughly.
CO3. Design signal conditioning circuits for mechatronics systems and establish the controlling methods required for that system to meet the specified needs.
CO4. Select, and apply appropriate programmable motion controller techniques and adaptive controllers to complex mechatronics systems with an understanding of the limitations.
CO5. Exhibit the knowledge on design approach, keeping in view of environmental contexts, to reflect the sustainable development.
CO6. Perform under a standard of professional behavior that requires adherence to the highest principles of ethical conduct.

III B. Tech. – I Semester
(16BT40502) **DATABASE MANAGEMENT SYSTEMS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —
COURSE DESCRIPTION: Database Systems; Database Design; Relational Model; SQL Queries, Constraints and Triggers; Schema Refinement and Normal Forms; Transaction Management; Concurrency Control; Overview of Storage and Indexing.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on
- Data models and Database Languages
- Database design
- Normal forms
- Storage and Indexing

CO2. Analyze databases using normal forms to provide solutions for real time applications.

CO3. Design solutions for database problems using database design, views design and framing queries.

CO4. Use database techniques for designing databases, managing databases and its security.

CO5. Select SQL, Hash based Indexing and Tree based Indexing to manage data in databases.

CO6. Apply contextual knowledge to develop database applications related to societal applications like Information Retrieval Systems, Banking and Financial systems.

III B. Tech. – I Semester

(16BT50331)**DYNAMICS AND VIBRATIONS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Course on Dynamics of Machinery.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the working principle of measuring devices used for dynamic testing.

CO2. Analyze the primary and secondary out-of-balance forces in reciprocating machinery.

CO3. Design the experiments to assess the performance of static and dynamic balancing rotating machinery systems.

CO4. Investigate the effect of forces and moments acting on particles and bodies.

CO5. Work in teams in measurement of various parameters of vibration systems.

CO6. Report experimental results, calculations, and inferences systematically.

III B. Tech. - I Semester

(16BT50332)**INTERNAL COMBUSTION ENGINES LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Course on Thermal Engineering-I.

COURSE DESCRIPTION: Calculating the performance parameters of 2-stroke and 4- stroke I.C. Engines; Heat balancing of an engine; Practicing the valve and port timing diagrams; Determining frictional power for single and multi-cylinder engines; Compressor performance. Assembly and disassembly of an automobile models; Determining the Fuel properties;

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the theoretical knowledge of Thermal Engineering in finding the Performance of I.C. Engines.

CO2. Analyze the Performance and Exhaust Emissions of an I.C. Engine by conducting various Tests.

CO3. Design and Conduct experiments as well as analyze and interpret the experimental data.

CO4. Conduct investigations on the IC engines for performance improvement and emission reductions.

CO5. Work in teams to achieve common Objectives.

CO6. Report experimental results, calculations, and inferences systematically.

III B. Tech. – I Semester

(16BT50333) **METROLOGY AND INSTRUMENTATION LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Courses on Computer Aided Machine Drawing Lab and Machine Tools and Modern Machining Processes.

COURSE DESCRIPTION: High precision Metrology; Standardization; Calibration of instruments such as Vernier calipers, Micrometer, Vernier height gauge; Measure dimensions of shafts, bearings; Alignment tests on lathes and milling machines; Straightness and flatness measurements; Identifying uncertainties in dimensional metrology; Measurement of gear and threaded profiles; Measurement of level, speed, viscosity, density, humidity, temperature, pressure and discharge coefficient; Data acquisition and analysis using LabVIEW; Data logging and analysis.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the knowledge on measure variables like temperature, pressure, torque, humidity etc. using transducers and gauging instruments for a given system.

CO2. Analyse and select suitable measurement tool and/or measurement system in a practical situation.

CO3. Apply analytical skills to design instrumentation to measure different physical parameters.

CO4. Investigate the sources of measurement errors and eliminate them by use of reference materials to ensure good quality, accurate and traceable measurement results.

CO5. Apply dimensional analysis techniques and use reference values for unit conversions, accurately perform associated mathematics and present final values.

CO6. Function effectively as an individual, and as a member of a team to express the results of measurement and calculations and correctly reflect the effects of measurement uncertainty.

CO7. Document the traceability of measurement standards and specify a dimension validation process.

III B. Tech. – II Semester

(16BT3HS02)**MANAGERIAL ECONOMICS AND PRINCIPLES OF ACCOUNTANCY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Managerial Economics; Demand and Elasticity of Demand; Production Functions; Markets and Pricing Policies; Basic concepts of Accounting (Journal, Ledger and Trial balance); Trading Account, Profit and Loss Account and Balance sheet with simple adjustments; Computerized Accounting.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Acquire Knowledge in
- Tools and concepts of Micro Economics
- Basic Principles and concepts of Accountancy
- Financial Accounting
- Significance of Economics and Accountancy

CO2. Demonstrate analytical skills in managerial decision making of an organization by applying economic theories

CO3. Develop effective communication in Business and Accounting transactions

CO4. Ascertain the profitability and soundness of an organization

CO5. Practice Financial Accounting

III B. Tech. – II Semester
(16BT60301)**CAD/CAM**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Computer Aided Machine Drawing Lab and Manufacturing Technology.
COURSE DESCRIPTION: Fundamental and conventional CAD processes; Raster scan graphics co-ordinate system; Transformations; Geometric construction models; Curve representation methods; Computer Control in NC; GT; CAPP.
COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the basic concepts of CAD/CAM to generate a suitable geometric model of an object.
CO2. Analyze the features on an object and develop process planning chart/ part program.
CO3. Model the components and develop part programs for real time applications.
CO4. Evaluate the sequential steps required for computer aided design and manufacturing of components.
CO5. Apply software tools for numerical control of fabrication processes.
CO6. Utilize the safe practices in developing codes for designing and manufacturing components with realistic constraints.

III B.Tech. – II Semester
(16BT60302) **HEAT TRANSFER**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Multi-Variable Calculus and Differential Equations, Thermodynamics and Fluid Mechanics.
COURSE DESCRIPTION: Modes of heat transfer; One-dimensional steady and transient conduction; Analysis of extended surfaces; Convection heat transfer; free and forced convection; boiling and condensation; Heat exchangers; radiation; Concept of black body; irradiative heat exchange between surfaces.
COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the knowledge on the concepts of conduction, convection and radiation heat transfer processes.
CO2. Identify, analyze and formulate heat transfer process for the thermal design of systems.
CO3. Design thermal systems for real time applications.
CO4. Conduct investigations on complex heat transfer problems and provide solutions.
CO5. Use analytical and numerical solution techniques in solving heat transfer problems, including heat generation and extended surfaces

III B. Tech. – II Semester
(16BT60303) **NON- CONVENTIONAL ENERGY SOURCES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —
COURSE DESCRIPTION: Overview and importance of non-conventional energy sources; Solar Energy collection, solar energy storage and applications; Wind energy conversion; Biomass energy conversion; Geothermal energy Conversion; Ocean energy conversion: Ocean thermal energy conversion, Wave energy and tidal energy conversion.
COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the knowledge of Non-Conventional energy resources.
CO2. Identify, analyze and formulate requirements for various non-conventional energy conversion systems.

CO3. Propose probable designs for various non-conventional energy conversion systems to solve real time applications.
CO4. Conduct investigations in selection of non-conventional energy conversion systems for a particular geographic region.
CO5. Consider health and safety issues in designing non-conventional energy conversion systems to solve industrial and social problems.
CO6. Optimize the utilization of the natural resources using non-conventional energy conversion systems to reduce the environmental pollution.

III B. Tech. - II Semester

(16BT50402) **MICROPROCESSORS AND MICROCONTROLLERS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Basic Electrical and Electronics Engineering.
COURSE DESCRIPTION: Architecture, Instruction set and programming of 8086; Programmable interfacing devices - architecture and programming; Interfacing Memory and I/O devices with 8086; 8051 Microcontroller - Architecture, programming, interrupts and applications.
COURSE OUTCOMES: On successful completion of this course, students will be able to:
CO1. Demonstrate knowledge in
- Internal hardware details of Intel 8086, 8051 and programmable devices like 8255, 8251, 8259, 8257.
- Interfacing various peripherals to build stand alone systems.

CO2. Critically analyze the requirements to meet the specifications of microprocessors and microcontrollers based systems.
CO3. Design and develop suitable interfaces for real time applications.
CO4. Exhibit programming skills, choose suitable hardware and program the devices to solve Engineering problems.
CO5. Apply appropriate techniques, resources to complex engineering activities for modeling microcomputer and microcontroller based systems with understanding of limitations.
CO6. Apply concepts of microprocessors and microcontrollers for solving societal problems.

III B. Tech. – II Semester

(16BT41202) **JAVA PROGRAMMING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Programming in C.
COURSE DESCRIPTION: Introduction of Java, Classes and Objects; Inheritance, Packages, Interfaces; Exception handling, Multithreading; Event handling, AWT, Collection Classes; Applets, Servlets.
COURSE OUTCOMES: On successful completion of this course, the student will be able to:
CO1. Demonstrate knowledge on:
- Object Oriented Programming concepts - classes, objects, inheritance, polymorphism, encapsulation and abstraction.
- Packages, interfaces, multithreading, exception handling, event handling.

CO2. Analyze complex engineering problems using object oriented concepts.
CO3. Design and develop reusable code to provide effective solutions for real world problems using inheritance and polymorphism.
CO4. Apply AWT and Applets to create interactive Graphical User Interfaces.
CO5. Use advanced programming languages to develop web applications.
CO6. Build Java Applications suitable for societal requirements.

III B. Tech. – II Semester
(16BT51201) **COMPUTER GRAPHICS AND MULTIMEDIA**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Matrices and Numerical Methods.
COURSE DESCRIPTION: Introduction to Computer Graphics, Output Primitives; 2D Geometric Transformations and Viewing; 3D object representation and Visible Surface Detection Methods; Introduction to Multimedia, Audio and Video; Multimedia Data Compression.
COURSE OUTCOMES: On successful completion of this course, the student will be able to:
CO1. Demonstrate knowledge on:
- Graphical interactive devices
- Viewing transformations
- 3-D object representations
- Surface detection methods
- Image, audio, video representations and standards.

CO2. Analyze multimedia compression issues using image, audio and video compression techniques.
CO3. Design algorithms to generate points, lines, polygons for 2-D, 3-D objects.
CO4. Apply Transformations and Clipping algorithms for 2-D and 3-D objects, various lossy/ lossless coding techniques on text and images for compression and decompression.
CO5. Build multimedia applications for societal requirements.

III B. Tech. – II Semester
(16BT60304) **GAS TURBINES AND JET PROPULSION**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Thermal Engineering - II
COURSE DESCRIPTION: Jet propulsion gas turbine; Engine types; Performance; Turbojet and turbofan engines; Design of Compressor; Combustor and Turbines; Jet and Rocket propulsions.
COURSE OUTCOMES: On successful completion of this course, students will be able to:
CO1. Demonstrate the knowledge on gas turbines, Jet and Rocket propulsion systems.
CO2. Identify, Analyze and formulate the performance of components in the engine.
CO3. Design the propulsion systems with an influence on engine output considering the required parameters for a particular gas turbine engine.
CO4. Investigate and carry out a cyclic analysis of a gas turbine engine, including ramjet and turbofan.
CO5. Utilize appropriate analytical methods in integrating the engine into an aircraft system for better performance analysis.

III B. Tech. – II Semester
(16BT60305) **HYDRAULICS AND PNEUMATICS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Fluid Mechanics and Basic Electrical and Electronics Engineering
COURSE DESCRIPTION: Basic fluid power system; Hydraulic components and its use; Hydraulic circuits and its application; Fundamentals of pneumatics; Pneumatic components and its use; Pneumatic circuits; Application; Design of hydraulic and pneumatic systems for various applications; Electro Pneumatics; Logic gates.
COURSE OUTCOMES: On successful completion of this course, students will be able to:
CO1. Demonstrate the basic mechanism of fluid power systems and automation.
CO2. Identify and analyze engineering problems in automated environment.

CO3. Design the pneumatic and hydraulic circuits for domestic and industrial problems.
CO4. Investigate the issues related to the design and manufacture of pneumatic and hydraulic systems.
CO5. Use modern tools available in automation to enhance the productivity.
CO6. Deploy the best way of implementing the automation to have eco-friendly environment and sustainable development.

III B. Tech. – II Semester
(16BT60306) MECHANICAL VIBRATIONS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Dynamics of Machinery.
COURSE DESCRIPTION: Basics of vibration; Analysis of two or more degrees of freedom; Multi-body mechanical systems; Undamped free vibrations; Damped free vibration; Forced vibrations; Basic concepts on engineering measurements; Spectrum analysis; signal processing; vibration control.
COURSE OUTCOMES: On successful completion of this course, students will be able to:
CO1. Demonstrate knowledge on Vibration and its practical applications.
CO2. Analyze the mathematical models of the system and provide a qualitative assessment of the vibrations present in the system.
CO3. Design the possible sources of unwanted vibration and suggest means of rectification.
CO4. Investigate the complex system by analyzing the sub-systems and using their models for quicker solutions.
CO5. Use the different tools involved in Vibration Control to enhance productivity.
CO6. Relate the issue of safety in dynamic systems involving moving parts and propose solutions for society.

III B. Tech. - II Semester
(16BT60307) SUPPLY CHAIN MANAGEMENT

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Industrial Engineering and Management.
COURSE DESCRIPTION: Fundamentals of supply chain management; Supply Chain Decisions; Achieving Strategic fit; Drivers of Supply Chain; Inventory management in a supply chain; Supply chain integration; Distribution Resources Planning; Bullwhip Effect; Role of information technology in SCM; Designing and planning transportation networks through infrastructure and strategies; International and Contemporary issues in SCM; Demand and Supply planning; Mass customization; Global issues and Outsourcing problems; Supply Chain Operations Reference Model; Third party logistics; Retailer-Supplier Partnership; Metrics and Emerging trends in SCM.
COURSE OUTCOMES: On successful completion of this course, the student will be able to:
CO1. Demonstrate the knowledge on the supply chain management concepts including supplier relationships, and optimization approaches.
CO2. Analyze and identify the key drivers and enablers of SCM for a given firm.
CO3. Propose appropriate and customized strategies and policies for managing supply chain of the firm and implement the same.
CO4. Investigate the issues in managing supply chains and give appropriate solutions that cater the needs of a particular organization.
CO5. Use internet technologies to enhance productivity of the firm through better SCM practices.

III B. Tech. – II Semester

(16BT6HS01) **BANKING AND INSURANCE**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: —

COURSE DESCRIPTION: Functions of Banking; Role & Functions of RBI; Bank-Customer Relationship; Deposit and Loan Services of Banks; Banking Procedures; Electronic Payment Mechanisms; Business Models; Concepts of Risk and Uncertainty; Fundamentals of Insurance; Principles of Insurance; Functions of Insurance; Insurance players in India.

COURSE OUTCOMES: On successful completion of this course, the student will be able to:

CO1. Demonstrate Knowledge in
- Tools and concepts of Banking and Insurance
- Basic Principles and concepts of Insurance and Banking
- E-fund transfers, e-payments and e-business models

CO2. Develop skills in providing solutions for
- Online banking and e – payments...
- Risk Management through insurance benefits the society at large.
- Money management by leveraging on technology, banking and insurance services.

CO3. Designing software and IT solutions based on banking and business models.

CO4. Provide life-long learning for effective utilization of Banking and Insurance facilities.

III B. Tech. – II Semester

(16BT6HS02) **BUSINESS COMMUNICATION AND CAREER SKILLS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Nature and scope of communication;corporate communication; writihng business documents;careers and resumes; interviews.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge in
- Corporate Communication
- Main Stages of Writing Messages
- Career Building

CO2. Analyze the possibilities and limitations of language in
- Communication Networks
- Crisis Management/Communication

CO3. Design and develop the functional skills for professional practice in
- Business Presentations & Speeches

CO4. Apply written and oral communication techniques in preparing and presenting various documents in technical writing.

CO5. Function effectively as an individual and as a member in diverse teams.

CO6. Communicate effectively with the engineering community and society in formal and informal situations.

III B. Tech. – II Semester

(16BT6HS03) **COST ACCOUNTING AND FINANCIAL MANAGEMENT**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: —

COURSE DESCRIPTION: Scope, Objectives and Elements of cost Accounting; Cost Sheet and Tender quotations; Variance Analysis: Material variances, Labor variances; Meaning and Scope, Liquidity, Profitability Ratios: concept of Risk and Return on Investment.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Acquire Knowledge in
- Elements of Costing.
- Basic concepts of Financial Management.
- Risk and Return
- Cost Accountancy
- Capital Budgeting

CO2. Develop skills in
- Material, Labor, Overheads control.
- Cost Control

CO3. Develop effective Communication in Cost Accountancy and Financial Management.

CO4. Design solutions for effective investment decisions.

III B. Tech. – II Semester
(16BT6HS04) ENTREPRENEURSHIP FOR MICRO, SMALL AND MEDIUM ENTERPRISES

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: —

COURSE DESCRIPTION: Introduction to Entrepreneur Development; Idea generation and formation of Business Plan; Micro and Small Enterprises; Institutional Finance and Support to Entrepreneur; Woman Entrepreneurship.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Acquire Knowledge in
- Basic Principles and concepts of entrepreneurship.
- Significance of entrepreneurship.
- Schemes and institutions encouraging entrepreneurship.

CO2. Develop skills in providing solutions for
- To start dynamic entrepreneurial ventures and manage them.
- Women entrepreneurship serving as contrivance in societal development

CO3. Develop Critical thinking and evaluation ability.

CO4. Inculcates business acumen and attitude towards trouble shooting

CO5. Design solutions for new start-ups

III B. Tech. – II Semester
(16BT6HS05) FRENCH LANGUAGE (La Langue Francais)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Oral communications; Basic grmmar; advancedgrammar;basic writing; Business French (La Francais Commercial)

COURSE OUTCOMES: On successful completion of this course, students will be able to

CO1. Demonstrate knowledge in
- a) Process of communication
- b) Modes of listening
- c) Paralinguistic features
- d) Skimming and Scanning
- e) Elements of style in writing

CO2. Analyze the possibilities and limitations of language, understanding
- a) Barriers to Communication
- b) Barriers to Effective Listening
- c) Barriers to Speaking
- d) Formal and metaphorical language

CO3. Design and develop language skills for professional practice**.**

CO4. Apply basic writing skills in writing Emails and understanding wide range of technical terminologies.

CO5. Understand French culture and civilization.

CO6. Communicate effectively with the native French in day to day situation**.**

III B. Tech. – II Semester

(16BT6HS06) **GERMAN LANGUAGE (Deutsch alsFremdsprache)**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:—

COURSE DESCRIPTION: Oral communication;Basic grammar; Advanced grammar; Basic writing; Berufsdeutcsch (Business German)

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge in
- Process of communication
- Modes of listening
- Paralinguistic features
- Skimming and Scanning
- Elements of style in writing

CO2. Analyze the possibilities and limitations of language, understanding
- Barriers to Communication
- Barriers to Effective Listening
- Barriers to Speaking
- Formal and metaphorical language

CO3. Design and develop language skills for professional practice**.**

CO4. Apply basic writing skills in writing Emails and understanding wide range of technical terminologies.

CO5. UnderstandGerman culture and civilization.

CO6. Communicate effectively with the native German in day to day situation**.**

III B. Tech. – II Semester

(16BT6HS07) **INDIAN CONSTITUTION**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Elements, functions and functionaries according to Indian Constitution, understanding for better professional practice and good citizenry

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Gain knowledge in
- parliamentary proceedings, laws, legislature, administration and its philosophy
- federal system and judiciary of India
- socials problems and public services like central civil services and state civil services
- Indian and international political aspects and dynamics

CO2. Develop etiquette and professional behavior in line with the constitution of India for becoming a responsible citizen

III B. Tech. – II Semester
(16BT6HS08) **INDIAN ECONOMY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —
COURSE DESCRIPTION: Introduction; Time Value of Money; Elementary Economic Analysis; Value Analysis; Value Engineering; Economic Planning.
COURSE OUTCOMES: On successful completion of this course, students will be able to:
CO1. Acquire the knowledge in
- Micro and Macro Economics.
- Traditional and Modern methods of Capital Budgeting.
- Five year plans and NITI Aayog.

CO2. Analyze
- Capital Budgeting.
- Value Analysis and Value Engineering.
- Economic analysis
- Law of supply and demand

CO3. Understand the nuances of project management and finance

III B. Tech. – II Semester
(16BT6HS09)**INDIAN HERITAGE AND CULTURE**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —
COURSE DESCRIPTION: Basic traits of Indian Culture; Humanistic Reforms under Jainism and Buddhism; Culture in the medieval period; Socio Religious reforms in Indian Culture; Reform movements for harmonious relations.
COURSE OUTCOMES: On successful completion of this course, students will be able to
CO1. Acquaint knowledge in
- human aspirations and values in Vedic culture.
- cultural aspects of Buddhism and Jainism
- unification of our country under Mourya’s and Gupta’s administrations
- socio Religious aspects of Indian culture
- reform movements and harmonious relations.

CO2. Apply ethical principles and reforms as models for the upliftment of the societal status in the present cultural contexts

III B. Tech. – II Semester
(16BT6HS10) **INDIAN HISTORY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —
COURSE DESCRIPTION: Introduction; Ancient India; Classical and Medieval era; Modern India; India after independence.
COURSE OUTCOMES: On successful completion of this course, students will be able to:
CO1. Gain knowledge on evolution and history of India as a nation
CO2. Analyze social and political situations of past and current periods
CO3. Practice in career or at other social institutions morally and ethically

III B. Tech. – II Semester
(16BT6HS11) **PERSONALITY DEVELOPMENT**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —
COURSE DESCRIPTION: Self-esteem & Self-Management; Developing Positive Attitudes; Self-Motivation & Self-Management; Getting Along with the Supervisor; Workplace Success.
COURSE OUTCOMES: On successful completion of this course, students will be able to
CO1. Demonstrate knowledge in
- Self-Management
- Planning Career

CO2. Analyze the situations based on
- Attitudes
- Thinking strategies

CO3. Design and develop the functional skills for professional practice in
CO4. Function effectively as an individual and as a member in diverse teams.
CO5. Communicate effectively in public speaking in formal and informal situations.

III B. Tech. – II Semester
(16BT6HS12) **PHILOSOPHY OF EDUCATION**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —
COURSE DESCRIPTION: Introduction to Philosophy and Engineering Education; Philosophical methods and their implications in engineering; Philosophical education in India; Values and Engineering education; Outcome based education.
COURSE OUTCOMES: On successful completion of this course, students will be able to:
CO1. Acquire knowledge in
- Philosophy of Engineering education.
- Philosophical Methods.
- Knowledge acquiring methods.
- Engineering education and responsibilities.

CO2. Understand the impact of Outcome Based Education for effective educational outcomes.
CO3. Apply reasoning to assess societal issues with the contextual knowledge of engineering education and responsibilities.

III B. Tech. – II Semester
(16BT6HS13) **PUBLIC ADMINISTRATION**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —
COURSE DESCRIPTION: Introduction; Public Policy; Good Governance; E-Governance; Development Administration.
COURSE OUTCOMES: On successful completion of this course, students will be able to:
CO1. Acquire knowledge in
- Public Policy.
- Good Governance.
- E-governance.
- Development Administration.

CO2. Analyze the possibilities and limitations of existing policies through Good Governance perspective.
CO3. Design and develop solutions in e-governance modelsto find and provide opportunities in e-governance.

CO4. Adopt principles ofe-governance in addressing the existing issues and challenges in e-governance sector.
CO5. Understand the significance of Administrative Development in finding professional engineering solutions by probing Bureaucracy. Role of civil society.

III B. Tech. – II Semester
(16BT60112) **BUILDING MAINTENANCE AND REPAIR**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —
COURSE DESCRIPTION: Durability of buildings, Failure and repair of buildings, MaterialTechniques for repair, Maintenance of buildings, Conservation and recycling.
COURSE OUTCOMES: On successful completion of this course, students will be able to:
CO1. Acquire basic knowledge on durability and serviceability, failures, repair and rehabilitation of buildings.
CO2. Analyze failures, repair and rehabilitation techniques.
CO3. Solve complex building maintenance problems through proper investigations and interpretation.
CO4. Use modern tools and techniques for various repairs and rehabilitation of structures.
CO5. Provide solutions for building maintenance and repair problems considering health and safety.
CO6. Consider environmental sustainability in building maintenance and repair.
CO7. Maintain ethical standards for quality in repairs and rehabilitation of structures.
CO8. Evaluate specifications and perform cost analysis of building components while repair and rehabilitation.

III B.Tech. – II Semester
(16BT60113) **CONTRACT LAWS AND REGULATIONS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: --
COURSE DESCRIPTION: Construction contracts; Tenders; Arbitration; Legal requirements; Labour regulations.
COURSE OUTCOMES: On successful completion of this course, students will be able to:
CO1. Demonstrate basic Knowledge on construction contracts, tenders, arbitration, legal requirements and labour regulations.
CO2. Analyze contracts and tenders.
CO3. Address the legal issues in contracts and tenders.
CO4. Follow laws and regulations in the preparation of contracts and tenders.
CO5. Prepare contract and tender documents as per the standards.
CO6. Consider project schedule, cost, quality and risk in the preparation of contracts and tenders.

III B.Tech. - II Semester
(16BT60114) **DISASTER MITIGATION AND MANAGEMENT**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —
COURSE DESCRIPTION: Disasters; Earthquakes; Floods; Cyclones; Droughts; Landslides; Disaster management.
COURSE OUTCOMES: On successful completion of course, students will be able to:
CO1. Demonstrate knowledge on disasters, their vulnerability and mitigation measures.
CO2. Analyze disasters and their vulnerability.
CO3. Design strategies for effective disaster mitigation.

CO4. Address pre and post disaster issues for better preparedness and mitigation measures, through proper analysis and interpretation.
CO5. Use appropriate methods in disaster mitigation and management.
CO6. Use historical data of disasters to inform the people over preparedness and mitigation measures.
CO7. Solve disaster related issues considering environment.
CO8. Consider economical issues in disaster management.

III B.Tech. - II Semester
(16BT60115) **ENVIRONMENTAL POLLUTION AND CONTROL**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:
COURSE DESCRIPTION: Fundamentals of air pollution; Dispersion of pollutants; Effects and control of air pollution; Water pollution; Soil pollution and control; Municipal solid waste management.ement.
COURSE OUTCOMES: On successful completion of this course, students will be able to:
CO1. Demonstrate knowledge on air, water, soil pollution and their control and solid waste management.
CO2. Analyze causes and effects of air, water and soil pollution and their remedial measures.
CO3. Recommend suitable solutions to complex environmental pollution problems.
CO4. Use appropriate remedial technique to solve environmental pollution problems.
CO5. Understand the effects of environmental pollutionon human health and vegetation.

III B.Tech. - II Semester
(16BT60116) **PLANNING FOR SUSTAINABLE DEVELOPMENT**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:—
COURSE DESCRIPTION: Sustainable development; Environmental impact; Sustainable Policies; Governance; Theories and strategies; Media and education for sustainability.
COURSE OUTCOMES: On successful completion of this course, students will be able to:
CO1. Demonstrate the knowledge on sustainable development, environmental impact, sustainable policies, governance, systems and strategies, media and education for sustainability.
CO2. Analyze theories, environmental impact, policies, systems and strategies for sustainable development.
CO3. Develop suitable methods and systems for sustainable development.
CO4. Use appropriate techniques in solving issues related to sustainable development.
CO5. Provide solutions to problems associated with sustainable development considering society.
CO6. Consider environment while planning sustainable development.
CO7. Communicate effectively on sustainable development issues through media and education.
CO8. Consider economical issues while planning for sustainable development.

III B.Tech. – II Semester
(16BT60117) **PROFESSIONAL ETHICS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: --
COURSE DESCRIPTION: Engineering ethics; Professional ideals and virtues; Engineering as social experimentation; Responsibilities and rights; Global issues.
COURSE OUTCOMES: On successful completion of this course, students will be able to:
CO1. Demonstrate the principles of ethics, importance of professional values and social responsibility.

CO2. Analyze the problems in the implementation of moral autonomy and use ethical theories in resolving moral dilemmas.
CO3. Develop suitable strategies to resolve problems arise in practicing professional ethics.
CO4. Provide solutions to complex problems associated with professional ethics by proper analysis and interpretation.
CO5. Use appropriate theories in resolving issues pertain to professional ethics.
CO6. Understand the impact of professional ethics on society and address the limitations of codes of ethics.
CO7. Practice engineering with professionalism, accountability and ethics.
CO8. Function as a member, consultant, manager, advisor and leader in multi-disciplinary teams.
CO9. Write reports without bias and give instructions to follow ethics.

III B.Tech. - II Semester
(16BT60118) **RURAL TECHNOLOGY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —
COURSE DESCRIPTION: Rural technology; Non conventional energy; Community development; IT in rural development.
COURSE OUTCOMES: On successful completion of this course, students will be able to:
CO1. Demonstrate the knowledge on technologies for rural development.
CO2. Analyze various technologies available which are appropriate for rural development.
CO3. Carryout feasibility study on the public and private partnership for rural development.
CO4. Develop and use latest technologies for rural development.
CO5. Address health and safety issues while choosing technologies for rural development.
CO6. Educate the rural populace on the positive impacts of biofertilisers and usage of agromachinery in agriculture.

III B.Tech. - II Semester
(16BT60308) **GLOBAL STRATEGY AND TECHNOLOGY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:—
COURSE DESCRIPTION: Introduction to strategic management; Strategic management process; Principles of good strategy; Globalization strategies; Research and Development strategies; Technology Management and Transfer; Elements of Transfer Process; Corporate Governance in the Indian scenario.
COURSE OUTCOMES: On successful completion of this course, students will be able to:
CO1. Demonstrate the knowledge on Strategic management, Research & development strategies, Technology management and transfer, Globalization and Corporate governance.
CO2. Indentify and analyze crucial problems in strategic management to improve performance of the organizations.
CO3. Develop the products and production process by using research and development strategies.
CO4. Conduct investigations on the impact of globalization in current scenario in the context of corporate governance.
CO5. Appraise the resources and capabilities of the firm in terms of their ability to confer sustainable development.
CO6. Apply ethics in strategic decision making.

III B.Tech. - II Semester

(16BT60309) **INTELLECTUAL PROPERTY RIGHTS AND MANAGEMENT**

Int. Marks	**Ext. Marks**	**Total Marks**	**L**	**T**	**P**	**C**
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Protection of ideas; innovation and artistic endeavors; Acts and procedure related to patents, trademarks, copy right, design registration, trade secrets and cyber laws; Infringement; Commercialization of intellectual property rights; Case studies in each.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on intellectual property rights, patents, trademarks, copyrights, trade secrets and commercialization of intellectual property.

CO2. Analyse the commercial significance of discoveries and developments and to assist in bringing these into public use.

CO3. Investigate and ensure smooth transition from concept to final product by following National & International Laws of Intellectual Property.

CO4. Utilize the various policies and procedures related to patents, trademarks and copyrights relating to IPR.

CO5. Safeguard, review and manage the intellectual property so that it may receive adequate and appropriate legal protection against unauthorized use.

CO6. Follow ethical standards in capacity building and work as a platform for development, promotion, protection, compliance, and enforcement of intellectual property and knowledge.

CO7. Prepare documents and fill applications needed for filing a patent, design, copyright and trade mark.

III B. Tech. – II Semester

(16BT60310) **MANAGING INNOVATION AND ENTREPRENEURSHIP**

Int. Marks	**Ext. Marks**	**Total Marks**	**L**	**T**	**P**	**C**
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Evolution of entrepreneurship from economic theory Managerial and entrepreneurial competencies; Concepts of Shifting Composition of the Economy Purposeful Innovation & Sources of Innovative Opportunity; The Innovation Process; Innovative Strategies; Entrepreneurial Motivation; Entrepreneurs versus inventors; Ethics and International Entrepreneurship; Strategic Issues in International Entrepreneurship; Problem solving Innovation and Diversification.

COURSE OUTCOMES: On successful completion of this course, the student will be able to:

CO1. Demonstrate the principles of business innovation and entrepreneurship for establishing industrial ventures.

CO2. Analyze business plans for potential investors and stakeholders and effectively answer probabilistic questions on the substance of plan.

CO3. Develop a comprehensive and well planned business structure for a new venture.

CO4. Conduct investigation on complex problems, towards the development of Project.

CO5. Apply modern statistical and mathematical tools to design projects and subsequent work procedures.

CO6. Apply ethics in constructive innovation framework.

CO7. Exhibit professionalism by employing modern project management and financial tools.

III B. Tech. – II Semester

(16BT60311) **MATERIALS SCIENCE**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Structure and Bonding in metals; Steels, Cast Irons and Non Ferrous alloys; Material Selection for conductors, Insulators and semi conductors; Strengthening mechanisms of metals; Plastics and Ceramics as Insulators; AC and DC properties of Insulators; Semiconductors and Magnetic materials; Composite materials in Electrical and Electronics engineering; Material Selection and manufacturing of Optical fibers.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the knowledge on concepts of fundamental science and engineering principles relevant to materials.

CO2. Analyze the structures of various types of Ferrous, Non ferrous alloys influencing various engineering applications.

CO3. Conduct investigations to select suitable materials with desired properties for engineering applications.

CO4. Use phase diagrams to interpret the data regarding microstructure of materials.

CO5. Consider health and safety issues while providing materials to real time applications.

CO6. Use composite materials that reduce material waste in design and manufacturing for sustainability.

III B. Tech. - II Semester

(16BT70412) **GREEN TECHNOLOGIES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Principles of green engineering; Green communications; Green energy; Green computing; Green construction; Green manufacturing.

COURSE OUTCOMES: On successful completion of this course, students will be able to

CO1. Deploy conceptual knowledge in green technologies pertaining to engineering practice.

CO2. Analyze various green technologies for engineering practice.

CO3. Provide green solutions to engineering problems.

CO4. Apply various green techniques in the engineering practice.

CO5. Consider health and safety issues while providing green solutions to the society.

CO6. Understand issues related to environment sustainability.

CO7. Apply ethical standards for environmental sustainability in the engineering practice.

III B. Tech. - II Semester

(16BT70413) **INTRODUCTION TO NANOSCIENCE AND NANOTECHNOLOGY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Introduction to the concept of nano; Description of nanomaterial; Nanostructure characterization tools; Classification of nanomaterials; Fabrication of nanomaterial; Different applications of nanostructures and nanomaterials.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge in

- Nanoscale technology.
- Difference between micro and nanotechnology
- Classification of Nanostructure and Nanomaterial
- Fabrication of various nanomaterials and nano-structures.

CO2. Analyze numerical and analytical problems in
- Nanomaterial size by using Scanning Electron Microscope and X-Ray diffraction

CO3. Design and fabricate devices based on nanostructures like
- Nano solar cell
- Nano cantilever
- Nano bio-sensor

CO4. Synthesize nano particle of different materials to solve the problems related to fabrication of nanostructures.

CO5. Select appropriate technique for fabrication of nanostructures and nanocomposites.

CO6. Apply ethical standards and legal issues while using chemical substances in fabrication of new nanostructures.

III B. Tech. – II Semester
(16BT60505) ENGINEERING SYSTEM ANALYSIS AND DESIGN

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Systems Process; Technologies for Systems; System Development Life Cycle; System Analysis and Modeling; Levels of Management; Project Management; Systems Implementation and Importance of UML Prototyping; Maintaining and Managing the Systems Output Process.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge in
- Systems Process and System Design
- Systems Analysis and Modeling
- System Development Life Cycle
- Design Management and Maintenance Tools.

CO2. Analyze System Process and estimate the given models by using case tools.

CO3. Design and Develop a model to the organizational systems.

CO4. Solve complex problems related to engineering systems and produce accurate results.

CO5. Apply object oriented techniques for modeling dynamic systems.

CO6. Contribute towards societal issues and responsibilities in designing, modeling and developing of organizational systems.

III B.Tech. – II Semester
(16BT71011) MICRO-ELECTRO-MECHANICAL SYSTEMS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —

COURSE DESCRIPTION: Overview of Micro Electro Mechanical Systems (MEMS); scaling laws; working principles of microsensors and microactuators; materials; microfabrication processes; packaging of Microsystems.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on MEMS devices, scaling laws, microsensors and microactuators

CO2. Analyze the properties of materials and identify its suitability for MEMS devices.

CO3. Design MEMS devices that meet desired specifications and requirements.

CO4. Analyze and synthesize the information to provide effective solution to engineering problems with MEMS devices.

CO5. Use modern techniques in micro manufacturing process.

CO6. Develop efficient and cost effective MEMS based products for society.

III B. Tech. – II Semester
(16BT61205) **CYBER SECURITY AND LAWS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: —
COURSE DESCRIPTION: Cyber Crimes and Indian IT Act; Cyber Offenses; Tools and Methods used in Cyber Crime; Phishing ad Identity Theft; Indian and Global Perspective on Cyber Crimes and Cyber Security; Organizational Implications on Cyber Security; IPR Issues; Cyber Crime and Terrorism; Cyber Crime Illustrations.
COURSE OUTCOMES: On successful completion of this course, students will be able to:
CO1. Demonstrate knowledge in Cyber security, Cyber crimes and its related laws in Indian and Global Act.
CO2. Analyze the legal perspectives and laws related to cyber crimes in Indian context.
CO3. Apply security and privacy methods in development of modern applications and in organizations to protect people and to prevent cyber crimes.
CO4. Solve Cyber security issues using privacy policies.
CO5. Use antivirus tools to minimize the impact of cyber threats.
CO6. Follow security standards for the implementation of Cyber Security and laws.

III B.Tech. – II Semester
(16BT61505) **BIOINFORMATICS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: —
COURSE DESCRIPTION: Introduction to Bioinformatics; Biology and Information; Sequence alignment and dynamic programming; Biological Database; Homology Modeling; Structure Prediction; Molecular Dynamics
COURSE OUTCOMES: On successful completion of this course, student will be able to:
CO1. Demonstrate knowledge on concepts of biological databases, Genome and proteome.
CO2. Analyze biological sequences for Homology Modeling.
CO3. Apply clustering methods for Phylogenetic trees.
CO4. Solve bio sequencing problems using dynamic programming.
CO5. Select and apply appropriate techniques and tools to structure Prediction

III B. Tech. - II Semester
(16BT60331) **CAD AND SIMULATION LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Course on Computer Aided Machine Drawing Lab.
COURSE DESCRIPTION: Fundamental Concepts of CAD and Simulation; 2D and 3D Part Modeling; Analysis of Simple Structural, Thermal and CFD problems.
COURSE OUTCOMES: On successful completion of this course, students will be able to:
CO1. Demonstrate basic knowledge to use software package CREO to generate 3D models of parts and assemblies, and choose appropriate module of ANSYS to perform stress, thermal and CFD analysis.
CO2. Analyze any part or machine component in a standardized manner suitable for industrial scenarios.
CO3. Design components and analyze for various required parameters.
CO4. Conduct investigation on complex subsystem and employ bottom- up approach to build the model of the entire system and generate drawings or models.
CO5. Apply appropriate hardware and software for CAD and Simulation thereby enhancing productivity in design.

CO6. Contribute to the society and engineering profession based on standard engineering norms and practices in design.
CO7. Function effectively as an individual and as a member of team to combine various part components into a single assembly.
CO8. Communicate effectively about any mechanical components or system.

III B. Tech. – II Semester
(16BT60332) **HEAT TRANSFER LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Course on Heat Transfer.
COURSE DESCRIPTION: Experimental studies on mechanisms of heat transfer; Film wise and drop wise condensation; Steady and unsteady flow; Effectiveness of heat exchanger; thermal conductivity; emissivity; Stefan - Boltzmann constant.
COURSE OUTCOMES: On successful completion of this course, students will be able to:
CO1. Demonstrate the knowledge of heat transfer phenomenon in objects of different geometries.
CO2. Identify, formulate and analyze various heat transfer problems.
CO3. Design various thermal systems and conduct experiments to increase/decrease heat transfer rates.
CO4. Investigate the results obtained in the various experiments and provide suitable conclusions.
CO5. Apply dimensional analysis to evaluate the performance of heat transfer equipment.
CO6. Work and contribute to team to accomplish common goals.
CO7. Communicate effectively about laboratory work reports and presentations.

III B. Tech – II Semester
(16BT60333) **SEMINAR**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	100	100	-	-	-	2

PRE-REQUISITES: —
COURSE DESCRIPTION: Identification of topic for the seminar; Literature survey; Performing critical study and analysis of the topic identified; Preparation of report and presentation.
COURSE OUTCOMES: Completion of the seminar work enables a successful student to demonstrate:
CO1. Knowledge on the seminar topic.
CO2. Analytical ability exercised during the seminar work.
CO3. Ability to investigate and solve complex engineering problems faced during the seminar work.
CO4. Ability to apply techniques to complex engineering activities with an understanding of limitations as applied in the seminar work.
CO5. Ability to function effectively as an individual as experienced during the seminar work.
CO6. Ability to present views cogently and precisely on the seminar topic.
CO7. Ability to engage in life-long leaning as experience during the seminar work.

IV B. Tech – I Semester
(16BT70301) **AUTOMOBILE ENGINEERING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Thermal Engineering-I.
COURSE DESCRIPTION: Basic components and classification of automobiles; Fuel Supply System; Cooling System; Ignition System; Emissions from automobiles; Pollution control Techniques; Transmission System; Steering System; Suspension and Braking System.
COURSE OUTCOMES: On successful completion of this course, students will be able to:
CO1. Demonstrate the knowledge on working of various components of an automobile.

CO2. Identify and analyze the various systems and sub systems suitable for an automobile.
CO3. Present the probable solution in the design of fuel systems, cooling and ignition systems, transmission systems, steering systems, suspension and braking systems of an automobile.
CO4. Investigate the complex issues in automobile engineering and provide valid conclusions.
CO5. Use the techniques to estimate pollution from the emissions of automobiles.
CO6. Use the national and international standards to assess the emissions from automobiles considering health and safety.

IV B. Tech. – I Semester

(16BT70302) FINITE ELEMENT METHOD

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Design of Machine Elements-II and Heat Transfer.
COURSE DESCRIPTION: Discretization; Formulation of finite element expression; Finite Element approach to solve 1-D problems; beams; trusses; CST problems; Heat transfer problems and Dynamic analysis problems.
COURSE OUTCOMES: On successful completion of this course, students will be able to:
CO1. Demonstrate principles and approaches for solving FEM problems in different fields.
CO2. Formulate and analyze element stiffness matrices and shape functions to find stresses in trusses and beams.
CO3. Develop solutions for CST element and axi-symmetric element.
CO4. Conduct investigation on heat transfer problems using FEM.
CO5. Apply finite element technique to solve vibration analysis problems.
CO6. Apply practical constraints to find solutions for structural and thermal problems.

IV B. Tech. – I Semester

(16BT70303) OPERATIONS RESEARCH

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Industrial Engineering and Management
COURSE DESCRIPTION: Quantitative methods and techniques for effective decision making; model formulation and applications pertinent to business decision problems; mathematical tools for solving deterministic problems, linear programming formulation and optimization; transportation models; queuing models and simulation; Replacement models; Game theory.
COURSE OUTCOMES: On successful completion of this course, students will be able to:
CO1. Demonstrate knowledge on preparation of mathematical model for optimization in a given application.
CO2. Analyze a practical situation and apply appropriate methodology to solve the problem.
CO3. Design a system with optimum parameters to maximize the efficiency and minimize the wastage in selected situations.
CO4. Investigate alternate solutions for complex decision making problems.
CO5. Apply simulation tool to model the industrial systems.
CO6. Consider societal issues in solving industrial decision making problems for optimum benefits.

IV B. Tech. – I Semester
(16BT70304) **CRYOGENICS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Refrigeration & Air-conditioning
COURSE DESCRIPTION: Necessity of low temperature, Multi stage refrigeration, Cascade system, Properties of cryogenic fluids, Liquefication of air, hydrogen and helium, Applications of low temperature, Low temperature insulation, Storage systems.
COURSE OUTCOMES: On successful completion of this course, students will be able to:
CO1. Demonstrate the principles of cryogenics in various low temperature refrigeration applications.
CO2. Analyze the various refrigeration cycles in solving cryogenic problems.
CO3. Present the probable solution in the design of insulation to the various systems in handling the cryogenic fluids.
CO4. Conduct investigations cryogenic fluids suitable for low temperature applications in real time situations.
CO5. Apply the suitable storage and handling systems for various cryogenic fluids.

IV B. Tech. – I Semester
(16BT70305) **GEOMETRIC MODELLING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on CAD/CAM.
COURSE DESCRIPTION: Basic concepts of coordinate systems; Bezier curves and surfaces, geometric continuity, curvature, subdivision, curve and surface fitting; Output primitives; 2-D and 3-D geometrical transformations and viewing; Surface detection methods and Computer Animation.
COURSE OUTCOMES: On successful completion of this course, students will be able to:
CO1. Demonstrate the knowledge on the Concepts of coordinate systems and Design Parameters involved in computer aided drawings.
CO2. Analyze higher degree curves using algorithms in geometric modeling.
CO3. Propose solutions which indulge with multiple 2-D and 3-D geometrical transformations to represent and solve real engineering problems.
CO4. Conduct investigations on intricate and non linear design projects involving geometric modeling.
CO5. Apply the visual surface detection methods such as solid works, Unigraghics, Ansys, Hyper mesh for new product design.
CO6. Consider societal issues while providing designs to real time applications.

IV B. Tech. – I Semester
(16BT70306) **QUALITY MANAGEMENT AND RELIABILITY ENGINEERING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Industrial Engineering and Management.
COURSE DESCRIPTION: Introduction to Quality, Quality Costs, Quality Circles, QC Tools, Statistical Quality Control, Control Charts, Acceptance Sampling Evaluation, Reliability, Types of Failures, Reliability Improvement.
COURSE OUTCOMES: On successful completion of this course, students will be able to:
CO1. Demonstrate knowledge on the concepts of standardization and bodies of standardization for improvement of quality.
CO2. Analyze sampling plans for continuous quality in production.
CO3. Develop failure hazard models to improve reliability.
CO4. Conduct investigations to identify active and standby redundancies for reliability optimization.
CO5. Use control charts and quality tools for inspection of quality.
CO6. Improve products and processes in accordance with the requirements for building and sustaining performance excellence.
CO7. Use the quality control codes and standards in the quality control processes.

IV B.Tech. - I Semester

(16BT70307) **TOOL DESIGN**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Machine Tools and Modern Machining Processes.
COURSE DESCRIPTION: Basic cutting parameters; Determination of cutting forces; Stresses and Strains; Importance of heat treatment in tool design; design of dies; design of single and multi-point cutting tools.
COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate knowledge on the impact of cutting tool angles for various operations.
CO2. Analyse the cutting tool requirement and specify the material and geometry required for a given tool in a given machining situation.
CO3. Design single/multipoint cutting tools and jigs/fixtures for selected applications.
CO4. Interpret tolerances applicable to dies, jigs, fixtures and moulds.
CO5. Select the tool and other requirements for machining an object with complex geometry.

IV B. Tech. - I Semester

(16BT70308) **COMPUTATIONAL FLUID DYNAMICS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Heat Transfer.
COURSE DESCRIPTION: Introduction to Computational Fluid Dynamics(CFD); Various Numerical methods; Solution methods for governing equations; Finite difference method and its application to heat transfer problems; Errors and stability analysis; Study flow analysis; Simple CFD techniques.
COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the knowledge of CFD techniques, basic aspects of discretization and grid generation in solving partial differential equations.
CO2. Analyze CFD problems and offer probable solutions using Finite Differential approach.
CO3. Develop mathematical models and flow simulations for CFD problems.
CO4. Conduct investigations on complex CFD problems using different techniques.
CO5. Apply modern flow simulation codes for solving governing equations of computational fluid dynamics.
CO6. Use CFD techniques for critical decision making in various applications in the society to eliminate the need for expensive and complex prototypes.

IV B. Tech. – I Semester

(16BT70309) **INDUSTRIAL ROBOTICS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Matrices and Numerical Methods and Dynamics of Machinery.
COURSE DESCRIPTION: Introduction of Robots classifications; Components; Robot drive mechanisms; Mechanical transmission methods aided in functioning of robots; Forward kinematics; inverse kinematics; Manipulator dynamics; Trajectory planning and avoidance of obstacles; Robot programming; Robot Application in Industry; Future Application and Challenges and Case Studies.
COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the knowledge on concepts of robot, Kinematics and dynamics, Trajectory planning and programming of robot.
CO2. Identify, analyze and interpret various methods and review the contemporary problems of robotics.

CO3. Optimize various robotic configuration parameters to analyze the reverse and forward kinematics.
CO4. Investigate the performance parameters on the complex robotic designs.
CO5. Apply appropriate functional techniques, resources, and programming tools to robotic engineering activities.
CO6. Consider safety issues in designing robots for societal applications.

IV B. Tech. – I Semester
(16BT70310) PRODUCT DESIGN

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Design of Machine Elements-I, CAD/CAM, Manufacturing Technology and Industrial Engineering and Management.
COURSE DESCRIPTION: Introduction to Design process; Identifying customer needs; Product development and design processes and methods; Product specifications; Concept development; Theory of Inventive Problem solving (TRIZ); Conception selection; Conception testing; Introduction to Embodiment design; Product architecture; Industrial design; Design for prototyping; and manufacturing; Ethical issues considered during Engineering Design Process.
COURSE OUTCOMES: On successful completion of this course, students will be able to
CO1. Demonstrate the knowledge on general design principles, material selection, theories of failure, factor of safety and manufacturing considerations.
CO2. Analyze and interpret the given product by modeling and simulation techniques by using the design specifications.
CO3. Design the complex engineering models and solution for the product.
CO4. Investigate and improve the process by using the tools like Failure mode effect analysis and Taguchi Methods.
CO5. Consider societal and safety issues in the designing of the products.
CO6. Follow the Ethical principles during engineering design process.

IV B. Tech. - I Semester
(16BT70311) PRODUCTION AND OPERATIONS MANAGEMENT

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Industrial Engineering and Management.
COURSE DESCRIPTION: Overview of production and operations management concepts and issues from both strategic and operational perspective; relationships between operations and environment; analysis of strategic issues relating to competitiveness in production and operations management, and application of tools to improve productivity in production and operations; concepts/principles related to management of operations – forecasting demand; production, material and capacity requirements planning; scheduling; inventory planning and control; lean and supply chain management systems.
COURSE OUTCOMES: On successful completion of this course, students will be able to:
CO1. Demonstrate the knowledge of Aggregate Planning, Scheduling, Forecasting, and Supply Chain Management to various operations of industry.
CO2. Analyze the operations of an industry and incorporate principles and concepts of operations management to asses and improve operational performance.
CO3. Design a process by optimizing the use of resources that meet the specified needs with appropriate consideration for industrial operations.
CO4. Apply the techniques of forecasting, aggregate planning, Just-In-Time, Enterprise Resource Planning, Kaizen to establish methods for maximizing productivity.
CO5. Use the concepts of operations management and specialized knowledge in Operations Management to solve business processes steering to meet societal needs.
CO6. Manage the industrial projects from forecasting of demand, identification of Material requirements, scheduling on machines and dispatching it to customer

IV B. Tech. – I Semester

(16BT70312) **POWER PLANT ENGINEERING**

(Program Elective-4)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Thermal Engineering-II and Heat transfer.

COURSE DESCRIPTION: Energy sources; Types of Power Plants; Thermal power plant; Study of various systems of thermal power plant; Combustion and Firing Methods; Diesel Power plant; Gas Turbine Power Plants; Hydroelectric power plants and Nuclear power plants; Power generation and recovery systems; Various conventional and nonconventional sources of energy with power plant economics.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the knowledge on various power plants and its sub systems.
CO2. Identify, analyze and formulate the various systems and components in power plants.
CO3. Propose probable designs of power plants for a particular geographic region.
CO4. Conduct investigation on the components of power plants using thermodynamic analysis to predict the performance of the power plants.
CO5. Consider health and safety issues in selecting a suitable type of power plant in a given location.
CO6. Provide preliminary estimates of the capital cost and operating costs of a power plant.

IV B. Tech – I Semester

(16BT70313) **PROJECT MANAGEMENT**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Industrial Engineering and Management.

COURSE DESCRIPTION: Project Characteristics; Project Selection; Economics; Feasibility Assessment and Evaluation; Project integration; Project scope management; Project time and cost management; Organizational and Work Breakdown; Scheduling; Budgeting; Project Control; Project Auditing; Financing for projects; Project investment evaluation.

EXPECTED OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the process of project management and practice it in the execution of projects.
CO2. Analyze the key performance metrics, audit report and project closure activities to obtain formal project acceptance.
CO3. Develop the resources required for a project to produce effective work plan and resource schedule.
CO4. Apply project management tools and techniques for project communications, risk analysis, and quality control.
CO5. Steer the projects for maximizing societal benefit.
CO6. Provide accurate project cost estimates and to plan various activities accordingly.

IV B. Tech. – I Semester

(16BT70314) **RAPID PROTOTYPE TECHNOLOGY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on CAD/CAM and Manufacturing Technology.

COURSE DESCRIPTION: History of RP systems; Stereo; Data files and machine details; Type of machines; Solid Ground Curing; Principle of operation, Machine details; Applications; Thermal jet printer; 3-D printer; GenisysXs printer HP system 5; Indirect Rapid tooling, Silicone rubber tooling; Aluminum filled epoxy tooling; Tooling; Quick cast process; Copper polyamide; Rapid Tool; DMILS; Software For RP; STL files; Overview of Solid view; Collaboration tools; Rapid manufacturing process optimization; Vacuum; Casting, Surface digitizing; data transfer to solid models.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the knowledge to identify the tools needed to produce a prototype of the product using RPT techniques.

CO2. Analyze the various simulations /proto typings and select an RPT system.

CO3. Develop the steps to acquire the desired products in any RPT system using the knowledge of process parameters of the machine.

CO4. Investigate the viability of various rapid tooling for specific applications.

CO5. Apply tools to develop manufacturing data which will be essential to produce products conforming to industrial standards.

IV B. Tech. - I Semester

(16BT70315) **TRIBOLOGY**

Int. Marks	**Ext. Marks**	**Total Marks**	**L**	**T**	**P**	**C**
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Fluid Mechanics and Design of Machine Elements-II.

COURSE DESCRIPTION: Surface friction; characteristic, sources, wear of various metals; lubricants, types, lubrication necessity; film lubrication theory; loads on bearing; surface modification; surface coatings; fusion processes; material for bearings.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the knowledge on effect of friction, wear phenomenon and lubrication in any system of mechanism.

CO2. Analyze complex problems in tribological system of mechanical engineering.

CO3. Design the journal bearing and provide suitable lubrication to minimize the stresses.

CO4. Conduct investigations on complex problems tribology and provide valid Solutions

CO5. Deploy the contextual knowledge on friction/lubrication mechanisms to the professional Engineering practices.

CO6. Implement the design pattern to have eco-friendly environment and sustainable development.

IV B. Tech. - I Semester

(16BT70331) **COMPUTER AIDED MANUFACTURING AND AUTOMATION LAB**

Int. Marks	**Ext. Marks**	**Total Marks**	**L**	**T**	**P**	**C**
50	50	100	-	-	3	2

PRE-REQUISITES: --

COURSE DESCRIPTION: CNC Programming; Pressure control valve; flow control valve; Directional control valve; Logic controls; Timers; PLC; Ladder diagram; Robotics.

COURSE OUTCOMES: On successful completion of this course, students will be able to:

CO1. Demonstrate the practical usage of automation and robotics.

CO2. Analyse the hydraulic, pneumatic circuits for the appropriateness to real time applications.

CO3. Design and model different components using automation and develop codes for part programming in CNC

CO4. Conduct investigations to suit the automation and robotics for practical applications.

CO5. Using computer numerical control techniques in computer aided manufacturing of components.

CO6. Formulate the team to attain multidisciplinary settings in achieving automation.

CO7. Communicate effectively on sequence of manufacturing operations for the given component or machine.

IV B. Tech. - I Semester
(16BT70332) **INDUSTRIAL ENGINEERING LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Course on Operations Research.
COURSE DESCRIPTION: Work study; Method Study; Preparation of Process Charts; Work Measurement; Time Study; Productivity; Sampling; Quality control for attributes; Ergonomics; Supply Chain Management, Simulation of Inventory.
COURSE OUTCOMES: On successful completion of this course, students will be able to:
CO1. Demonstrate the concepts and use of IE techniques in providing solutions to complex productivity related Problems.
CO2. Analyze the process parameters required for conducting the experiments related to industrial engineering problems.
CO3. Prepare (Design) and conduct the exercises on Process chart, Method study and Work Measurement for effective utilization of Man- power resources.
CO4. Investigate the results obtained in the various experiments anovide suitable conclusions.
CO5. Apply IE techniques to achieve Effective work place environment.
CO6. Work and contribute to team to accomplish common goals.
CO7. Communicate effectively about laboratory work reports and presentation.

IV B. Tech – I Semester
(16BT70333) **COMPREHENSIVE ASSESSMENT**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	100	100	-	-	-	2

PRE-REQUISITES: All the courses of the program.
COURSE DESCRIPTION: Assessment of student learning outcomes in the courses of the program.
COURSE OUTCOMES: Comprehensive Assessment enables a successful student to demonstrate:
CO1. Knowledge in the courses of the program.
CO2. Analytical ability in the courses of the program.
CO3. Design skills in the courses of the program.
CO4. Ability to investigate and solve complex engineering problems in the courses of the program.
CO5. Ability to apply tools and techniques to complex engineering activities with an understanding of limitations in the courses of the program.
CO6. Ability to provide solutions as per societal needs with consideration to health, safety, legal and cultural issues in the courses of the program.
CO7. Understanding of the impact of the professional engineering solutions in environmental context and need for sustainable development in the courses of the program.
CO8. Ability to apply ethics and norms of the engineering practice in the courses of the program.
CO9. Ability to function effectively as an individual in the courses of the program.
CO10. Ability to present views cogently and precisely in the courses of the program.
CO11. Ability to engage in life-long leaning in the courses of the program.

IV B. Tech – II Semester
(16BT80331) **PROJECT WORK**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
100	100	200	-	-	-	12

PRE-REQUISITES: All the courses of the program.
COURSE DESCRIPTION: Identification of topic for the project work; Literature survey; Collection of preliminary data; Identification of implementation tools and methodologies; Performing critical study and analysis of the topic identified; Time and cost analysis; Implementation of the project work; Preparation of thesis and presentation.

COURSE OUTCOMES: Completion of the project work enables a successful student to demonstrate:

CO1. Knowledge on the project topic.
CO2. Analytical ability exercised in the project work.
CO3. Design skills applied on the project topic.
CO4. Ability to investigate and solve complex engineering problems faced during the project work.
CO5. Ability to apply tools and techniques to complex engineering activities with an understanding of limitations in the project work.
CO6. Ability to provide solutions as per societal needs with consideration to health, safety, legal and cultural issues considered in the project work.
CO7. Understanding of the impact of the professional engineering solutions in environmental context and need for sustainable development experienced during the project work.
CO8. Ability to apply ethics and norms of the engineering practice as applied in the project work.
CO9. Ability to function effectively as an individual as experienced during the project work.
CO10. Ability to present views cogently and precisely on the project work.
CO11. Project management skills as applied in the project work.
CO12. Ability to engage in life-long leaning as experience during the project work.

Program: B.Tech. CIVIL ENGINEERING

I B. Tech. - I Semester
(16BT1HS01) **Technical English**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: English at Intermediate level
COURSE DESCRIPTION: Introduction to Communication; Active Listening; Effective Speaking; Reading; and Writing.
COURSE OUTCOMES: On successful completion of this course, the students will be able to

CO1. Demonstrate knowledge in
  a. Process of communication
  b. Modes of listening
  c. Paralinguistic features
  d. Skimming and Scanning
  e. Elements of style in writing

CO2. Analyze the possibilities and limitations of language for understanding
  a. Barriers to Communication
  b. Barriers to Effective Listening
  c. Barriers to Speaking
  d. Formal and metaphorical language

CO3. Design and develop functional skills for professional practice.
CO4. Apply writing skills in preparing and presenting documents
CO5. Function effectively as an individual and as a member in diverse teams.
CO6. Communicate effectively with the engineering community and society in formal and informal situations.

I B. Tech - I Semester
(16BT1BS01): **ENGINEERING CHEMISTRY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE REQUISITE: Intermediate/Senior Secondary Chemistry
COURSE DESCRIPTION: Water technology, Chemistry of Engineering materials, Nanochemistry, Green Chemistry, Electro chemical cells, Sensors, Corrosion and Lubricants.
COURSE OUTCOMES:
After completion of the course, a successful student is able to:

CO1: Acquire basic knowledge in water technology, engineering plastics, conducting polymers, composites, Electro chemical cells, Nano Chemistry, principles of Green Chemistry, corrosion phenomenon and lubricants.

CO2: Develop analytical skills in:
  a. Determination of hardness of water.
  b. Determination of viscosity, flame and fire points, cloud and pour points.

CO3: Develop designing skills in:
  a. Synthesis of engineering plastics.
  b. Chemical methods for the synthesis of Nano materials.

CO4: Develop skills for providing solutions through:
  a. Mitigation of hardness of water.
  b. Newer Nanomaterials and engineering plastics for specific applications

CO5: Acquire awareness to practice engineering in compliance to modern techniques such as:
  a. Nalgonda technique for defluoridation of water
  b. Electroplating technique for control of corrosion.

CO6: Acquire awareness to societal issues on:
  a. Quality of water.
  b. Bio-diesel
  c. Chemical materials utility and their impact.

I B. Tech. - I Semester
(16BT1BS03) MATRICES AND NUMERICAL METHODS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Intermediate /Senior secondary mathematics
COURSE DESCRIPTION: Fundamentals of matrix theory; numerical solutions of equations, curve fitting; interpolation; numerical differentiation and integration; numerical solutions of ordinary differential equations.
COURSE OUTCOMES: After completion of the course a successful student is able to

CO1: Acquire basic **knowledge** in
- (a) Finding the rank of matrices and analyzing them.
- (b) Solving algebraic and transcendental equations by various numerical methods.
- (c) Fitting of various types of curves to the experimental data.
- (d) Estimating the missing data through interpolation methods.
- (e) Identification of errors in the experimental data
- (f) Finding the values of derivatives and integrals through various numerical methods.
- (g) Solving differential equations numerically when analytical methods fail.

CO2: Develop skills in **analyzing** the
- (a) methods of interpolating a given data
- (b) properties of interpolating polynomials and derive conclusions
- (c) properties of curves of best fit to the given data
- (d) algebraic and transcendental equations through their solutions
- (e) properties of functions through numerical differentiation and integration
- (f) properties of numerical solutions of differential equations

CO3: Develop skills in **designing** mathematical models for
- (a) Fitting geometrical curves to the given data
- (b) Solving differential equations
- (c) Constructing polynomials to the given data and drawing inferences.

CO4: Develop numerical skills in **solving the problems** involving
- (a) Systems of linear equations
- (b) Fitting of polynomials and different types of equations to the experimental data
- (c) Derivatives and integrals
- (d) Ordinary differential equations

CO5: Use relevant numerical **techniques** for
- (a) Diagonalising the matrices of quadratic forms
- (b) Interpolation of data and fitting interpolation polynomials
- (c) Fitting of different types of curves to experimental data
- (d) obtaining derivatives of required order for given experimental data
- (e) Expressing the functions as sum of partial fractions

I B. Tech. - I Semester
(16BT1BS04) **MULTI-VARIABLE CALCULUS AND DIFFERENTIAL EQUATIONS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Intermediate /Senior secondary mathematics
COURSE DESCRIPTION: First order differential equations; higher order linear differential equations; functions of several variables; applications of integration; multiple integrals; vector calculus.
COURSE OUTCOMES: After completion of the course a successful student is able to

CO1: Acquire knowledge in
- (a) Higher order Differential equations
- (b) Maximum and minimum values for the functions of several variables
- (c) Double and triple integrals
- (d) Differentiation and integration of vector functions.
- (e) Line and surface volume
- (f) transforming integrals from three dimensional surfaces and volumes on to plane surfaces

CO2: Develop skills in analyzing the
- (a) methods for differential equation for obtaining appropriate solutions,
- (b) Properties of oscillatory electrical circuits and heat transfer in engineering systems
- (c) The variations in the properties of functions near their stationary values
- (d) Flow patterns of fluids, electrical and magnetic flux and related aspects

CO3: Develop skills in designing mathematical models for
- (a) R-C and L-R-C oscillatory electrical circuits
- (b) Heat transfer and Newton’s law of cooling

(c) Engineering concepts involving lengths of curves and areas of planes, Flux across surfaces

CO4: Develop analytical skills in solving the problems involving
- (a) Newton's law of cooling
- (b) non homogeneous linear differential equations
- (c) maximum and minimum values for the functions
- (d) lengths of curves, areas of surfaces and volumes of solids in engineering
- (e) transformation of integrals from three dimensional surfaces and volumes on to plane surfaces

CO5: Use relevant mathematical techniques for evaluating
- (a) various types of particular integrals in differential equations
- (b) stationary values for multi variable functions
- (c) multiple integrals in change of variables
- (d) integrations of vector functions.

I B. Tech. - I Semester

(16BT10501) **PROGRAMMING IN C**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: NIL

COURSE DESCRIPTION:

Program design; Operators and Expressions; Data Input and Output; Control Statements; Functions; Arrays; Strings; Pointers; Structures & Unions and File handling Techniques;

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO1: Demonstrate knowledge in:
- o Elements of C Language
- o Selection and Repetition statements.
- o Arrays, Strings and Functional statements.
- o Derived data types, Files and Pointers

CO2: Analyze complex engineering problems to develop suitable solutions

CO3: Design algorithms for specified engineering problems

CO4: Use appropriate 'C' language constructs for solving engineering problems

CO5: Write programs using 'C' language to implement algorithms

I B. Tech. - I Semester

(16BT1HS31) **ENGLISH LANGUAGE LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITE: English at Intermediate or Equivalent Level

COURSE DESCRIPTION: Phonetics; Vocabulary Building; Functional Grammar; Just a Minute; Elocution/Impromptu; Giving Directions/Conversation Starters; Role Play; Public Speaking; Describing People, Places, Objects and Events; Reading Comprehension; Listening Comprehension; Information Transfer.

COURSE OUTCOMES:

On successful completion of this course the students will be able to

CO1. Demonstrate knowledge in
- a. Phonetics b. Information Transfer

CO2. Analyze the situations in professional context by using
- a. Vocabulary b. Grammar

CO3. Design and develop functional skills for professional practice.

CO4. Apply the techniques of Listening and Reading skills to comprehend Listening and Reading comprehension.

CO5. Function effectively as an individual and as a member in diverse teams through
- a. Extempore talk and b. Role Play

CO6. Communicate effectively in public speaking in formal and informal situations.

CO7. Recognize the need to engage in lifelong learning to upgrade competence of knowledge and communication.

I-B. Tech- I Semester
(16BT1BS31): **ENGINEERING CHEMISTRY LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE REQUISITE: Intermediate/Senior Secondary Chemistry
COURSE DESCRIPTION: Estimation of hardness, alkalinity, dissolved oxygen of water samples and estimation of Iron by volumetric methods, determination of effect of P^H on rate of corrosion, measurement of viscosity of lubricants; Instrumental methods like potentiometer, conductivity meter, P^H meter and colorimeter; synthesis of Polymers and Nano materials.
COURSE OUTCOMES:
After completion of the course, a successful student is able to:
CO1: Acquire basic Knowledge about the volumetric analysis and synthesis of materials used for engineering applications.
CO2: Acquire analytical skills in the estimation of hardness of water, alkalinity of water, dissolved oxygen in water and estimation of Iron through wet laboratory methods.
CO3: Develop designing skills for the synthesis of polymers and Nanomaterials.
CO4: Acquire skills to use instrumental techniques for the determination of Electrical conductance of electrolytes, EMF of a cell, PH of a solution, determination of viscosity of lubricants and estimation of iron in cement.
CO5: Provide solutions for environmental issues through determination of quality of water.

I B. Tech. - I Semester
(16BT10331) **COMPUTER AIDED ENGINEERING DRAWING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	1	6	3

PRE-REQUISITES: *None*
COURSE DESCRIPTION:
Engineering drawing conventions; importance of engineering drawing; fundamental concepts of sketching; computed aided drafting and different types of projections of geometric entities (both 2D and 3D) through computer aided drafting packages.
COURSE OUTCOMES:
After completion of the course, a successful student is able to:
CO1: Understand, write and read the language of engineering drawing in industry through International System of Standards.
CO2: Develop the imagination and mental visualization ability for interpreting the geometrical details of engineering objects.
CO3: Produce different views and projection in drawing.
CO4: Use modern CAD software for design and drafting of drawings.
CO5: Create multi-view drawings suitable for presentation to Engineering community.
CO6: Introduce and communicate universally accepted conventions and symbols for their usage in technical drawing.

I B. Tech. - I Semester
(16BT10531) **PROGRAMMING IN C LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES:-
A course on Programming in C
COURSE DESCRIPTION:
Hands on practice in developing and executing simple programs using C Programming constructs– Conditional statements, Loops, Arrays, Strings, Functions, Structures, Pointers and Functions.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
CO1. Demonstrate practical knowledge of using C language constructs:
. Selection and Repetition statements.
. Arrays, Strings and Functional statements.
. Derived data types, Files and Pointers
CO2. Analyze problems to develop suitable algorithmic solutions
CO3. Design Solutions for specified engineering problems

CO4. Use appropriate 'C' language constructs for solving engineering problems
CO5. Implement and execute programs using 'C' language
CO6. Document programs and communicate effectively while conducting Professional transactions.

I B. Tech. - II Semester
(16BT1BS02) **ENGINEERING PHYSICS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: Intermediate / Senior Secondary Physics
COURSE DESCRIPTION: Lasers; optical fibers; principles of quantum mechanics; band theory of solids; semiconductors; dielectric properties of materials; acoustics of buildings; superconductors; crystallography and nanomaterials.
COURSE OUTCOMES:
After completion of the course, a successful student will be able to:
CO1. Acquire basic knowledge of lasers, optical fibers, quantum mechanics, dielectrics, semiconductors, and superconductors, acoustic of buildings, crystallography and nanomaterials.
CO2. Analyze the construction and working of various laser systems, semiconductor devices, various types of optical fibers and its communication system and nano materials properties.
CO3. Gain skills in designing lasers, optical fiber cable, semiconductor devices, acoustically good halls and nanomaterials.
CO4. Develop problem solving skills in engineering context.
CO5. Use relevant techniques for assessing ball milling, pulsed laser deposition, p-n junction and Laser.

I B. Tech. - II Semester
(16BT2BS01) **TRANSFORMATION TECHNIQUES AND PARTIAL DIFFERENTIAL EQUATIONS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE REQUISITE: Intermediate /Senior secondary mathematics
COURSE DESCRIPTION: Fourier series; Fourier integrals and transforms; Laplace transforms; z –transforms; partial differential equations.
COURSE OUTCOMES:
After completion of the course a successful student is able to
CO1: Acquire basic knowledge in
- (a) Fourier series and Fourier transforms
- (b) Fourier integrals
- (c) Laplace transforms and their applications
- (d) z- transforms and their applications
- (e) solving partial differential equations

CO2: Develop skills in analyzing the
- (a) Properties of Fourier series for a given function
- (b) Partial differential equations through different evaluation methods
- (c) Difference equations through z – transforms
- (d) Engineering systems and processes involving wave forms and heat transfer

CO3: Develop skills in designing mathematical models for
- (a) Problems involving heat transfer and wave forms
- (b) Engineering concepts involving, Fourier transforms, Fourier integrals, Laplace transforms, z-transforms and difference equations

CO4: Develop analytical skills in solving the problems involving
- (a) Fourier series and Fourier transforms
- (b) Laplace transforms
- (c) Z-transforms and difference equations
- (d) Heat transfer and wave motion

CO5: Use relevant transformation techniques for
- (a) Obtaining Fourier transforms for different types of functions
- (b) Laplace transforms
- (c) Z- transforms
- (d) Partial differential equations

I B. Tech. - II Semester
(16BT20101) **BUILDING MATERIALS AND CONSTRUCTION TECHNOLOGY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	0	3

PRE-REQUISITE: Engineering Chemistry
COURSE DESCRIPTION: Stones; Bricks; Tiles; Timber; Lime; Cement; Miscellaneous materials in construction; Masonry and Foundations; Building Components; Finishings; Shoring; Scaffolding and Formwork.
COURSE OUTCOMES:
On successful completion of this course the students will be able to
CO1. Identify building materials, building components and construction techniques.
CO2. Characterize building materials and construction techniques.
CO3. Recommend proper building materials and construction techniques.
CO4. Develop new construction materials and construction techniques.
CO5. Use modern tools and techniques in construction practice.
CO6. Ensure health and safety in construction practice.
CO7. Encourage sustainable and environmental friendly building materials and construction techniques.
CO8. Maintain ethical standards for quality in construction.
CO9. Promote cost effective building materials and construction techniques.
CO10. Engage in continuous learning of latest construction materials and techniques.

I B. Tech. - II Semester
(16BT20102) **ENGINEERING MECHANICS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	4	1	-	4

PRE-REQUISITES: Intermediate Mathematics and Physics.
COURSE DESCRIPTIONS: statics of particles and rigid bodies; support reactions; analysis of perfect frames; friction; centroid, centre of gravity and moment of inertia; kinematics and kinetics.
COURSE OUTCOMES:
After successful completion of this course, the student will be able to:

CO1: Apply the knowledge of engineering mechanics fundamentals to the solutions of basic engineering problems.
CO2: Analyze
- Multi-body systems under equilibrium and dynamic conditions.
- Systems involving dry friction and computing the efficiency of the system of forces in frames under suitable assumptions.
- Sectional properties of surfaces and solids.

CO3: Design sustainable solutions to complex engineering problems using first principles of engineering mechanics.
CO4: Exercise awareness to assess the safety of system related to engineering mechanics.
CO5: Communicate effectively engineering and allied information through free body diagram.
CO6: Sustain interest in engineering mechanics to upgrade knowledge and skills through self learning concepts in mechanics.

I B. Tech. - II Semester
(16BT20241) **BASIC ELECTRICAL AND ELECTRONICS ENGINEERING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Physics and Mathematics
COURSE DESCRIPTION: Basics of electrical DC and AC circuits; principle of operation and applications of DC machines, transformers, and induction motors; Transducers and measuring instruments; rectifier devices; bipolar transistors and its characteristics.
COURSE OUTCOMES:
After successful completion of this course, the student will be able to:

CO1: Demonstrate knowledge on
☐☐Electrical and electronic circuits.
☐☐Construction and operation of electrical machines, electrical and electronic instruments.
CO2: Analyze various electrical & electronic circuits and different transducers.
CO3: Evaluate the electrical and electronic circuit parameters and performance of electrical machines.
CO4: Select and apply various machines and transducers.

I B. Tech. - II Semester
(16BT1BS32) **ENGINEERING PHYSICS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Intermediate / senior secondary Physics.
COURSE DESCRIPTION:
Characteristics of p-n junction diode, Photodiode, LED, and semiconductor laser diode. Experimental determination of carrier concentration and energy gap of a semiconductor material, wave length of a laser source, size of fine particle, numerical aperture and acceptance angle of optical fiber. Determination of frequency of electrically vibrating tuning fork and A.C source using A.C sonometer, magnetic field along axial line of a current carrying coil and rigidity modulus of material of a wire using torsional pendulum.
COURSE OUTCOMES:
After completion of the course, a successful student will be able to:
CO1: Acquire basic knowledge about semiconductor materials, magnetic materials and lasers.
CO2: Acquire analytical skills in the estimation of carrier concentration of semiconductor materials and characterization of p-n junction.
CO3: Develop skills in designing electronic circuits using semiconductor components.
CO4: Acquire skills to use instrumental techniques in A.C sonometer and Melde's experiment.
CO5: Apply diffraction techniques for determination of size of tiny particles and wave length of lasers.

I B. Tech. - II Semester
(16BT20131) **BUILDING MATERIALS AND CONSTRUCTION TECHNOLOGY LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITE: Building Materials and Construction Technology
COURSE DESCRIPTION: Exercises on Masonry; Bar bending; Painting; House wiring; Shuttering and scaffolding; Plumbing and sanitation; Building materials; Construction equipment.
COURSE OUTCOMES:
After completion of this course, a successful student will be able to:
CO1. Identify building materials, building components and construction techniques.
CO2. Characterize building materials and construction techniques.
CO3. Recommend proper building materials and construction techniques.
CO4. Develop new construction materials and construction techniques.
CO5. Use modern tools and techniques in construction practice.
CO6. Ensure health and safety in construction practice.
CO7. Encourage sustainable and environmental friendly building materials and construction techniques.
CO8. Maintain ethical standards for quality in construction.
CO9. Function effectively as an individual, and as a member or leader in teams.
CO10. Comprehend and write effective reports on building materials and construction techniques.
CO11. Promote cost effective building materials and construction techniques.
CO12. Engage in continuous learning of latest construction materials and techniques.

I B. Tech. - II Semester
(16BT20252) **MATLAB Practice for Civil Engineers**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	1	3	2

PRE-REQUISITE: Mathematics at Intermediate Level and Principles of Computer Programming.
COURSE DESCRIPTION: Exercises on MATLAB Basics; Arrays; Functions and Files; Programming Techniques; Plotting; Linear Algebraic Equations; Polynomials; Simulink.
COURSE OUTCOMES:
After successful completion of the course, student will be able to
CO1. Apply knowledge of MATLAB basics.
CO2. Carryout numerical computations and analysis.
CO3. Design solutions for engineering problems using MATLAB.
CO4. Develop solutions for complex civil engineering problems using MATLAB Programming and Simulation.
CO5. Use MATLAB Tool boxes for civil engineering applications.

I B. Tech. - II Semester
(16BT20331) **ENGINEERING WORKSHOP PRACTICE**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: None
COURSE DESCRIPTION: Knowledge on various workshop hand and power tools; utilization in different manufacturing trades such as carpentry, fitting, house wiring, sheet metal forming, foundry; overview of metal cutting processes, plumbing and welding through live demonstrations.
COURSE OUTCOMES:
After successful completion of this course, the student will be able to:

- **CO1:** Acquire knowledge on utilization of hand and power tools for engineering applications.
- **CO2:** Employ analytical skills for the production of a component for real time applications.
- **CO3:** Design and model different prototypes in the carpentry, fitting and sheet metal operations.
- **CO4:** Comprehend the usage of modern power tools.
- **CO5:** Abide by workshop safety regulations and adopt environmentally safe practices.
- **CO6:** Engage in self study for solving engineering related problems.

II B.Tech. – I Semester
(16BT3BS01) **PROBABILITY DISTRIBUTIONS AND STATISTICAL METHODS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE REQUISITES: Intermediate/senior secondary mathematics
COURSE DESCRIPTION: Random variables; mathematical expectations; probability distributions; correlation and regressions; statistical quality control; sampling distributions; tests for small and large samples and their significances.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Acquire basic knowledge in
- a) probability distributions, correlation and regressions
- b) statistical quality control and testing of hypotheses
- c) Simple linear regression
- d) Tests of significance for small and large samples

CO2. Develop skills for analyzing the data with
- a) mathematical expectations for realistic results
- b) probability distributions for practical situations.
- c) control charts of statistical quality control
- d) correlation and regression concepts
- e) suitable tests of significance for practical situations.

CO3. Develop skills in designing
- a) probability distributions
- b) limitations of statistical quality control
- c) control charts,
- d) X, R, np, and c charts

CO4. Develop analytical skills for solving problems involving
- a) Probability distributions, means, variances and standard deviations
- b) statistical techniques employed for quality
- c) sampling techniques for decision making
- d) Tests of significances for small and large samples

CO5. Use relevant probability and statistical techniques for
- a) Mathematical expectations of desired results
- b) Fitting probability distributions for experimental data.
- c) Quality control and testing of hypothesis.

II B.Tech. – I Semester
(16BT3HS02) **MANAGERIAL ECONOMICS AND PRINCIPLES OF ACCOUNTANCY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE REQUISITES: -
COURSE DESCRIPTION: Managerial Economics; Demand and Elasticity of Demand; Production Functions; Markets and Pricing Policies; Formation of different types of Business Organizations; Basic concepts of Accounting

(Journal, Ledger and Trial balance); Trading Account, Profit and Loss Account and Balance sheet with simple adjustments; Computerized Accounting.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Acquire Knowledge in
- a) Tools and concepts of Micro Economics.
- b) Basic Principles and concepts of Accountancy.
- c) Provides life skills for effective utilization of scarce resources.
- d) Financial Accounting.
- e) Significance of Economics and Accountancy

CO2. Develop skills in managerial decision making of an organization.
CO3. Apply the Economic theories i.e., Demand, Production, Cost, Markets and Price.
CO4. Develop effective communication in Business and Accounting transactions.
CO5. Ascertain the profitability and soundness of an organization.
CO6. Practice Financial Accounting

II B.Tech. – I Semester

(16BT30101) **CONSTRUCTION PLANNING AND PROJECT MANAGEMENT**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Building Materials and Construction Technology.

COURSE DESCRIPTION: Construction planning and organization; Resource management - Manpower, Materials, Machinery; Project management; Elements and development of network; PERT and CPM.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Demonstrate the knowledge on construction planning and project management.
CO2. Identify critical activities and critical paths in a construction project and analyze networks.
CO3. Develop the network for analyzing critical path by using programme evaluation techniques.
CO4. Solve complex construction planning and management problems through proper interpretation of data.
CO5. Use appropriate tools and techniques for better construction planning and management.
CO6. Plan and manage construction ensuring safety.
CO7. Use environmentally sustainable approach in construction planning and management.
CO8. Maintain ethics in construction planning and management following rules and regulations.
CO9. Plan, monitor and control the finance in civil engineering construction.

II B.Tech. – I Semester

(16BT30102) **FLUID MECHANICS AND HYDRAULIC MACHINERY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Engineering Mechanics, Multi–Variable Calculus and Differential Equations.

COURSE DESCRIPTION: Properties of fluids and pressure measurement; Hydrostatic forces; Fluid kinematics; Fluid dynamics; Closed conduit flow; Measurement of flow; Laminar and Turbulent flow; Hydraulic similitude and Model testing; Boundary layer theory; Open channel flow; Impact of jets; Hydraulic turbines; Centrifugal pumps.

COURSE OUTCOMES: On successful completion of this course, the students will able to:

CO1 Demonstrate the knowledge on basic properties of fluids, classification of flows and hydraulic machinery.
CO2 Analyze fluids, flows and forces in hydraulics.
CO3 Design piping systems, open channels and hydraulic machinery.
CO4 Address the problems and faults in the prototype preparation using the model analysis and provide suitable solutions.
CO5 Use of flow and pressure measurement devices in channels and hydraulic machinery.
CO6 Consider safety issues in the analysis and design of channels, pipes and hydraulic machinery.

II B.Tech. – I Semester

(16BT30103) **MECHANICS OF SOLIDS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Engineering Mechanics

COURSE DESCRIPTION: Simple stresses and strains; Strain energy; Shear force and bending moment; Stresses in beams; Combined direct and bending stresses; Torsion; Springs; Thin cylinders; Thick cylinders.

COURSE OUTCOMES: On successful completion of this course, the students will be able to

CO1. Acquire the knowledge on simple stresses and strains, shear force, bending moment, stresses in beams, torsion, springs, thin cylinders and thick cylinders.

CO2. Analyze bars, beams, shafts, springs and cylinders for stresses, strains, strain energy, shear force and bending moment distributions.
CO3. Design beams, shafts, springs and cylinders for various loading conditions.
CO4. Solve complex engineering problems associated with beams, shafts, springs and cylinders through proper investigation and interpretation of stresses, strains, shear force and bending moment.
CO5. Use appropriate methods in analyzing bars, beams, shafts and cylinders.
CO6. Consider safety and stability issues in analyzing bars, beams, shafts, springs and cylinders.

II B.Tech. – I Semester
(16BT30104) **SURVEYING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Matrices and Numerical Methods, Engineering Physics.
COURSE DESCRIPTION: Chain surveying; Compass surveying; Plane tabling; Levelling and contouring; Theodolite surveying; Tachometric surveying; Computation of areas and volumes; Curves; Electronic distance measurement.
COURSE OUTCOMES: On successful completion of this course, the students will able to:
CO1. Demonstrate the knowledge on chain, compass, plane table, auto level, theodolite, teacheometer and EDM surveying; areas and volumes; curves.
CO2. Analyze surveying techniques, tools and survey data.
CO3. Design different types of curves and prepare contour maps.
CO4. Solve complex engineering survey problems through proper survey and interpretation.
CO5. Use appropriate modern tools in surveying.
CO6. Follow ethics in surveying practice.

II B.Tech. – I Semester
(16BT30131) **FLUID MECHANICS AND HYDRAULIC MACHINERY LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Course on Fluid Mechanics and Hydraulic Machinery
COURSE DESCRIPTION: Calibration of flow meters; Verification of Bernoulli's equation; Performance of turbines and pumps; Losses through pipes.
COURSE OUTCOMES: On successful completion of this course, the students will able to:
CO1. Demonstrate practical knowledge on flow measuring devices, losses in pipes and hydraulic machinery.
CO2. Analyze fluids, flows and forces in hydraulics.
CO3. Interpret the experimental results and suggest suitable solutions.
CO4. Use of flow and pressure measurement devices in channels and hydraulic machinery.
CO5. Consider safety issues in performing experiments.
CO6. Function effectively as an individual and as a team member in solving fluid mechanics and hydraulic machinery problems.
CO7. Communicate effectively on the experimental results in written, oral and graphical forms.

II B.Tech. – I Semester
(16BT30132) **STRENGTH OF MATERIALS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Course on Mechanics of Solids/Strength of Materials.
COURSE DESCRIPTION: Tension test; Compression test; Bending test; Shear test; Torsion test; Hardness test; Maxwell reciprocal theorem.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Acquire the knowledge on conducting experiments for testing strength of materials such as steel, timber, metals, beams and springs.
CO2. Analyze test results on steel, timber, metals, beams and springs.
CO3. Recommend suitable materials for construction after interpreting test results.
CO4. Use appropriate method of testing construction materials.
CO5. Consider safety in construction material testing with societal perspective.
CO6. Follow ethics in reporting exact testing results.
CO7. Function effectively as an individual and as a team member in construction material testing.
CO8. Communicate effectively on construction material testing in written, oral and graphical forms.

II B.Tech. – I Semester
(16BT30133) **SURVEYING LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Courses on Matrices and Numerical Methods, Engineering Physics.
COURSE DESCRIPTION: Exercises on chain surveying; Compass surveying; Plane table surveying; Auto Levelling; Theodolite surveying; Total station surveying; Area by planimeter.
COURSE OUTCOMES: On successful completion of this course, the students will able to:
CO1. Demonstrate the knowledge on chain, compass, plane table, auto level, theodolite, and total station surveying setting out works, area measurement by planimeter.
CO2. Analyze surveying techniques, tools and survey data.
CO3. Design simple curves; and develop survey plots and contour maps.
CO4. Solve complex engineering survey problems through proper survey and interpretation.
CO5. Use appropriate modern tools in surveying.
CO6. Follow ethics in surveying practice.
CO7. Function effectively as an individual and as a team member in surveying.
CO8. Communicate effectively on surveying in written, oral and graphical forms.

II B.Tech - II semester
(16BT3HS01) **ENVIRONMENTAL STUDIES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	0	-	3

PRE-REQUISITES: Course on Engineering Chemistry
COURSE DESCRIPTION: Multidisciplinary nature of environment; Natural resources; Ecosystems; Biodiversity; Environment pollution and control; Social issues and environment; Human population and environment; Field studies.
COURSE OUTCOMES: On successful completion of this course, the students will be able to
CO1. Acquire knowledge on nature of environment, natural resources, ecosystems, biodiversity, environmental pollution and control, social issues and human population.
CO2. Analyze natural resources, ecosystems, biodiversity, environmental pollution and control, social issues and human population.
CO3. Develop strategies for environmental pollution control and natural resource management.
CO4. Solve environmental problems through proper analysis and interpretation of environmental data.
CO5. Choose appropriate techniques in environmental pollution control and natural resource management.
CO6. Understand the impact of social issues and population on environment.
CO7. Provide solutions to individuals, industries and government for environmental sustainable development.
CO8. Follow environmental protection laws for sustainable development.
CO9. Communicate effectively on environmental issues in the form reports.

II B. Tech. – II Semester
(16BT40101) **CONCRETE TECHNOLOGY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Building Materials and Construction Technology.
COURSE DESCRIPTION: Cement and admixtures; Aggregates; Fresh and hardened concrete; Tests on concrete; Elasticity, Creep and Shrinkage; NDT; Mix design- ACI and IS methods; Special concretes.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate the knowledge on properties of cement, admixtures, aggregates, fresh and hardened concrete; elasticity, creep and shrinkage of concrete; special concrete.
CO2. Characterize the constituent materials of concrete in choice of mix proportion.
CO3. Design the concrete mix using IS-10262 and ACI method.
CO4. Conduct various tests on fresh and hardened concrete.
CO5. Make use of modern tools in Non-Destructive testing of concrete.
CO6. Encourage the use of sustainable and environmental friendly constituent materials in manufacture of concrete.
CO7. Maintain ethical standards for quality in concrete.

II B.Tech. – II Semester
(16BT40102) **ENGINEERING GEOLOGY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: General geology and weathering; Mineralogy and petrology; Structural geology and geophysical studies; Groundwater; Earthquake and landslides; Dams; Reservoirs; Tunnels; Bridges.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate basic knowledge on weathering, minerals, rocks, geological structures, geophysical methods, groundwater, earthquakes and landslides and site selection for civil engineering structures.
CO2. Analyze minerals, rocks, geological structures and failure of structures due to geological considerations.
CO3. Conduct geological investigations and give recommendations for the site suitability for construction.
CO4. Use modern methods and apply suitable techniques in geological study for civil engineering applications.
CO5. Demonstrate causes and effects of natural hazards and suggest remedial measures for the societal safety.
CO6. Consider environmental sustainability in exploitation of groundwater and construction materials using suitable methods.
CO7. Communicate effectively on geological maps and reports to the engineering community.

II B.Tech.– II Semester
(16BT40103) **ENGINEERING HYDROLOGY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Fluid Mechanics and Hydraulic Machinery
COURSE DESCRIPTION: Hydrologic cycle; Applications and history; Weather and seasons in India; Precipitation; Evaporation; Evapotranspiration; Runoff; Groundwater hydrology; Hydrograph analysis; Design flood; Erosion; Reservoir sedimentation.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Acquire the basic knowledge on surface and groundwater hydrology.
CO2. Analyze problems associated with surface and groundwater hydrology.
CO3. Design of floods using Muskingum's method.
CO4. Provide solutions for complex engineering problems in hydrology through proper interpretation data.
CO5. Use appropriate techniques for solving issues related to hydrology
CO6. Address the safety issues in flood routing, erosion and reservoir sedimentation.
CO7. Understand the effect of erosion and reservoir sedimentation on the environment and provide solutions to ensure environmental sustainability.

II B.Tech. – II Semester
(16BT40104) **STRUCTURAL ANALYSIS – I**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Engineering Mechanics, Mechanics of Solids.
COURSE DESCRIPTION: Principal stresses and strains; Deflection of beams, Macaulay's method and double integration method; Columns and struts; Indeterminate Beams; Theories of failure; Unsymmetrical bending and shear centre.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Elucidate the knowledge on principal stresses and strains, slopes and deflections of beams using double integration, Macaulay's and moment area method; columns and struts, fixed and propped cantilever beams, continuous beams, theories of failure and unsymmetrical bending and shear centre.
CO2. Analyze different beams, columns and struts, unequal sections and theories of failure.
CO3. Solve complex problems linked with different beams, columns and channel sections.
CO4. Use appropriate methods to analyze the beams and columns.
CO5. Ensure safety in the analysis of beams and columns.
CO6. Present the results of analysis such as stresses, bending moment, shear force, slope and deflections effectively in written and graphical forms.

II B.Tech. II Semester
(16BT40105) **WATER SUPPLY ENGINEERING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Courses on Environmental Studies, Fluid Mechanics and Hydraulic Machinery.
COURSE DESCRIPTION: Water sources; Quality; Quantity; Demand; Collection; Conveyance and distribution; Water treatment; Distribution; Water supply arrangements in buildings.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Acquire the basic knowledge on sources, quality, quantity, demand, conveyance, treatment systems, storage and distribution of water; and water supply arrangements in buildings.
CO2. Analyse problems associated with water supply engineering.
CO3. Design water conveyance, treatment, storage and distribution systems.
CO4. Solve water supply engineering problems through proper investigations and interpretation.
CO5. Use appropriate techniques in solving water supply engineering problems.
CO6. Provide solutions to water supply engineering problems ensuring health and safety.
CO7. Maintain quality standards in analysis, treatment and distribution of water in water supply schemes.

II B.Tech. – II Semester
(16BT40131) **CONCRETE TECHNOLOGY LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Course on Concrete Technology.
COURSE DESCRIPTION: Testing of cement and sand; Testing of fresh and hardened concrete mixes; Non-destructive tests on concrete.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Demonstrate knowledge on test for cement, sand and concrete.
CO2. Characterize the constituent material of concrete in the choice of mix proportion.
CO3. Design the concrete mix using IS-10262.
CO4. Conduct various tests on cement, sand and concrete in fresh and hardened state.
CO5. Make use of modern tools in non-destructive testing of concrete.
CO6. Maintain ethical standards for quality in concrete.
CO7. Function effectively as an individual and as a team member in concrete technology using modern tools and techniques.
CO8. Communicate effectively on concrete technology in written, oral and graphical forms.

II B.Tech. – II Semester
(16BT40132) **ENGINEERING GEOLOGY LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: -
COURSE DESCRIPTION: Study of physical properties and identification of minerals and rocks; Rock forming minerals; Ore forming minerals; Igneous rocks; Sedimentary rocks; Metamorphic rocks; Geological maps; Problems on structural geology; CIPW norm calculations; Resistivity survey.
COURSE OUTCOMES: On successful completion of this course the students will be able to:

CO1. Apply the knowledge on identification of minerals and rocks, structural geology problems and maps and geophysical studies.
CO2. Analyze different minerals, rocks, geophysical data for engineering applications.
CO3. Interpret the geological maps and geophysical data with emphasis on practical applications in civil engineering.
CO4. Use modern tools for geologic investigations on the availability of minerals, rocks and groundwater.
CO5. Consider safety in geological investigations.
CO6. Follow standards in geological investigations.
CO7. Function effectively as an individual, and as a member or leader in teams to solve engineering geology problems.
CO8. Communicate effectively on geological information in written, oral and graphical forms.

II B.Tech. – II Semester

(16BT4HS31) **SOFT SKILLS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: English Language Laboratory in I B.Tech or English Laboratory at Diploma Level.
COURSE DESCRIPTION: Body Language; Assertiveness; Goal Setting; Creative Thinking; Interpersonal Skills; Team Work; Conflict Management; Etiquette; Report Writing; Group Discussions; Interviewing Skills.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Acquire knowledge in
  a) Goal Setting
  b) Creative Thinking
  c) Leadership Skills and
  d) Team Work

CO2. Analyse the situations and develop skills for
  a) Body Language
  b) Personality Development and
  c) Stress Management

CO3. Apply the techniques of soft skills in a problem situation enhanced through multimedia software.

CO4. Function effectively as an individual and as a member in diverse teams.

CO5. Communicate effectively in public speaking in formal and informal forums.

III B.Tech. – I Semester

(16BT50101) **IRRIGATION ENGINEERING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Fluid Mechanics and Hydraulic Machinery, Engineering Hydrology.
COURSE DESCRIPTION: Irrigation and soil moisture; Diversion head works; Gravity and earth dams; Canal structures; Cross drainage works.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Identify the importance of various irrigation practices and irrigation structures.

CO2. Analyze irrigation structures.

CO3. Design irrigation structures.

CO4. Provide solutions to the various types of failures of hydraulics structures.

CO5. Use appropriate techniques in solving irrigation engineering problems.

CO6. Ensure safety and stability of irrigation structures.

CO7. Follow IS codes in the design of irrigation structures.

CO8. Consider environmental sustainability in the analysis and design of irrigation structures.

III B.Tech. – I Semester

(16BT50102) **REINFORCED CEMENT CONCRETE STRUCTURES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Building Materials and Construction Technology, Engineering Mechanics, Mechanics of Solids, Structural Analysis – I, Structural Analysis – II.
COURSE DESCRIPTION: Beams (Working stress and limit state methods); Shear, torsion and bond; Slabs; Columns; Shallow footings and Stair case.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Demonstrate the knowledge concepts, techniques and applications of design of reinforced cement concrete structural elements: beams, slabs, columns, footings, stair cases.

CO2. Analyze different reinforced cement concrete structural elements.

CO3. Design different reinforced cement concrete structural elements.

CO4. Recommend suitable structural elements for reinforced cement concrete structures.

CO5. Use appropriate method to design RCC structural elements.

CO6. Ensure the RCC design as per safety and serviceability requirements.

CO7. Uphold Ethics in RCC design.

III B.Tech. – I Semester
(16BT50103) **SOIL MECHANICS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Engineering Mechanics, Engineering Geology.
COURSE DESCRIPTION: Basic principles of soil mechanics and their application in engineering practice; Index properties; Engineering properties - Permeability and Seepage, Stress distribution and Compaction, Consolidation, Shear strength.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Gain knowledge on classification and engineering behavior of soils.
CO2. Analyze properties and engineering behavior of soils.
CO3. Address complex problems associated with soils and suggest suitable solutions.
CO4. Use appropriate techniques to determine the soil properties.
CO5. Consider safety through proper assessment of engineering behavior of soils.
CO6. Demonstrate the need of soil testing for sustainable development.
CO7. Practice soil engineering in accordance with IS Codes.
CO8. Communicate effectively on soil engineering problems in written and graphical forms.

III B.Tech. – I Semester
(16BT50104) **STRUCTURAL ANALYSIS – II**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Structural Analysis – I.
COURSE DESCRIPTION: Shear force and bending moment for moving loads; Influence lines; Slope–deflection method; Moment distribution method; Kani’s method; Energy method; Redundant pin–jointed frames; Plastic analysis.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate the knowledge on moving loads, influence lines, slope deflection method, moment distribution method, Kani’s method, energy method and plastic analysis.
CO2. Analyze beams and frames using slope-deflection method, moment distribution method and Kani’s method; beams subjected to moving loads, trusses.
CO3. Address complex problems associated with the analysis of beams for collapse loads using plastic theory.
CO4. Use appropriate method to analyze civil engineering structures.
CO5. Follow the analyzing principles to ensure safety of the structures.
CO6. Present the results of analysis such as bending moment and shear force distributions and deflections effectively in written and graphical forms.

III B.Tech. – I Semester
(16BT50105) **WASTEWATER TECHNOLOGY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Course on Water Supply Engineering.
COURSE DESCRIPTION: Wastewater collection systems and sewer design; Sewage characteristics; Preliminary and primary treatment of sewage; Secondary treatment of sewage; Tertiary treatment; Sludge management; Effluent disposal.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate knowledge on sewage collection systems, characteristics, treatment, sludge management and effluent disposal.
CO2. Analyze characteristics, treatment methods and disposal techniques of wastewater.
CO3. Design sewer pipeline and storm water drain, wastewater treatment plant units.
CO4. Investigate and recommend suitable solutions to complex wastewater treatment and disposal problems.
CO5. Use appropriate techniques to treat and dispose wastewater.
CO6. Understand the effectsof improper wastewater treatment and disposal on health and safety.
CO7. Encourage environmental friendly sustainable approach in wastewater treatment and disposal.
CO8. Maintain ethical standards for wastewater treatment and disposal following relevant IS Codes.
CO9. Communicate effectively on wastewater engineering problems in written and graphical forms.

III B.Tech. – I Semester
(16BT50441) **PRINCIPLES OF IMAGE PROCESSING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: -
COURSE DESCRIPTION:
Fundamentals of digital image processing; Image transforms; Image enhancement techniques in spatial and frequency domains; Restoration techniques & image segmentation techniques; Morphological operations; Representation and description; Pattern recognition.
COURSE OUTCOMES: On successful completion of the course, the students will be able to:
CO1. Demonstarte knowledge in
- a. Image Fundamentals
- b. Image Enhancement & Restoration Techniques
- c. Image Segmentation Techniques
- d. Morphological operations.
- e. Representation and description
- f. Pattern recognition

CO2. Analyze different images using various processing techniques.
CO3. Develop various image processing algorithms to process the images in various Real Time Applications.
CO4. Solve problems related to images for feasible and optimal solutions in the core area of Image Processing.
CO5. Apply appropriate techniques to restore degraded images in the field of image processing.
CO6. Understand the impact of the image processing for societal needs.

III B.Tech. – I Semester
(16BT5HS01) **COSTING AND FINANCE MANAGEMENT FOR CIVIL ENGINEERS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: -
COURSE DESCRIPTION: Cost Planning; Contract Costing; Budgeting; Capital Budgeting; Estimation of Cash Flows; Working Capital Management.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Acquire knowledge in
- a) The basic concepts of finance
- b) Basic principles of costing
- c) Provides skills for effective utilization of costing concepts for quoting tenders
- d) Framing budgets in relation to construction

CO2. Develop skills in analyzing problems for
- a) Quoting tenders in relation to civil engineering
- b) Budgeting finance for construction industry
- c) Enhancing ability in calculating working capital requirement
- d) Improvising ability in estimating cash flows

CO3. Develop effective communication in relation to costing and finance
CO4. Design solutions for effective decisions in investment

III B.Tech. – I Semester
(16BT50241) **RENEWABLE ENERGY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Engineering Physics and Basic Electrical and Electronics Engineering
COURSE DESCRIPTION: Various renewable energy sources; Different energy conversion techniques; Storage methods and applications.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate knowledge on
- a) various renewable energy sources.
- b) different conversion techniques, energy storage methods and applications.

CO2. Analyze
- a) various solar energy collectors.
- b) horizontal and vertical axis windmills.
- c) ocean energy conversions
- d) various biogas digesters.

CO3. Design suitable accessories / controllers for desired operating conditions.
CO4. Explore relevant renewable sources to generate electrical power and provide valid solutions.
CO5. Assess societal and safetyissues and the consequent responsibilities relevant to therenewable sources engineering practice.

III B.Tech. – I Semester
(16BT70308) **COMPUTATIONAL FLUID DYNAMICS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Multi-Variable Calculus and Differential Equations and Fluid Mechanics.
COURSE DESCRIPTION:
Introduction to Computational Fluid Dynamics (CFD); Various Numerical methods; Solution methods for governing equations; Finite difference method and its application to heat transfer problems; Errors and stability analysis; Study flow analysis; Simple CFD techniques.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate the knowledge of CFD techniques, basic aspects of discretization and grid generation in solving partial differential equations.
CO2. Analyze CFD problems and offer probable solutions using Finite Differential approach.
CO3. Develop mathematical models and flow simulations for CFD problems.
CO4. Conduct investigations on complex CFD problems using different techniques.
CO5. Apply modern flow simulation codes for solving governing equations of computational fluid dynamics.
CO6. Use CFD techniques for critical decision making in various applications in the society to eliminate the need for expensive and complex prototypes.

III B.Tech. – I Semester
(16BT50131) **COMPUTER AIDED BUILDING PLANNING AND DRAWING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	1	3	2

PRE-REQUISITES: Course on Building Materials and Construction Technology.
COURSE DESCRIPTION: Exercises on Conventional signs and symbols used in building; Planning and computer aided drawing of load bearing walls; RCC framed structures; Industrial buildings.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Explain knowledge on computer aided building drawing to develop the 2D and 3D views of structures using AutoCAD.
CO2. Analyze the given data for the developing the plans, elevations, cross-sectional view of the structures.
CO3. Design and develop the buildings plans, elevations, sectional views using AutoCAD.
CO4. Use appropriate drafting tools for developing the plans, elevation, sectional views using AutoCAD.
CO5. Utilize contextual knowledge for preparing the structural elements and building plans as per the engineering practice.
CO6. Follow building bye-laws and principles for promoting building plans, elevation, sectional views using AutoCAD.
CO7. Function effectively as an individual and as a team member to develop plan, elevation, cross sectional view of the structural elements and buildings using AutoCAD.
CO8. Communicate effectively on the building planning and drawing using AutoCAD in written, oral and graphical forms.
CO9. Promote cost effective building plans by management principles using AutoCAD.

III B.Tech. – I Semester
(16BT50132) **ENVIRONMENTAL ENGINEERING LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: Courses on Water Supply Engineering, Wastewater Technology.
COURSE DESCRIPTION: Experimental analysis of physical, chemical and biological parameters of water and wastewater.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate the knowledge on experimental analysis of water and wastewater.
CO2. Analyse water and wastewater.

CO3. Solve complex problems associated with water and wastewater through proper investigations and interpretation of data.
CO4. Use appropriate techniques in the analysis of water and wastewater.
CO5. Provide solutions to the problems of water and wastewater ensuring health and safety.
CO6. Consider environmental sustainability in solving water and wastewater problems.
CO7. Follow standards in water and wastewater analysis.
CO8. Function effectively as an individual, and as a member or leader in teams to solve the water and wastewater problems.
CO9. Communicate effectively on water and wastewater analysis in written, oral and graphical forms.

III B. Tech. – I Semester
(16BT50133) **GEOTECHNICAL ENGINEERING LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: Course on Soil Mechanics.
COURSE DESCRIPTION: Experiments on the determination of index properties and engineering properties of soil.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate knowledge on laboratory testing of soils.
CO2. Analyze characteristics and engineering behavior of soils.
CO3. Conduct experiments on soils to find its suitability for any civil engineering construction.
CO4. Select an appropriate experimental method based on soil, ease of testing and application.
CO5. Establish soil properties with societal responsibility.
CO6. Give solutions to the problems of soil which are environmental friendly.
CO7. Follow IS Codes in soil testing.
CO8. Work effectively as an individual or in a group to determine soil properties.
CO9. Communicate effectively on soil properties in written, oral and graphical forms.

III B.Tech. – II Semester
(16BT60101) **FOUNDATION ENGINEERING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Soil Mechanics.
COURSE DESCRIPTION: Soil exploration- Subsurface sampling and characterization methods; Lateral earth pressure; Earth retaining structures; Stability of earth slopes; Bearing capacity of shallow foundations; Pile foundations; Caissons and well foundations.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Acquire knowledge on geotechnical site investigation, types of footings, bearing capacity and settlement of shallow and deep footings.
CO2. Analyze soil exploration techniques, slopes; and footings for bearing capacity and settlements.
CO3. Decide and design all types of foundations.
CO4. Interpret the data obtained from soil investigations and suggest suitable foundation.
CO5. Select appropriate techniques to solve foundation engineering problems.
CO6. Consider safety measures in soil exploration, design and construction of foundations, earth slopes and retaining walls.
CO7. Perform soil exploration and design of footings as per IS Code.
CO8. Communicate effectively on foundation engineering problems in written and graphical forms.
CO9. Plan cost effective soil exploration programs.

III B.Tech. – II Semester
(16BT60102) **HIGHWAY AND TRAFFIC ENGINEERING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Surveying, Soil Mechanics.
COURSE DESCRIPTION: Highway development and planning; Highway geometric design; Highway materials; Pavement design; Traffic engineering; Traffic measurement and analysis; Highway capacity; Traffic regulation, control and control devices.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate knowledge on highway and traffic engineering.
CO2. Analyze highway materials, pavements, traffic and parking facilities.
CO3. Design highway geometry, pavements and traffic signals.
CO4. Provide solutions to complex highway and traffic engineering problems through investigations.
CO5. Use appropriate methods to assess highway materials, traffic; and design pavements.
CO6. Follow IS and IRC Codes in the design of highway and traffic engineering systems.
CO7. Maintain ethical standards for quality in highway and traffic engineering practice.
CO8. Communicate effectively on highway and traffic engineering in written and graphical forms.

III B.Tech. – II Semester
(16BT60103) **STEEL STRUCTURES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Engineering Mechanics, Mechanics of Solids, Structural Analysis-I, Structural Analysis-II.
COURSE DESCRIPTION: Bolted connections; Welded connections; Beams; Tension members; Compression members; Built-up Compression members; Column foundations, Roof trusses; Tubular trusses.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Attain the basic knowledge on design of steel structures and their elements by limit state method.
CO2. Analyze the steel structures and their elements.
CO3. Design steel structures and their elements.
CO4. Provide solutions to complex engineering problems associated with steel construction through proper analysis and design.
CO5. Use appropriate techniques to analyze and design of steel structures and their elements.
CO6. Ensure safety and stability in the design of steel structures and their elements.
CO7. Follow IS codes in the design of steel structures and their elements.

III B.Tech. – II Semester
(16BT40502) **DATABASE MANAGEMENT SYSTEMS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Database Systems; Database Design; Relational Model; SQL Queries, Constraints and Triggers; Schema Refinement and Normal Forms; Transaction Management; Concurrency Control; Overview of Storage and Indexing.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate knowledge on
  a) Data models and Database Languages
  b) Database design
  c) Normal forms
  d) Storage and Indexing
CO2. Analyze databases using normal forms to provide solutions for real time applications.
CO3. Design solutions for database problems using database design, views design and framing queries.
CO4. Use database techniques for designing databases, managing databases and its security.
CO5. Select SQL, Hash based Indexing and Tree based Indexing to manage data in databases.
CO6. Apply contextual knowledge to develop database applications related to societal applications like Information Retrieval Systems, Banking and Financial systems.

III B.Tech. – II Semester
(16BT50341) **OPTIMIZATION TECHNIQUES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: A course on Multi-variable Calculus and Differential Equations
COURSE DESCRIPTION: Introduction to optimization; Classical optimization techniques; Classification of optimization problems; Linear programming; transportation and assignment problem; Non-linear programming; Un-constrained non-linear programming; Constrained non-linear programming; Dynamic programming.

COURSE OUTCOMES: On successful completion of this course, the student will be able to:
CO1. Demonstrate the knowledge on Optimization techniques for Linear, Nonlinear and Dynamic programming problems.
CO2. Analyze and quantify a system architecture or product design problem for selecting appropriate objective function, design variables, parameters and constraints.
CO3. Develop mathematical models for real time optimization problems.
CO4. Conduct investigations on complex problems and make recommendations based on solutions, analysis and limitations of models.
CO5. Use optimization techniques for solving complex problems of real time applications.
CO6. Optimize the resources in organizations for sustainable development.

III B.Tech. – II Semester
(16BT60104) **FIRE ENGINEERING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Engineering Chemistry, Building Materials and Construction Technology, Environmental Studies.
COURSE DESCRIPTION: Physics and chemistry of fire; Fire prevention and protection; Industrial fire protection systems; Building fire safety; Explosion protecting systems.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Acquire the knowledge on fire characteristics, fire detection, fire protection and explosion protection.
CO2. Analyze fire characteristics, fire detection systems, fire and explosion protection systems.
CO3. Design building elements and develop fire and explosion protection systems.
CO4. Solve fire engineering problems through proper investigation and interpretation.
CO5. Use appropriate techniques to solve fire engineering problems.
CO6. Ensure health and fire safety in solving fire engineering problems.
CO7. Consider environmental sustainability in fire and explosion protection systems.
CO8. Follow rules and regulations in fire engineering practice.
CO9. Prepare layouts and diagrams in fire engineering.
CO10. Manage effectively fire and explosion protection systems.

III B.Tech. – II Semester
(16BT60241) **ENERGY AUDIT AND CONSERVATION**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Principles of energy audit and conservation; Energy efficiency in buildings; Energy efficient motors, lighting, instruments and significance of energy economics.
COURSE OUTCOMES: On successful completion of this course, the students will be able to
CO1. Demonstrate knowledge on auditing practices, conservation measures and economics of energy.
CO2. Analyze auditing practices, conservation measures and economics of energy.
CO3. Design an appropriate energy conservation measures in commercial and industrial applications.
CO4. Provide feasible solutions for problems associated with energy auditing and conversion through proper investigation and interpretation of data.
CO5. Use appropriate techniques for energy auditing and conservation.
CO6. Solve energy auditing and conservation problems with societal relevance.
CO7. Consider environment and sustainability in energy auditing and conservation.
CO8. Follow relevant rules and regulations in practicing energy audit and conservation.
CO9. Communicate effectively on energy audit in written and graphical forms.
CO10. Consider financial issues in energy audit and conservation.

III B.Tech. – II Semester
(16BT60105) **ADVANCED REINFORCED CEMENT CONCRETE STRUCTURES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Building Materials and Construction Technology, Engineering Mechanics, Mechanics of Solids, Structural Analysis – I, Structural Analysis – II, Reinforced Cement Concrete Structures.

COURSE DESCRIPTION: Foundations; Flat slabs; Water tanks; Retaining walls; Bunkers; Silos; Chimneys.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate the knowledge concepts, techniques and applications of design of reinforced cement concrete structures; foundations, flat slabs, water tanks, retaining walls, bunkers, silos, chimneys.
CO2. Analyze different reinforced cement concrete structures.
CO3. Design different reinforced cement concrete structures.
CO4. Recommend suitable structural elements for reinforced cement concrete structures
CO5. Use appropriate method to design RCC structures.
CO6. Ensure the RCC design as per safety and serviceability requirements.
CO7. Uphold Ethics in RCC design

III B.Tech. – II Semester
(16BT60106) **ADVANCED STRUCTURAL ANALYSIS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Structural Analysis – I, Structural Analysis –II.
COURSE DESCRIPTION: Arches: two and three hinged arches; Portal frames; Flexibility method; Stiffness method; Curved beams.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate the knowledge on the analysis of arches, portal frames, beams (flexibility and stiffness methods) and curved beams.
CO2. Analyze arches, portal frames, beams and curved beams.
CO3. Solve complex problems in analyzing arches, portal frames, beams and curved beams for different loading.
CO4. Select appropriate technique for analyzing arches, portal frames, beams and curved beams.
CO5. Ensure safety in the analysis of arches, portal frames, beams and curved beams.
CO6. Present the results of analysis such as bending moment, shear force effectively in written and graphical forms.

III B.Tech. – II Semester
(16BT60107) **ADVANCED SURVEYING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Matrices and Numerical Methods, Engineering Physics, Surveying.
COURSE DESCRIPTION: Astronomical surveying; Construction and boundary surveys; Theory of errors; Land surveys; Triangulation and baseline measurements; GPS surveying.
COURSE OUTCOMES: On successful completion of this course, the students will able to:
CO1. Demonstrate the knowledge on advanced surveying techniques.
CO2. Analyze advanced surveying techniques, tools and survey data.
CO3. Prepare survey maps.
CO4. Solve complex engineering survey problems through proper survey and interpretation.
CO5. Use appropriate modern tools in advanced surveying practice.
CO6. Follow ethics in surveying practice.
CO7. Communicate effectively on advanced surveying issues in written and graphical forms.

III B.Tech. – II Semester
(16BT60108) **GEOENVIRONMENTAL ENGINEERING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Courses on Soil Mechanics, Environmental Engineering.
COURSE DESCRIPTION: Fundamentals of geoenviromental engineering; Soil–water–contaminant interaction; Waste containment system; Contaminant site remediation; Advanced soil characterization.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Acquire knowledge on fundamentals of geoenvironmental engineering, site characterization, waste containment systems and remediation.
CO2. Characterize contaminated site and analyze waste containment systems and remediation techniques.
CO3. Design waste containment systems and remediation techniques.
CO4. Solve complex geoenvironmental problems through proper investigations.
CO5. Use appropriate techniques for site characterization and remediation.

CO6. Propose geoenvironmental solutions considering health and safety issues.
CO7. Protect environment through sustainable remediation techniques.
CO8. Follow ethics in geoenvironmental engineering practice.

III B.Tech. – II Semester
(16BT60109) **GROUNDWATER DEVELOPMENT AND MANAGEMENT**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Engineering Hydrology, Engineering Geology, Irrigation Engineering.
COURSE DESCRIPTION: Groundwater occurrence and movement; Analysis of pumping test data; Saline water intrusion in an aquifer; Artificial recharge of groundwater; Groundwater exploration.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate the knowledge on ground water occurrence, exploration, movement, pollution, and recharge methods.
CO2. Analyze problems associated with occurrence, pumping test data, artificial recharge and exploration of groundwater and saline water intrusion.
CO3. Design and develop artificial groundwater recharge sites using various techniques.
CO4. Conduct investigations on occurrence of groundwater and saline water intrusion in a basin.
CO5. Use appropriate tools and techniques in exploration, development and management of groundwater.
CO6. Solve groundwater issues related to saline water intrusion considering societal issues.
CO7. Consider environmental sustainability in solving groundwater problems.

III B.Tech. – II Semester
(16BT60110) **SOLID WASTE MANAGEMENT**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Course on Environmental Studies
COURSE DESCRIPTION: Sources and types of municipal solid wastes; Onsite handling; Storage and processing; Collection and transfer; Off sites processing; Disposal.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate the knowledge on sources, characterization, collection, segregation, transportation, storage, off-site processing and disposal of solid waste.
CO2. Analyze characteristics; collection, transportation, storage, processing and disposal methods of solid waste.
CO3. Design of solid waste disposal systems.
CO4. Investigate and interpret data to recommend suitable solutions to solid waste management.
CO5. Use appropriate techniques for solid waste management.
CO6. Consider health and safety in solid waste management.
CO7. Ensure environmental sustainability in solid waste management.
CO8. Follow environmental acts in solid waste management.
CO9. Provide economically viable solid waste management solutions.

III B.Tech. – II Semester
(16BT60111) **STRUCTURAL HEALTH MONITORING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Basic Electrical and Electronics Engineering, Concrete Technology.
COURSE DESCRIPTION: Structural health monitoring; Non destructive testing of concrete structures; Sensors for health monitoring systems; SHM Techniques and systems; Information technology for health monitoring; SHM Applications in civil engineering.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Acquire the fundamental knowledge on structural health monitoring and its applications.
CO2. Analyze smart materials, civil engineering structures and techniques for health monitoring.
CO3. Recommend suitable solutions for structural health monitoring.
CO4. Implement the modern tools and techniques in structural health monitoring.
CO5. Ensure health and safety of the structures through structural health monitoring systems.
CO6. Understand the impacts of the structural heath monitoring on environment and sustainability.
CO7. Follow ethics in choosing and implementing structural heath monitoring systems and techniques.

III B.Tech. – II Semester
(16BT6HS01) **BANKING AND INSURANCE**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE REQUISITES: -
COURSE DESCRIPTION: Origin of Banking; Functions of Banking; Role & Functions of RBI; Bank-Customer Relationship; Deposit and Loan Services of Banks; Banking Procedures; Electronic Payment Mechanisms; Business Models; Concepts of Risk and Uncertainty; Fundamentals of Insurance; Principles of Insurance; Essentials of Insurance Contracts; Insurance players in India.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate Knowledge in
  a) Tools and concepts of Banking and Insurance.
  b) Basic Principles and concepts of Insurance and Banking.
  c) e-fund transfers, e-payments and e-business models.
CO2. Develop skills in providing solutions for
  a) Online banking and e – payments.
  b) Risk Management through insurance benefits the society at large.
  c) Money management by leveraging on technology, banking and insurance services.
CO3. Exhibit conceptual soundness about banking and insurance, this would contribute to more employment opportunities.
CO4. Provide life skills for effective utilization of Banking and Insurance facilities.

III B. Tech. – II Semester
(16BT6HS02) **BUSINESS COMMUNICATION AND CAREER SKILLS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Technical English or English at Diploma level
COURSE DESCRIPTION: Nature and Scope of Communication; Corporate Communication; Writing Business Documents; Careers and Resumes; Interviews.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate knowledge in
  a) Corporate Communication
  b) Main Stages of Writing Messages
  c) Career Building
CO2. Analyze the possibilities and limitations of language in
  a) Communication Networks
  b) Crisis Management/Communication
CO3. Design and develop the functional skills for professional practice in
  a) Business Presentations & Speeches
CO4. Apply written and oral communication techniques in preparing and presenting various documents in technical writing.
CO5. Function effectively as an individual and as a member in diverse teams.
CO6. Communicate effectively with the engineering community and society in formal and informal situations.

III B.Tech. – II Semester
(16BT6HS03) **COST ACCOUNTING AND FINANCIAL MANAGEMENT**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE REQUISITES: -
COURSE DESCRIPTION: Scope, Objectives and Elements of Cost Accounting; Cost Sheet and Tender Quotations; Variance Analysis: Material variances, Labor variances; Meaning and Scope, Liquidity, Profitability Ratios: Concept of Risk and Return on Investment.
Course outcomes: On successful completion of this course, the students will be able to:
CO1. Acquire Knowledge in
  a) Elements of Costing.
  b) Basic concepts of Financial Management.
  c) Risk and Return
  d) Significance of Cost Accountancy
  e) Behavioral Finance

CO2. Develop skills in
  a) Material, Labor, Overheads control.
  b) Excellence and ability to minimize the cost of the organization
CO3. Develop effective Communication in Cost control and Financial Management.
CO4. Provide solutions for effective investment decisions.

III B.Tech. – II Semester
(16BT6HS04) **ENTREPRENEURSHIP FOR MICRO, SMALL AND MEDIUM ENTERPRISES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE REQUISITE: -
COURSE DESCRIPTION: Introduction to Entrepreneur Development; Idea generation and formation of Business Plan; Micro and Small Enterprises; Institutional Finance and Support to Entrepreneur; Woman Entrepreneurship.
Course outcomes: On successful completion of this course, the students will be able to:
CO1. Acquire Knowledge in
  a) Schemes and institutions encouraging entrepreneurship
  b) Basic Principles and concepts of Accountancy
  c) Significance of entrepreneurship
CO2. Develop skills in providing solutions for
  a) Personal excellence through financial and professional freedom
  b) Women entrepreneurship serving as contrivance in societal development
CO3. Develop Critical thinking and evaluation ability.
CO4. Widens knowledge and build up attitude towards trouble shooting.
CO5. Demonstrate business acumen.

III B.Tech. – II Semester
(16BT6HS05) **FRENCH LANGUAGE (La Langue Francais)**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Oral communications; Basic grmmar; Advanced grammar; Basic writing; Business French (La Francais Commercial).
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate knowledge in
  a) Process of communication
  b) Modes of listening
  c) Paralinguistic features
  d) Skimming and Scanning
  e) Elements of style in writing
CO2. Analyze the possibilities and limitations of language, understanding
  a) Barriers to Communication
  b) Barriers to Effective Listening
  c) Barriers to Speaking
  d) Formal and metaphorical language
CO3. Design and develop language skills for professional practice**.**
CO4. Apply basic writing skills in writing Emails and understanding wide range of technical terminologies.
CO5. Understand French culture and civilization.
CO6. Communicate effectively with the native French in day to day situation

III B.Tech. – II Semester
(16BT6HS06) **GERMAN LANGUAGE (Deutsch alsFremdsprache)**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Oral communication; Basic grammar; Advanced grammar; Basic writing; Berufsdeutcsch (Business German)
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate knowledge in

a) Process of communication
b) Modes of listening
c) Paralinguistic features
d) Skimming and Scanning
e) Elements of style in writing

CO2. Analyze the possibilities and limitations of language, understanding
a) Barriers to Communication
b) Barriers to Effective Listening
c) Barriers to Speaking
d) Formal and metaphorical language

CO3. Design and develop language skills for professional practice**.**
CO4. Apply basic writing skills in writing Emails and understanding wide range of technical terminologies.
CO5. UnderstandGerman culture and civilization.
CO6. Communicate effectively with the native German in day to day situation**.**

III B.Tech. – II Semester
(16BT6HS07) **INDIAN CONSTITUTION**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Elements, functions and functionaries according to Indian Constitution, Understanding for better professional practice and good citizenry.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Gain knowledge in
a) parliamentary proceedings, laws, legislature, administration and its philosophy
b) federal system and judiciary of India
c) socials problems and public services like central civil services and state civil services
d) Indian and international political aspects and dynamics

CO2. Develop etiquette and professional behavior in line with the constitution of India for becoming a responsible citizen.

III B.Tech. – II Semester
(16BT6HS08) **INDIAN ECONOMY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Introduction; Time Value of Money; Elementary Economic Analysis; Value analysis, Value Engineering; Economic Planning.
COURSE OUTCOMES: On successful completion of this course, the students will be able to
CO1. Acquire the knowledge in
a) Micro and Macro Economics.
b) Traditional and Modern methods of Capital Budgeting.
c) Five year plans and NITI Aayog.

CO2. Analyze
a) Capital Budgeting.
b) Value Analysis and Value Engineering.
c) Economic analysis
d) Law of supply and demand

CO3. Understand the nuances of project management and finance.

III B.Tech. - II Semester
(16BT6HS09) **INDIAN HERITAGE AND CULTURE**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -

COURSE DESCRIPTION: Basic traits of Indian Culture; Humanistic Reforms under Jainism and Buddhism; Culture in the medieval period; Socio Religious reforms in Indian Culture; Reform movements for harmonious relations.

COURSE OUTCOMES: On successful completion of this course, the students will be able to

CO1. Acquaint knowledge in
- a) human aspirations and values in Vedic culture.
- b) cultural aspects of Buddhism and Jainism
- c) unification of our country under Mourya's and Gupta's administrations
- d) socio Religious aspects of Indian culture
- e) reform movements and harmonious relations.

CO2. Apply ethical principles and reforms as models for the upliftment of the societal status in the present cultural contexts.

III B.Tech. – II Semester
(16BT6HS10) **INDIAN HISTORY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -

COURSE DESCRIPTION: Introduction; Ancient India; Classical and Medieval era; Modern India; India after independence.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Gain knowledge on evolution and history of India as a nation.
CO2. Analyze social and political situations of past and current periods.
CO3. Practice in career or at other social institutions morally and ethically.

III B.Tech. – II Semester
(16BT6HS11) **PERSONALITY DEVELOPMENT**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Soft Skills Lab

COURSE DESCRIPTION: Self-esteem & Self-improvement; Developing Positive Attitudes; Self-Motivation & Self-Management; Getting Along with the Supervisor; Workplace Success.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Demonstrate knowledge in
- a) Self-Management
- b) Planning Career

CO2. Analyze the situations based on
- a) Attitudes
- b) Thinking strategies

CO3. Design and develop the functional skills for professional practice in
CO4. Function effectively as an individual and as a member in diverse teams.
CO5. Communicate effectively in public speaking in formal and informal situations.

III B.Tech. – II Semester
(16BT6HS12) **PHILOSOPHY OF EDUCATION**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -

COURSE DESCRIPTION: Introduction to Philosophy and Engineering Education; Philosophical methods and their implications in engineering; Philosophical education in India; Values and Engineering education; Outcome based education.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Acquire knowledge in
- a) Philosophy of engineering education.
- b) Philosophical methods.
- c) Knowledge acquiring methods.
- d) Engineering education and responsibilities.

CO2. Understand the impact of Outcome Based Education for effective educational Outcomes.
CO3. Apply reasoning to assess societal issues with the contextual knowledge of engineering education and responsibilities.

III B.Tech. – II Semester
(16BT6HS13) **PUBLIC ADMINISTRATION**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Introduction; Public Policy; Good Governance; E-Governance; Development Administration.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Acquire knowledge in
 a) Public Policy.
 b) Good Governance.
 c) E-governance.
 d) Development Administration.
CO2. Analyze the possibilities and limitations ofexisting policies through Good Governance perspective.
CO3. Design and develop solutions in e-governance modelsto find and provide opportunities in e-governance.
CO4. Adopt principles of e-governance in addressing the existing issues and challenges in e-governance sector.
CO5. Understand the significance of Administrative Development in finding professional engineering solutions by probing
 a) Bureaucracy.
 b) Role of civil society.

III B.Tech. – II Semester
(16BT60112) **BUILDING MAINTENANCE AND REPAIR**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Durability of buildings, Failure and repair of buildings, MaterialTechniques for repair, Maintenance of buildings, Conservation and recycling.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Acquire basic knowledge on durability and serviceability, failures, repair and rehabilitation of buildings.
CO2. Analyze failures, repair and rehabilitation techniques.
CO3. Solve complex building maintenance problems through proper investigations and interpretation.
CO4. Use modern tools and techniques for various repairs and rehabilitation of structures.
CO5. Provide solutions for building maintenance and repair problems considering health and safety.
CO6. Consider environmental sustainability in building maintenance and repair.
CO7. Maintain ethical standards for quality in repairs and rehabilitation of structures.
CO8. Evaluate specifications and perform cost analysis of building components while repair and rehabilitation.

III B.Tech. – II Semester
(16BT60113) **CONTRACT LAWS AND REGULATIONS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Construction contracts; Tenders; Arbitration; Legal requirements; Labour regulations.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate basic Knowledge on construction contracts, tenders, arbitration, legal requirements and labour regulations.
CO2.Analyze contracts and tenders.
CO3.Address the legal issues in contracts and tenders.
CO4.Follow laws and regulations in the preparation of contracts and tenders.
CO5.Prepare contract and tender documents as per the standards.
CO6.Consider project schedule, cost, quality and risk in the preparation of contracts and tenders.

III B.Tech. - II Semester
(16BT60114) **DISASTER MITIGATION AND MANAGEMENT**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:
COURSE DESCRIPTION: Disasters; Earthquakes; Floods; Cyclones; Droughts; Landslides; Disaster management.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate knowledge on disasters, their vulnerability and mitigation measures.
CO2. Analyze disasters and their vulnerability.
CO3. Design strategies for effective disaster mitigation.
CO4. Address pre and post disaster issues for better preparedness and mitigation measures, through proper analysis and interpretation.
CO5. Use appropriate methods in disaster mitigation and management.
CO6. Use historical data of disasters to inform the people over preparedness and mitigation measures.
CO7. Solve disaster related issues considering environment.
CO8. Consider economical issues in disaster management.

III B.Tech - II Semester
(16BT60115) **ENVIRONMENTAL POLLUTION AND CONTROL**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Fundamentals of air pollution; Dispersion of pollutants; Effects and control of air pollution; Water pollution; Soil pollution and control; Municipal solid waste management.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate knowledge on air, water, soil pollution and their control and solid waste management.
CO2. Analyze causes and effects of air, water and soil pollution and their remedial measures.
CO3. Recommend suitable solutions to complex environmental pollution problems.
CO4. Use appropriate remedial technique to solve environmental pollution problems.
CO5. Understand the effects of environmental pollutionon human health and vegetation.
CO6. Encourage sustainable development through implementation of pollution control measures.
CO7. Maintain IS Codes for environmental quality control.

III B.Tech - II Semester
(16BT60116) **PLANNING FOR SUSTAINABLE DEVELOPMENT**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES:-
COURSE DESCRIPTION: Sustainable development; Environmental impact; Sustainable Policies; Governance; Theories and strategies; Media and education for sustainability.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate the knowledge on sustainable development, environmental impact, sustainable policies, governance, systems and strategies, media and education for sustainability.
CO2. Analyze theories, environmental impact, policies, systems and strategies for sustainable development.
CO3. Develop suitable methods and systems for sustainable development.
CO4. Use appropriate techniques in solving issues related to sustainable development.
CO5. Provide solutions to problems associated with sustainable development considering society.
CO6. Consider environment while planning sustainable development.
CO7. Communicate effectively on sustainable development issues through media and education.
CO8. Consider economical issues while planning for sustainable development.

III B.Tech. – II Semester
(16BT60117) **PROFESSIONAL ETHICS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Engineering ethics; Professional ideals and virtues; Engineering as social experimentation; Responsibilities and rights; Global issues.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate the principles of ethics, importance of professional values and social responsibility.
CO2. Analyze the problems in the implementation of moral autonomy and use ethical theories in resolving moral dilemmas.
CO3. Develop suitable strategies to resolve problems arise in practicing professional ethics.
CO4. Provide solutions to complex problems associated with professional ethics by proper analysis and interpretation.
CO5. Use appropriate theories in resolving issues pertain to professional ethics.
CO6. Understand the impact of professional ethics on society and address the limitations of codes of ethics.
CO7. Practice engineering with professionalism, accountability and ethics.
CO8. Function as a member, consultant, manager, advisor and leader in multi-disciplinary teams.
CO9. Write reports without bias and give instructions to follow ethics.

III B.Tech. - II Semester
(16BT60118) **RURAL TECHNOLOGY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: -
COURSE DESCRIPTION: Rural technology; Non conventional energy; Technologies for rural development; Community development; IT in rural development.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate the knowledge on technologies for rural development.
CO2. Analyze various technologies available which are appropriate for rural development.
CO3. Carryout feasibility study on the public and private partnership for rural development.
CO4. Develop and use latest technologies for rural development.
CO5. Address health and safety issues while choosing technologies for rural development.
CO6. Educate the rural populace on the positive impacts of biofertilisers and usage of agromachinery in agriculture.

III B.Tech - II Semester
(16BT60308) **GLOBAL STRATEGY AND TECHNOLOGY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: -
COURSE DESCRIPTION: Introduction to strategic management; Strategic management process; Principles of good strategy; Globalization strategies; Research and Development strategies; Technology Management and Transfer; Elements of Transfer Process; Corporate Governance in the Indian scenario.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate the knowledge on Strategic management, Research & Development strategies, Technology management and transfer, Globalization and Corporate governance.
CO2. Indentify and analyze crucial problems in strategic management to improve performance of the organizations.
CO3. Develop the products and production process by using research and development strategies.
CO4. Conduct investigations on the impact of globalization in current scenario in the context of corporate governance.
CO5. Appraise the resources and capabilities of the firm in terms of their ability to confer sustainable development.
CO6. Apply ethics in strategic decision making.

III B.Tech - II Semester
(16BT60309) **INTELLECTUAL PROPERTY RIGHTS AND MANAGEMENT**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION:
Protection of ideas; innovation and artistic endeavors; Acts and procedure related to patents, trademarks, copy right, design registration, trade secrets and cyber laws; Infringement; Commercialization of intellectual property rights; Case studies in each.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate knowledge on intellectual property rights, patents, trademarks, copyrights, trade secrets and commercialization of intellectual property.
CO2. Analyse the commercial significance of discoveries and developments and to assist in bringing these into public use.
CO3. Investigate and ensure smooth transition from concept to final product by following National & International Laws of Intellectual Property.
CO4. Utilize the various policies and procedures related to patents, trademarks and copyrights relating to IPR.
CO5. Safeguard, review and manage the intellectual property so that it may receive adequate and appropriate legal protection against unauthorized use.
CO6. Follow ethical standards in capacity building and work as a platform for development, promotion, protection, compliance, and enforcement of intellectual property and knowledge.
CO7. Prepare documents and fill applications needed for filing a patent, design, copyright and trade mark.

III B.Tech – II Semester
(16BT60310) **MANAGING INNOVATION AND ENTREPRENEURSHIP**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Evolution of entrepreneurship from economic theory Managerial and entrepreneurial competencies; Concepts of Shifting Composition of the Economy Purposeful Innovation & Sources of Innovative Opportunity; The Innovation Process; Innovative Strategies; Entrepreneurial Motivation; Entrepreneurs versus inventors; Ethics and International Entrepreneurship; Strategic Issues in International Entrepreneurship; Problem solving Innovation and Diversification.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1: Demonstrate the principles of business innovation and entrepreneurship for establishing industrial ventures.
CO2: Analyze business plans for potential investors and stakeholders and effectively answer probabilistic questions on the substance of plan.
CO3: Develop a comprehensive and well planned business structure for a new venture.
CO4: Conduct investigation on complex problems, towards the development of Project.
CO5: Apply modern statistical and mathematical tools to design projects and subsequent work procedures.
CO6: Apply ethics in constructive innovation framework.
CO7: Exhibit professionalism by employing modern project management and financial tools.

III B. Tech – II Semester
(16BT60311) **MATERIALS SCIENCE**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Structure and Bonding in metals; Steels, Cast Irons and Non Ferrous alloys; Material Selection for conductors, Insulators and semi conductors; Strengthening mechanisms of metals; Plastics and Ceramics as Insulators; AC and DC properties of Insulators; Semiconductors and Magnetic materials; Composite materials in Electrical and Electronics engineering; Material Selection and manufacturing of Optical fibers.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate the knowledge on concepts of fundamental science and Engineering principles relevant to materials.
CO2. Analyze the structures of various types of Ferrous, Non ferrous alloys influencing various engineering applications.
CO3. Conduct investigations to select suitable materials with desired properties for engineering applications.

CO4. Use phase diagrams to interpret the data regarding microstructure of materials.
CO5. Consider health and safety issues while providing materials to real time applications.
CO6. Use composite materials that reduce material waste in design and manufacturing for sustainability.

III B.Tech - II Semester
(16BT70412) **GREEN TECHNOLOGIES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Principles of green engineering; Green communications; Green energy; Green computing; Green construction; Green manufacturing.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Deploy conceptual knowledge in green technologies pertaining to engineering practice.
CO2. Analyze various green technologies for engineering practice.
CO3. Provide green solutions to engineering problems.
CO4. Apply various green techniques in the engineering practice.
CO5. Consider health and safety issues while providing green solutions to the society.
CO6. Understand issues related to environment sustainability.
CO7. Apply ethical standards for environmental sustainability in the engineering practice.

III B.Tech. - II Semester
(16BT70413) **INTRODUCTION TO NANOSCIENCE AND NANOTECHNOLOGY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Introduction to the concept of nano; Description of nanomaterial; Nanostructure characterization tools; Classification of nanomaterials; Fabrication of nanomaterial; Different applications of nanostructures and nanomaterials.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate knowledge in
- a) Nanoscale technology.
- b) Difference between micro and nanotechnology
- c) Classification of Nanostructure and Nanomaterial
- d) Fabrication of various nanomaterials and nanostructures.

CO2. Analyze numerical and analytical problems in
- a) Nanomaterial size by using Scanning Electron Microscope and X-Ray diffraction

CO3. Design and fabricate devices based on nanostructures like
- a) Nano solar cell
- b) Nano cantilever
- c) Nano bio-sensor

CO4. Synthesize nano particle of different materials to solve the problems related to fabrication of nanostructures.
CO5. Select appropriate technique for fabrication of nanostructures and nanocomposites.
CO6. Apply ethical standards and legal issues while using chemical substances in fabrication of new nanostructures.

III B.Tech. – II Semester
(16BT60505) **ENGINEERING SYSTEM ANALYSIS AND DESIGN**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION:
Systems Process; Technologies for Systems; System Development Life Cycle; System Analysis and Modeling; Levels of Management; Project Management; Systems Implementation and Importance of UML Prototyping; Maintaining and Managing the Systems Output Process.
COURSE OUTCOMES: On successful completion of this course, the student will be able to:
CO1. Demonstrate knowledge in
- a) Systems Process and System Design
- b) Systems Analysis and Modeling
- c) System Development Life Cycle
- d) Design Management and Maintenance Tools.

CO2. Analyze System Process and estimate the given models by using case tools.
CO3. Design and Develop a model to the organizational systems.
CO4. Solve complex problems related to engineering systems and produce accurate results.
CO5. Apply object oriented techniques for modeling dynamic systems.
CO6. Contribute towards societal issues and responsibilities in designing, modeling and developing of organizational systems.

III B.Tech. – II Semester
(16BT71011) **MICRO-ELECTRO-MECHANICAL SYSTEMS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Overview of Micro Electro Mechanical Systems (MEMS); scaling laws; working principles of microsensors and microactuators; materials; microfabrication processes; packaging of Microsystems.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1.Demonstrate knowledge on MEMS devices, scaling laws, microsensors and microactuators.
CO2.Analyze the properties of materials and identify its suitability for MEMS devices.
CO3.Design MEMS devices that meet desired specifications and requirements.
CO4. Analyze and synthesize the information to provide effective solution to engineering problems with MEMS devices.
CO5.Use modern techniques in micro manufacturing process.
CO6.Develop efficient and cost effective MEMS based products for society.

III B.Tech. – II Semester
(16BT61205) **CYBER SECURITY AND LAWS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Cyber Crimes and Indian IT Act; Cyber Offenses; Tools and Methods used in Cyber Crime; Phishing ad Identity Theft; Indian and Global Perspective on Cyber Crimes and Cyber Security; Organizational Implications on Cyber Security; IPR Issues; Cyber Crime and Terrorism; Cyber Crime Illustrations.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate knowledge in Cyber security, Cyber crimes and its related laws in Indian and Global Act.
CO2. Analyze the legal perspectives and laws related to cyber crimes in Indian context.
CO3. Apply security and privacy methods in development of modern applications and in organizations to protect people and to prevent cyber crimes.
CO4. Solve Cyber security issues using privacy policies.
CO5. Use antivirus tools to minimize the impact of cyber threats.
CO6. Follow security standards for the implementation of Cyber Security and laws

III B.Tech. – II Semester
(16BT61505) **BIOINFORMATICS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: -
COURSE DESCRIPTION: Introduction to Bioinformatics; Biology and Information; Sequence alignment and dynamic programming; Biological Database; Homology Modeling; Structure Prediction; Molecular Dynamics
COURSE OUTCOMES: After successful completion of this course, the students will be able to:
CO1. Demonstrate knowledge on concepts of biological databases, Genome and proteome.
CO2. Analyze biological sequences for Homology Modeling.
CO3. Apply clustering methods for Phylogenetic trees.
CO4. Solve bio sequencing problems using dynamic programming.
CO5. Select and apply appropriate techniques and tools to structure Prediction

III B.Tech. – II Semester
(16BT60131) **COMPUTER AIDED DESIGN AND DETAILING LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Courses on Reinforced Cement Concrete Structures, Design of Steel Structures.
COURSE DESCRIPTION: Exercises on Analysis and design of Simple beams; 2–D and 3–D RCC Frames; Trusses; Solid slabs; Retaining walls; Water tanks; Plate Girder Bridges.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Explain the knowledge on computer aided design of RCC and steel structures using software tools.
CO2. Analyze RCC and steel structures using software tools.
CO3. Design RCC and steel structures using software tools.
CO4. Solve complex RCC and steel structural design problems using software tools and suggest suitable solutions.
CO5. Use appropriate techniques in modeling, analysis and design of RCC and steel structures using software tools.
CO6. Apply contextual knowledge to assess the safety and serviceability of the structures designed.
CO7. Follow relevant IS Codes for the design of RCC and steel structures using software tools.
CO8. Function effectively as an Individual and as a team member in the design of RCC and steel structures using software tools.
CO9. Communicate effectively on the design of RCC and steel structures using software tools in written, oral and graphical forms.

III B.Tech. II Semester
(16BT60132) **HIGHWAY ENGINEERING LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: Course on Highway and Traffic Engineering.
COURSE DESCRIPTION: Highway material testing – Aggregates, Bituminous materials, Bituminous mixes; Pavement evaluation; Traffic studies.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate practical knowledge on highway material testing, pavement evaluation and traffic studies.
CO2. Characterize highway materials, pavements and traffic.
CO3. Design bituminous mix for pavements.
CO4. Solve complex engineering problems associated with highway materials, pavements and traffic through suitable investigations.
CO5. Use modern tools and techniques appropriate in highway material testing, pavement evaluation and traffic studies.
CO6. Ensure health and safety in highway material testing, pavement evaluation and traffic studies.
CO7. Encourage sustainable and environmental friendly highway materials, pavement evaluation methods and traffic studies.
CO8. Maintain ethical standards for quality in highway material testing, pavement evaluation and traffic studies following relevant IS codes.
CO9. Function effectively as an individual, and as a member or leader in teams to solve highway and traffic engineering problems.
CO10. Communicate effectively on highway material testing, pavement evaluation and traffic studies in written, oral and graphical forms.
CO11. Promote cost effective highway materials.

III B.Tech. – II Semester
(16BT60133) **SEMINAR**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
	100	100	-	-	-	2

PREREQUISITES: All the courses of the program up to III B. Tech. – I Semester.
COURSE DESCRIPTION: Identification of topic for the seminar; Literature survey; Performing critical study and analysis of the topic identified; Preparation of report and presentation.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Knowledge on the seminar topic.
CO2. Analytical ability exercised during the seminar work.
CO3. Ability to investigate and solve complex engineering problems faced during the seminar work.
CO4. Ability to apply techniques to complex engineering activities with an understanding of limitations as applied in the seminar work.

CO5. Ability to function effectively as an individual as experienced during the seminar work.
CO6. Ability to present views cogently and precisely on the seminar topic.
CO7. Ability to engage in life-long leaning as experience during the seminar work.

IV B.Tech. – I Semester
(16BT70101) **ESTIMATION AND QUANTITY SURVEYING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Building Materials and Construction Technology, Surveying, Computer Aided Building Planning and Drawing.
COURSE DESCRIPTION: Estimation of residential buildings; Estimation of different structures; Specifications and rate analysis; Contracts and Tenders; Valuation.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate the basic knowledge on estimation of civil engineering structures, specifications, rate analysis, contracts, tenders and valuation.
CO2. Analyze estimates for different structures, rates, specifications, contracts, tenders and valuation.
CO3. Provide solutions to problems associated with valuation, contracts and tenders by proper interpretation.
CO4. Use appropriate techniques for estimation and valuation of civil engineering structures.
CO5. Consider societal and legal issues in contracts and tenders.
CO6. Maintain ethical standards in estimation, valuation, contracts and tenders.
CO7. Prepare contracts, tenders and valuation reports for various civil engineering projects.
CO8. Prepare contacts and tenders considering financial issues.

IV B. Tech. – I Semester
(16BT70102) **GEOSPATIAL TECHNOLOGIES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Surveying.
COURSE DESCRIPTION: Photogrammetry; Remote sensing; Geographic information system; GIS Spatial analysis; Remote sensing and GIS applications.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate the basic knowledge on photogrammetry, remote sensing and geographic information system and their applications.
CO2. Analyze the spatial data and non spatial data.
CO3. Develop thematic maps using RS and GIS data for engineering applications.
CO4. Conduct investigations to provide valid conclusions in geospatial applications.
CO5. Apply suitable techniques to predict and model the damages due to natural disasters.
CO6. Provide geospatial solutions ensuring societal safety.
CO7. Consider the environmental sustainability issues in geospatial applications.

IV B.Tech. – I Semester
(16BT70103) **RAILWAY, AIRPORT AND HARBOUR ENGINEERING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Highway and Traffic Engineering.
COURSE DESCRIPTION: Railway Engineering; Construction and maintenance of railway tracks; Airport planning; Airport design; Harbour engineering.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate the basic knowledge on railway, airport and harbour engineering.
CO2. Analyze railway, airport and harbour engineering problems.
CO3. Design elements of railways and airports.
CO4. Solve problems associated with railway, airport and harbour engineering through proper investigations, analysis and interpretation.
CO5. Use appropriate techniques in solving railway, airport and harbour engineering problems.
CO6. Provide solutions to railway, airport and harbour engineering problems considering health and safety in the context of society.
CO7. Consider the environmental issues while solving railway, airport and harbour engineering problems.
CO8. Follow standards for planning and design of Railways, Airports and Harbours.

IV B.Tech. - I Semester
(16BT70104) **ADVANCED FOUNDATION ENGINEERING**

(Program Elective – 2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Soil Mechanics, Foundation Engineering.
COURSE DESCRIPTION: Shallow foundations- Advanced bearing capacity theories, Design principles of shallow foundations; Pile foundations; Sheet pile walls; Foundations in problematic soils - Underreamed pile foundations; Marine substructures.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate knowledge on advanced theories of bearing capacity and settlement of shallow and pile foundations; sheet pile walls, foundations on expansive soils and marine sub structures.
CO2. Analyze footings for bearing capacity and settlements, sheet piles for stability and marine substructures.
CO3. Proportion and design all types of foundations, sheet piles and break waters.
CO4. Provide solutions to complex foundation engineering problems.
CO5. Use appropriate techniques for the analysis and design of foundations, sheet piles and marine substructures.
CO6. Ensure stability and safety in the design of foundations, sheet piles and marine substructures.
CO7. Follow IS Codes to design foundations, sheet piles and break waters.
CO8. Communicate effectively on advanced foundation engineering problems in written and graphical forms.

IV B.Tech. I Semester
(16BT70105) **ARCHITECTURE AND TOWN PLANNING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Construction Planning and Project Management
COURSE DESCRIPTION: Architectural design and site planning; Building architecture and services; Town planning and structure; Land use planning; Regional planning and standards.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate knowledge on architecture and town planning.
CO2. Identify the regional and urban related problems by analyzing the principles of architecture design and town planning practices in India.
CO3. Design and develop a town plan by using various models of urban structure.
CO4. Use information system approach and appropriate techniques for better land use planning.
CO5. Ensure safety and performance standards in integration of building architecture and services.
CO6. Use environmentally sustainable approach in architecture and town planning.
CO7. Maintain ethics in architecture and town planning by following building rules and regulations.
CO8. Communicate effectively in the form of layouts pertain to architecture and town planning.

IV B.Tech. I Semester
(16BT70106) **ENVIRONMENTAL IMPACT ASSESSMENT AND MANAGEMENT**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Courses on Environmental Studies, Water Supply Engineering, Wastewater Technology.
COURSE DESCRIPTION: Environmental impact assessment (EIA); EIA methodologies; Environmental impact on soils, ground water and surface water; Environmental impact assessment on air, vegetation and wild life; Environmental audit and acts.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Gain basic knowledge on EIA, EIA methodologies, environmental audits and acts and preparation of EIA reports for various projects.
CO2. Analyze factors, elements, methodologies and reports of EIA; environmental audits and acts.
CO3. Interpret EIA and audit reports to provide solutions for environmental problems.
CO4. Use appropriate methods to prepare EIA and audit reports.
CO5. Consider health and safety in EIA.
CO6. Give suitable recommendations based on EIA study for sustainable development.
CO7. Follow environmental acts in EIA.
CO8. Prepare EIA and audit reports.

IV B. Tech. – I Semester
(16BT70107) **GLOBAL POSITIONING SYSTEM**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Physics.
COURSE DESCRIPTION: Geodesy; Overview of Global Positioning System (GPS); GPS signal structure; GPS Errors and accuracy; GPS surveying and applications.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate the knowledge on geodesy, GPS signal structure, GPS errors and accuracy, GPS surveying and applications for civil engineering structures.
CO2. Analyze problems associated with GPS and GPS surveying.
CO3. Conduct investigations and give recommendations for boundary and locations, specific land surveying issues.
CO4. Use modern methods and apply suitable techniques in collecting waypoints, recording tracks, navigating to a position.
CO5. Consider societal issues in practicing GPS survey.
CO6. Follow ethics in GPS survey practice.
CO7. Understand and manage projects on global positioning satellite data interface and relation in multidisciplinary environments.

IV B.Tech. – I Semester
(16BT70108) **STRUCTURAL DYNAMICS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Engineering Mechanics, Mechanics of Solids, Structural Analysis - I, Structural Analysis - II.
COURSE DESCRIPTION: Principle of vibration analysis; Single degree of freedom, Two degree of freedom and multi–degree of freedom systems; Vibration analysis; Dynamic analysis of continuous systems.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Elucidate the knowledge on theory of vibrations.
CO2. Analyze engineering systems for different modes of vibrations.
CO3. Formulate the complex equation of motions for free vibrations and continuous systems.
CO4. Solve complex engineering problems associated with vibrations by proper modeling and analysis.
CO5. Use appropriate methods to analyze engineering systems for vibrations.
CO6. Ensure sustainability while analyzing engineering systems for vibrations.

IV B.Tech. - I Semester
(16BT70109) **TRANSPORTATION PLANNING AND MANAGEMENT**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Course on Highway and Traffic Engineering.
COURSE DESCRIPTION: Transportation planning; Transport demand analysis; Traffic assignment; Landuse transport models and theory of traffic flow; Transport economics; Public transportation–mass transit systems; Scheduling; Planning; Softwares.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate the knowledge on transportation planning and management.
CO2. Analyze problems associated with transportation planning and management.
CO3. Develop transportation plans and management systems.
CO4. Solve complex problems in transportation planning and management through proper investigations, analysis and interpretation.
CO5. Use appropriate tools and techniques in transportation planning and management.
CO6. Consider societal issues in transportation planning and management.
CO7. Provide solutions to transportation planning and management problems considering environment.
CO8. Maintain ethics in transportation planning and management practice.
CO9. Consider economical issues in transportation planning and management.

IV B.Tech. – I Semester
(16BT70110) **WATER RESOURCES SYSTEMS PLANNING AND MANAGEMENT**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Courses on Surveying, Engineering Hydrology, Irrigation Engineering.
COURSE DESCRIPTION: Concepts of water resources system planning and management; Linear programming; Dynamic programming; Non–linear optimization techniques; Simulation; Water resources economics; Water resources management.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate the basic knowledge on optimization techniques in systems, planning and management of water resources.
CO2. Analyze optimization techniques and their application in water resources systems, planning and management.
CO3. Develop water resources management systems.
CO4. Solve complex problems associated with water resources systems planning and management through proper analysis and interpretation of data.
CO5. Use and develop appropriate optimization techniques in water resources planning and management.
CO6. Understand the impact of water resources planning and management on society.
CO7. Provide suitable solutions to water resources planning and management problems considering environment sustainability.
CO8. Consider economical issues for cost effective water resources planning and management.

IV B.Tech. – I Semester
(16BT70111) **ADVANCED STEEL STRUCTURES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Structural Analysis-I, Structural Analysis-II, Steel Structures.
COURSE DESCRIPTION: Welded plate girders; Gantry girder; Steel water tanks; Composite construction; Grillage foundation.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Gain the knowledge on advanced steel structures: welded plate girders, gantry girder, water tanks, composite construction, grillage foundation and connections.
CO2. Analyze the advanced steel structures and their elements.
CO3. Design advanced steel structures and their elements.
CO4. Provide solutions to complex engineering problems associated with advanced steel construction through proper analysis and design.
CO5. Use appropriate techniques to analyze and design of advanced steel structures and their elements.
CO6. Ensure safety and stability in the design of advanced steel structures and their elements
CO7. Follow IS codes in the design of advanced steel structures and their elements.

IV B.Tech. – I Semester
(16BT70112) **EARTHQUAKE RESISTANT DESIGN OF STRUCTURES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Structural Dynamics, Engineering Geology.
COURSE DESCRIPTION: Earthquake engineering; Earthquake analysis; Codal design and detailing provisions; Seismic planning; Shear walls and base isolation techniques.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Acquire the knowledge on seismology and earthquake resistant design of structures.
CO2. Analyze structures for earthquake loading.
CO3. Design earthquake resistant structures.
CO4. Recommend suitable structural elements for earthquake resistant structures.
CO5. Use an appropriate technique for earthquake resistant design of structures.
CO6. Consider stability and safety issues in earthquake resistance design of structures.
CO7. Ensure ethics in earthquake resistant design of structures as per IS Codes.

IV B.Tech. – I Semester
(16BT70113) **HIGHWAY CONSTRUCTION AND MAINTENANCE**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Highway and Traffic Engineering
COURSE DESCRIPTION: Highway construction; Stabilized roads; Highway drainage, Hill roads; Highway construction equipment; Highway maintenance; Road side development.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate the knowledge on highway construction and maintenance.
CO2. Analyze the problems associated with highway construction and maintenance.
CO3. Design highway drainage.
CO4. Solve issues related to highway construction and maintenance through proper investigations and interpretation of data.
CO5. Use appropriate techniques and tools in highway construction and maintenance.
CO6. Consider the societal issues in highway construction and maintenance.
CO7. Provide solutions to the problems in highway construction and maintenance considering environment.
CO8. Follow ethics in highway construction and maintenance.

IV B.Tech - I Semester
(16BT70114) **INDUSTRIAL WASTEWATER TREATMENT**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Course on Wastewater Technology.
COURSE DESCRIPTION: Industrial wastewater sources and characteristics; Principles of Primary and biological treatment; Advanced wastewater treatment systems; Typical wastewater treatment systems for different industries; Waste minimization.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CEO1. Demonstrate the knowledge on characteristics of industrial wastewater, treatment systems and waste minimization.
CEO2. Analyze characteristics, treatment systems and waste minimization techniques of industrial wastewater.
CEO3. Design wastewater treatment

IV B.Tech. I Semester
(16BT70115) **INFRASTRUCTURE DEVELOPMENT AND MANAGEMENT**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Construction Planning and Project Management.
COURSE DESCRIPTION: Infrastructure development; Overview of Indian infrastructure – Tenders, Contracts and specifications; Policies on infrastructure development; Construction and infrastructure; Infrastructure management.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate the knowledge on infrastructure development and management in global economy scenario in India.
CO2. Analyze problems associated with infrastructure development and management.
CO3. Formulate legal framework for regulating private partnerships by adopting government policies.
CO4. Use appropriate tools and techniques for better infrastructure development and management.
CO5. Ensure public health care and education in different sectors of infrastructural development projects.
CO6. Use environmentally sustainable approach in infrastructure development and management.
CO7. Maintain ethics in infrastructure development and management by following policies and regulations as per government norms.
CO8. Futuristic plan, monitor and control the finance in infrastructural development projects.

IV B.Tech. - I Semester
(16BT70116) **SOIL DYNAMICS AND MACHINE FOUNDATIONS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Soil Mechanics, Foundation Engineering.
COURSE DESCRIPTION: Fundamentals of vibration; Frequency of soil systems; Wave propagation; Dynamic soil properties; Vibration analyses; Design of machine foundations; Machine foundations on piles; Vibration isolation.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate knowledge on soil behaviour under dynamic loading, vibration analysis, machine foundations and vibration isolation.
CO2. Analyze dynamic soil properties, vibrations and machine foundations.
CO3. Design machine foundations.
CO4. Investigate the soil properties during wave propagation and suggest suitable foundations.
CO5. Use appropriate techniques for dynamic soil characterization, design of machine foundations and vibration isolation.
CO6. Recommend machine foundations and vibration isolation techniques considering stability and safety.
CO7. Follow IS codes in dynamic soil characterization, design of machine foundations and suggesting vibration isolation techniques.

IV B.Tech I Semester
(16BT70117) **WATERSHED MANAGEMENT**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Courses on Surveying, Engineering Hydrology.
COURSE DESCRIPTION: Concept of watershed; Need and objectives; Characteristics of watershed; Principles of erosion; Measures to control erosion; Water harvesting; Land and ecosystem management; Planning and administration.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Understand the principles and applications of watershed management.
CO2. Assess water availability, soil erosion, ecosystems and watershed management techniques.
CO3. Design solutions for complex harvesting sites to meet the specific needs.
CO4. Conduct investigations and interpret data for development of watersheds.
CO5. Use of modern tools to enhance the efficiency of harvesting systems.
CO6. Consider societal issues in the development of watershed management.
CO7. Ensure environmental sustainability in the development of watershed.
CO8. Effective management of watersheds.

IV B.Tech. - I Semester
(16BT70118) **AIR POLLUTION AND CONTROL**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Environmental Studies
COURSE DESCRIPTION: Fundamentals of air pollution; Effects of air pollution; Sampling and analysis; Control methods and equipment; Air and noise pollution from industrial operations.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate the knowledge on air pollution, effects, sampling, control methods and equipment.
CO2. Identify and analyse air pollution and control measures.
CO3. Design various air pollution controlling systems.
CO4. Provide solutions to complex air pollution problems through proper investigations and interpretation.
CO5. Use appropriate techniques in the analysis, control and management of air pollution.
CO6. Consider the ill effects of air pollution on human health, materials and vegetation in designing controlling systems.
CO7. Understand and demonstrate the need for sustainable development.
CO8. Follow IS codes in analysis and control of air pollution.

IV B.Tech. – I Semester
(16BT70119) **BRIDGE ENGINEERING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Reinforced Concrete Structures and Foundation Engineering.
COURSE DESCRIPTION: Bridge loading standards; Box culvert and deck slab bridge; Beam and slab bridge; Bridge bearings; Piers and abutments.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Acquire knowledge on site selection and design of RCC Bridges.
CO2. Analyze various components RCC bridges.
CO3. Design various components of RCC bridges.
CO4. Recommend suitable bridge components.
CO5. Use appropriate techniques in the analysis and design of RCC bridges.
CO6. Consider stability, safety and serviceability requirements in the design components of RCC bridges.
CO7. Ensure environmental sustainability in planning and preparing RCC bridge designs.
CO8. Ensure ethics in RCC bridge design in accordance with IS Codes.

IV B.Tech. – I Semester
(16BT70120) **GROUND IMPROVEMENT TECHNIQUES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: Courses on Soil Mechanics and Foundation Engineering.
COURSE DESCRIPTION: Scope of ground improvement; Methods of ground improvement; Drainage and dewatering; In–situ densification; Stabilization; Geosynthetics and earth reinforcement.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Explain the concept and techniques of ground improvement.
CO2. Compare different types of ground improvement techniques and select an appropriate one.
CO3. Design ground improvement techniques.
CO4. Solve complex soil problems through suitable ground improvement techniques.
CO5. Use and develop appropriate ground improvement techniques.
CO6. Understand the importance of safety in the design and execution of any ground improvement technique.
CO7. Recommend environmental friendly ground improvement techniques.
CO8. Follow IS Codes in practicing ground improvement techniques.

IV B.Tech. – I Semester
(16BT70121) **HYDRO POWER ENGINEERING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Fluid Mechanics and Hydraulic Machinery.
COURSE DESCRIPTION: Hydro power; Water power estimate; Hydro power plants; Pumped storage power plants; Hydraulic turbines; Water conveyance; Channel surges and intakes; Power house and equipment.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Demonstrate knowledge on the basic concepts of hydro power, hydro power plants and its components.
CO2. Analyze hydro power estimates, hydro power plants and its components.
CO3. Design components of hydro power plant.
CO4. Recommend suitable solutions for hydro power issues through proper investigation and interpretation.
CO5. Use appropriate methods in estimation of hydropower potential.
CO6. Consider societal issues while recommending for the construction of hydro power plants.
CO7. Ensure environmental sustainability in planning, construction and operation of hydro power plants.

IV B.Tech. – I Semester
(16BT70122) **PAVEMENT ANALYSIS AND DESIGN**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Course on Highway and Traffic Engineering.

COURSE DESCRIPTION: Highway materials and mix design; Design factors for flexible pavements; Analysis and design of flexible pavements; Analysis and design of rigid pavements.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Demonstrate the knowledge on transportation planning, pavement analysis and design.
CO2. Analyze problems associated with transportation planning, pavement analysis and design.
CO3. Design of pavements and bituminous concrete mix.
CO4. Solve transportation planning, pavement analysis and design problems through proper analysis, interpretation and design.
CO5. Use appropriate methods in transportation planning, pavement analysis and design.
CO6. Consider safety issues in providing solutions to problems in transportation planning and pavement design.
CO7. Provide solutions to the problems in transportation planning, pavement analysis and design, considering environment.
CO8. Follow codes of practice in transportation planning, pavement analysis and design.

IV B.Tech. – I Semester

(16BT70123) **PRESTRESSED CONCRETE**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Structural Analysis, Reinforced Cement Concrete Structures.

COURSE DESCRIPTION: Materials for prestressed concrete; Prestressing systems**;** Analysis of prestress; Design of section for flexure and shear; Analysis of end blocks, Composite construction of prestressed and insitu concrete.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Demonstrate the knowledge on prestressed concrete structures and composite construction.
CO2. Analyze prestressed concrete members and composite structures.
CO3. Design prestressed concrete structural elements and composite structures.
CO4. Solve problems associated with prestressed concrete structures and composite construction through proper analysis and interpretation.
CO5. Use appropriate techniques for the analysis and design of prestressed concrete structures and composite construction.
CO6. Consider safety issues in the design of prestressed concrete structures and composite construction in the context of society.
CO7. Follow IS Codes of practice in the design of prestressed concrete structures and composite construction.

IV B.Tech. – I Semester

(16BT70124) **REHABILITATION AND RETROFITTING OF STRUCTURES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Courses on Building Materials and Construction Technology, Concrete Technology, Reinforced Cement Concrete Structures.

COURSE DESCRIPTION: Maintenance and repair strategies; Serviceability and durability of concrete; Materials and techniques for repair; Repairs, Rehabilitation and Retrofitting of structures; Demolition techniques.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Demonstrate the knowledge on maintenance, repair and rehabilitation of concrete structures.
CO2. Analyze structural damages and techniques of rehabilitation, retrofitting and demolition.
CO3. Solve the complex problems pertaining to the repairs, rehabilitation, retrofitting and demolition of structures.
CO4. Use appropriate techniques for repairs, rehabilitation, retrofitting and demolition of structures.
CO5. Understanding the impacts of damages and apply contextual knowledge in repair, rehabilitation, retrofitting to ensure safety of the structures in societal context.
CO6. Comprehend the reports effectively on the case studies of demolition of buildings.

IV B.Tech. – I Semester

(16BT70131) **CIVIL ENGINEERING SOFTWARE LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Courses in different domains of Civil Engineering.

COURSE DESCRIPTION: Software tools in modeling; analysis and design of systems in different domains of Civil Engineering - Structural Engineering; Geotechnical Engineering; Transportation Engineering; Environmental Engineering; Water Resources Engineering; Construction Engineering; Surveying.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Acquire knowledge on software tools in analysis and design of civil engineering systems.
CO2. Analyse civil engineering systems by software tools.
CO3. Design civil engineering systems through software tools.
CO4. Address complex civil engineering problems for better solutions with software tools.
CO5. Use the latest software tools for modeling, analysis and design of civil engineering systems.
CO6. Consider safety of built environment through software tools.
CO7. Contemplate environmental sustainability of civil engineering systems through software tools.
CO8. Follow ethics in civil engineering practice through software tools.
CO9. Function effectively as an individual and as a team member in modeling, analysis and design of civil engineering systems using software tools.
CO10. Communicate effectively on civil engineering software applications in written, oral and graphical forms.

IV B. Tech. – I Semester
(16BT70132) **REMOTE SENSING AND GEOGRAPHICAL INFORMATION SYSTEMS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: -

COURSE DESCRIPTION: Creation of geo–database; Digitization of toposheet/map; Drainage analysis; Developing digital elevation model; Preparation of thematic maps; Land use and land cover analysis; Study of feature estimation; Rainfall runoff analysis; Road network analysis; Watershed analysis; Site suitability analysis; Natural hazard zones map.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Demonstrate the practical knowledge on toposheets, aerial photographs, satellite imagery, remote sensing and GIS applications to civil engineering.
CO2. Identify the spatial objects on the toposheets and imagery.
CO3. Create the thematic maps using geospatial data with emphasis on practical applications in civil engineering.
CO4. Conduct field study and interpret the spatial and non spatial data.
CO5. Select appropriate methods to estimate the feature classes in RS and GIS applications.
CO6. Provide geospatial solutions to civil engineering problems considering societal issues.
CO7. Consider environmental sustainability in engineering and non engineering applications.
CO8. Follow standards in mapping and interpretation of the geospatial data.
CO9. Function effectively as an individual, and as a member or leader in teams to solve Geospatial technology issues.
CO10. Communicate effectively on the geospatial data to the engineering community and society in written, oral and graphical forms.

IV B.Tech. – I Semester
(16BT70133) **COMPREHENSIVE ASSESSMENT**

Int. Marks	Ext. Marks	Total Marks		L	T	P	C
	100	100	-	-	-	2	

PRE-REQUISITES: All the courses of the program.

COURSE DESCRIPTION: Assessment of student learning outcomes in the courses of the program.

COURSE OUTCOMES: Comprehensive Assessment enables a successful student to demonstrate:

CO1. Knowledge in the courses of the program.
CO2. Analytical ability in the courses of the program.
CO3. Design skills in the courses of the program.
CO4. Ability to investigate and solve complex engineering problems in the courses of the program.
CO5. Ability to apply tools and techniques to complex engineering activities with an understanding of limitations in the courses of the program.
CO6. Ability to provide solutions as per societal needs with consideration to health, safety, legal and cultural issues in the courses of the program.
CO7. Understanding of the impact of the professional engineering solutions in environmental context and need for sustainable development in the courses of the program.
CO8. Ability to apply ethics and norms of the engineering practice in the courses of the program.
CO9. Ability to function effectively as an individual in the courses of the program.
CO10. Ability to present views cogently and precisely in the courses of the program.
CO11. Project management skills in the courses of the program.
CO12. Ability to engage in life-long leaning in the courses of the program.

IV B.Tech. – II Semester
(16BT80131) **PROJECT WORK**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
100	100	200	-	-	-	12

PRE-REQUISITES: All the courses of the program.
COURSE DESCRIPTION: Identification of topic for the project work; Literature survey; Collection of preliminary data; Identification of implementation tools and methodologies; Performing critical study and analysis of the topic identified; Time and cost analysis; Implementation of the project work; Preparation of thesis and presentation.
COURSE OUTCOMES: Completion of the project work enables a successful student to demonstrate:

CO1. Knowledge on the project topic.
CO2. Analytical ability exercised in the project work.
CO3. Design skills applied on the project topic.
CO4. Ability to investigate and solve complex engineering problems faced during the project work.
CO5. Ability to apply tools and techniques to complex engineering activities with an understanding of limitations in the project work.
CO6. Ability to provide solutions as per societal needs with consideration to health, safety, legal and cultural issues in the project work.
CO7. Understanding of the impact of the professional engineering solutions in environmental context and need for sustainable development experienced during the project work.
CO8. Ability to apply ethics and norms of the engineering practice as applied in the project work.
CO9. Ability to function effectively as an individual as experienced during the project work.
CO10. Ability to present views cogently and precisely on the project work.
CO11. Project management skills as applied in the project work.
CO12. Ability to engage in life-long leaning as experience during the project work.

Course Outcomes
(PG Programmes)

SREE VIDYANIKETHAN ENGINEERING COLLEGE

(AUTONOMOUS)

Sree Sainath Nagar, A.Rangampet – 517 102 (A.P.)

(AFFILIATED TO JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR, ANANTHAPURAMU)

Program: M.Tech. DIGITAL ELECTRONICS AND COMMUNICATION SYSTEMS

M. Tech. - I Semester
(16MT13801) COMPUTER NETWORKS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES: --
A Course on Computer Networks and Wireless Communication and Networks at UG Level
COURSE DESCRIPTION:
Advanced computer networks and its architectures; Protocols & Network security; Mobile adhoc networks.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:

1. Demonstrate in-depth knowledge on
    - Architectures and functioning of advanced computer networks like Ethernet, SONET/SDH, Wi-Fi, Frame Relay, ATM networks etc.
    - Protocols like IPv6, MPLS, RSVP, VoIP associated with advanced computer networks.
    - Security features associated with advanced computer networks.
2. Analyze various design issues for conducting research related to the Internet protocol (IP), Wireless LANs and ATM network technologies prominent in high performance scenario.
3. Design and develop techniques for solutions pertaining to the advanced networking technologies.
4. Formulate solutions for engineering problems pertaining to the advanced networking technologies.
5. Initiate research in advanced computer networks.
6. Apply appropriate techniques and tools to complex engineering activities in the field of advanced computer networks.
7. Contribute positively to multidisciplinary scientific research in design and development of Protocols for adhoc network architectures.

I M. Tech. – I Semester
(16MT13802) DIGITAL COMMUNICATION TECHNIQUES

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES: --
Course on Digital Communications at UG Level**,** Review of random Variables and Processes
COURSE DESCRIPTION:
Characterization of Communication Signals and Systems; Digital Modulation Techniques; Optimum Receivers for the Additive Gaussian Noise Channel; Spread Spectrum Technique; Multichannel and Multicarrier Systems.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:

1. Demonstrate in-depth knowledge in
    - Characterization of communication signals and systems.
    - Digital modulation techniques
    - Communication over AWGN channels
    - Optimum receivers
    - Spread spectrum techniques
    - Multi-carrier communication system
2. Analyze numerical and analytical problems critically for conducting research in the field of Digital Communication Systems.
3. Solve engineering problems and arrive at optimal solutions pertaining to digital communications.
4. Apply appropriate techniques to complex engineering activities in the field of signal processing and communications.

M. Tech. - I Semester

(16MT13803) DIGITAL SYSTEM DESIGN AND TESTING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES:

A Course on Switching Theory and Logic Design at UG Level.

COURSE DESCRIPTION:

Design of digital systems using ROMs, PLAs, CPLDs and FPGAs; Fault diagnosis in combinational and sequential circuits; Fault modeling in programmable logic array.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Demonstrate in-depth knowledge in
   - Identifying various Faults in combinational and sequential circuits
   - Test generation algorithms
   - Programmable Logic Devices (PLDs)
   - BIST
2. Analyze complex engineering problems critically for conducting research in the field of digital system design.
3. Design of complex digital systems in combinational and sequential modes.
4. Conceptualize and solve engineering problems to obtain solutions for the design of digital machines.
5. Initiate research in digital system design and testing.
6. Apply appropriate techniques to complex engineering activities in the design of digital systems.
7. Contribute positively to multidisciplinary scientific research in design and development of Fault Diagnosis well suited for wide range of applications.

M. Tech. - I Semester

(16MT13804) IMAGE & VIDEO PROCESSING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES:

A Course on Digital Communications & Digital Signal Processing at UG Level

COURSE DESCRIPTION:

Image Fundamentals and its transforms; image enhancement techniques; Image compression, Image Restoration & Image Segmentation; Video Processing basics like Representation, Sampling, Motion estimation, Filtering and Compression.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Gain in-depth knowledge in
   a. Image Transforms
   b. Image Enhancement & Restoration Techniques
   c. Image Segmentation & Compression Techniques
   d. Video Processing
2. Analyze complex engineering problems critically in the domain of Image Processing for conducting research.
3. Solve engineering problems for feasible and optimal solutions in the core area of Image Processing.
4. Initiate research in image and video processing.

5. Apply appropriate tools and techniques to complex engineering activities in the field of Image Processing.
6. Contribute positively to multidisciplinary scientific research in Image Processing.

M. Tech. - I Semester

(16MT13805) MODERN DIGITAL SIGNAL PROCESSING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITE: Courses on Digital Signal Processing at UG level.

COURSE DESCRIPTION: Design of digital filter banks; Power spectral estimation; Principles of adaptive filters; Algorithms for error minimization.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Demonstrate in-depth knowledge in
   - Filter banks and Wavelets
   - Efficient power Spectral Estimation Techniques.
   - Characteristics of adaptive systems
   - Searching algorithms such as gradient and steepest descent
   - Adaptive algorithms like LMS, RLS and Kalman filtering
   - Non-linear adaptive filtering
2. Analyze complex engineering problems critically in digital filter design and the domain of adaptive filtering for conducting research.
3. Design Various Digital Filter Banks for using in Communication Systems.
4. Solve engineering problems for feasible and optimal solutions in the core areas of Multirate signal processing and Adaptive signal processing.
5. Initiate research in modern digital signal processing.
6. Applying Various Techniques related to the Linear Optimum Filters and understand their design considerations
7. Contribute positively to scientific research in signal processing, applications towards society, antennas and spectral analysis.

M. Tech. I-Semester

(16MT20501) ADVANCED COMPUTER ARCHITECTURE

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: *A course on* "Computer Organization".

COURSE DESCRIPTION

Quantitative design and analysis, memory hierarchy design; parallel computer models and network properties; pipelining, superscalar techniques, multiprocessors and multi computers; Multi-Vector, SIMD and Multi-Core computers

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Acquire knowledge of:
   - Computational models and Computer Architectures.
   - Concepts of parallel computer models.
   - Scalable Architectures.
   - Pipelining, Superscalar processors, multiprocessors, SIMD and Multi core Computers.
2. Analyze architectures of parallel computers, sub systems and their interconnection structures.
3. Apply concepts and techniques of advanced computer architectures to solve engineering problems.

4. Conduct investigations, apply appropriate techniques to analyze and interpret data to gain advanced knowledge and solve new problems.

M. Tech. -I Semester

(16MT12541) SOFT COMPUTING TECHNIQUES

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES: --

COURSE DESCRIPTION: Artificial neural network; fuzzy logic; Genetic algorithms and Soft Computing.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Demonstrate in-depth knowledge on :
   - Neural networks and fuzzy logic
   - Genetic algorithms
   - Soft Computing techniques
2. Analyze numerical and analytical problems critically to design fuzzy neural networks.
3. Demonstrate problem solving skills in designing efficient Fuzzy Algorithms.
4. Apply appropriate Genetic techniques to solve problems in the field of soft computing

M. Tech. I-Semester

(**16MT13806) ASIC DESIGN**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES:

A Course on VLSI Design at UG Level.

COURSE DESCRIPTION:

ASIC design categories; Design Libraries; Design Entry; Logic Synthesis; Simulation; Testing; Physical design flow of ASIC.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Gain in-depth knowledge in
   - ASIC Design Styles.
   - ASICs Design Libraries.
   - ASICs Design Issues.
   - ASIC Construction.
2. Analyze problems critically in the field of ASIC Design.
3. Design Application Specific ICs for use in various systems.
4. Solve engineering problems and arrive at optimal solutions in pertaining to ASIC Design.
5. Initiate research in ASIC Design.
6. Apply appropriate techniques, resources and tools to engineering activities to provide appropriate Solution for the development of ASICs.
7. Contribute to multidisciplinary scientific work in the field of ASIC Design.

M. Tech. - I Semester

(16MT13807)TRANSFORM TECHNIQUES

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES:

Course on Signal Processing at UG Level.

COURSE DESCRIPTION:

Continuous Wavelet Transforms; Discrete Wavelet Transforms; Multi Resolution Analysis; Wavelet packets; Applications of Wavelet Transforms.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Gain in-depth knowledge in
   - Multiresolution Analysis
   - Continuous wavelets
   - Discrete wavelets and Filter design.
   - Alternative Wavelets & Wavelet packets
2. Analyze complex engineering problems critically in the area of Signal Processing and communications.
3. Design, conduct experiments, analyze and interpret complex engineering problems and apply appropriate research methodologies for conducting research in Signal Processing.
4. Solve engineering problems with wide range of solutions in the areas of Biomedical Signal Processing, Image Processing, Radar Signal Processing and Communications and arrive at optimum solutions.
5. Initiate research in Transform Techniques.
6. Use appropriate techniques, resources and tools to engineering activities in the fields of Signal Processing and Communications.
7. Contribute to collaborative multidisciplinary scientific work/research by initiating research work on Data compression, Noise reduction, Communications, Image and signal Processing.

M. Tech. - I Semester

(16MT13831) DIGITAL SYSTEM DESIGN AND TESTING LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	4	2

PRE-REQUISITES:

A Course on Digital Design at UG Level

COURSE DESCRIPTION:

Design and simulation of digital circuits; Implementing digital circuits in FPGAs.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Demonstrate advanced knowledge in
   - Behavioral system modeling: concurrency and event-driven simulation
   - Digital design modeling using various styles (behavioral, structural and dataflow)
   - Designing Combinational and sequential circuits
   - Verifying the Functionality of Designed circuits using function Simulator
   - Checking for critical path time calculation
   - Placement and routing in FPGA
   - Implement digital designs in FPGA device.
2. Conceptualize and solve problems in logic verification and timing calculation of Digital circuits.
3. Undertake projects efficiently in Digital system design to achieve optimization for high device utilization and performance in industrial needs.
4. Contribute to multidisciplinary groups in design and development of digital systems.

5. Create, develop and use modern CAD tools to analyze problems of RTL schematic, Technology schematic, and system implementation.
6. Communicate effectively in verbal and written forms.

M.Tech. – I Semester

(16MT13832) IMAGE & VIDEO PROCESSING LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	4	2

PREREQUISITE:

A course on Image & Video Processing

COURSE DESCRIPTION: Fundamentals of images, image transforms, enhancement, restoration, image compression and coding and video processing.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Demonstrate knowledge in
   - Image Transforms
   - Image Enhancement & Restoration Techniques
   - Image Segmentation & Compression Techniques
   - Video Processing
2. Understand various applications of image processing in industry, Medicine, and defense.
3. Solve engineering problems for feasible and optimal solutions in the core area of Image and video Processing.
4. Initiate research in image and video processing.
5. Acquire an appreciation for the Image and video processing issues and techniques and be able to apply these techniques to real world problems.
6. Contribute positively to multidisciplinary scientific research in Image and video Processing.
7. Communicate effectively in verbal and written forms.

M. Tech. – I Semester

(16MT13808) RESEARCH METHODOLOGY

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	-	2	-	-

PREREQUISITES: --

COURSE DESCRIPTION:

Overview of Research, research problem and design, various research designs, data collection methods, statistical methods for research, importance of research reports and its types.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Acquire in-depth knowledge on
   - Research design and conducting research
   - Various data collection methods
   - Statistical methods in research
   - Report writing techniques.
2. Analyze various research design issues for conducting research in core or allied areas.
3. Formulate solutions for engineering problems by conducting research effectively in the core or allied areas.
4. Carryout literature survey and apply research methodologies for the development of scientific/technological knowledge in one or more domains of engineering.

5. Select and Apply appropriate techniques and tools to complex engineering activities in their respective fields.
6. Write effective research reports.
7. Develop attitude for lifelong learning to do research.
8. Develop professional code of conduct and ethics of research.

M. Tech. -II Semester
(16MT23801) DETECTION AND ESTIMATION OF SIGNALS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES:
A Course on Probability and Stochastic Processes at UG Level

COURSE DESCRIPTION:
Decision criteria for single and multiple observations; Estimation techniques; Properties of estimators; parameter Estimation.

COURSE OUTCOMES:
After successful completion of the course, students will be able to:

1. Demonstrate advanced knowledge in
    - Different decision criteria
    - Estimation techniques and their properties
    - Selection of a good estimator for the given specifications.
    - Kalman Filter
    - Statistical estimation of parameters
2. Analyze complex engineering problems critically for conducting research in the field of signal detection and estimation.
3. Design optimum filters for solving problems in the field of Communications.
4. Solve engineering problems to obtain solutions for the design of optimum receivers.
5. Initiate research in detection and estimation of signals.
6. Apply appropriate techniques, resources to complex engineering activities in the field of Communications.
7. Contribute to multidisciplinary scientific work in the field of Communications and Radar Systems.

M. Tech. - II Semester
(16MT23802) EMBEDDED SYSTEM DESIGN

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES:
Courses on Digital Logic Design and Programming using 'C' language at UG Level

COURSE DESCRIPTION: Embedded Hardware Challenges and Choice; Real Time Interfacing; Software Architectures; Programming Concepts and Language support; Operating System Concepts; Development Tools; System Design Concepts.

COURSE OUTCOMES:
After successful completion of the course, students will be able to:

1. Demonstrate in-depth knowledge in
    - Embedded Hardware
    - Software Architectures
    - Embedded Programming Languages
    - Embedded Development Tools
    - Operating System concepts
    - Design Techniques

2. Analyze critically and resolve the issues pertaining to the selection of Hardware, Software architecture, Development tools, operating system and system components from the available lot
3. Solve complex engineering problems in embedded domain with societal impact.
4. Contribute positively in designing and developing solutions with embedded Systems with open mindedness, objectivity and rational approach.
5. Initiate research in Embedded system design.
6. Model embedded systems with chosen set of Hardware, development tools with an understanding of their limitations
7. Apply reasoning and demonstrate skills to take up inter disciplinary research in embedded domain

M. Tech. - II Semester

(16MT23803) INFORMATION THEORY AND CODING TECHNIQUES

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES:

A Course on Digital Communications at UG Level

COURSE DESCRIPTION:

Information theory; Channel capacity; Channel coding techniques – Linear block codes, Cyclic codes, Convolutional codes; Reed-Solomon and Turbo codes.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Demonstrate knowledge in
   - Various aspects of source and channel coding techniques
   - Channel capacity
   - Performance evaluation of various source coding techniques
2. Analyze complex engineering problems critically in the domain of information, source encoding.
3. Design encoder, Syndrome circuits to solve complex engineering problems.
4. Conceptualize and Solve engineering problems for feasible and optimal solutions in the core area of information theory and coding techniques.
5. Initiate research in information theory and coding techniques.
6. Contribute positively to multidisciplinary scientific research in communications with objectivity and rational analysis.

M. Tech.- II Semester

(16MT23804) LOW POWER CMOS VLSI DESIGN

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES:

A Course on VLSI Design at UG Level.

COURSE DESCRIPTION:

Needs For Low Power VLSI Chips; Principles Of Low Power Design; Simulation and Probabilistic Analysis of Low Power; Logic and Circuit Analysis; Special Techniques Of Low Power Design, Performance Management of an Architecture or a System.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Demonstrate advanced knowledge in
   - Design of logic Circuits for low power Requirements
   - Power Estimation of Analysis
   - Low power architecture & Systems
   - Low Power Techniques

2. Analyze complex problems critically in the domain of low power CMOS Circuit, effects and issues of devices, for conducting research in VLSI Design.
3. Solve engineering problems with wide range of solutions of low power design challenges, tradeoff between area, speed and power requirements.
4. Apply appropriate research methodologies in Low power CMOS devices of complex engineering activities in the field of VLSI Design.
5. Apply appropriate techniques, Resources and tools in, evaluating electrical properties of low power CMOS devices based on second order effects.
6. Contribute positively to multidisciplinary scientific research work in the design and development of Ultra Low power Integrated Circuits suited for wide range of applications.

M. Tech.-II Semester

(16MT23805) WIRELESS COMMUNICATIONS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: A Course on Digital Communications at UG Level.

COURSE DESCRIPTION:

Introduction to cellular wireless communication; Radio propagation in mobile atmosphere; Equalization along with Diversity techniques; several access techniques; Introduction to wireless networking; Multicarrier modulation techniques.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Demonstrate advanced knowledge in
   - Cellular systems and wireless standards
   - Radio wave propagation in wireless environment
   - Equalization and diversity techniques
   - Multiple access techniques and networking
   - Multicarrier modulation
2. Analyze complex engineering problems critically for conducting research in wireless systems.
3. Design a Digital Communication System/ Subsystem for societal needs.
4. Solve engineering problems with wide range of solutions in wireless communications.
5. Apply appropriate techniques to engineering activities in the field of wireless communications.

M. Tech. -II Semester

(16MT23806) DISPLAY TECHNOLOGIES AND DEVICES

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES:

A Course on Semiconductor Devices and Circuits at UG Level.

COURSE DESCRIPTION:

Introduction to display optics, Inorganic display technologies; Measurements of display systems; Characteristics of liquid crystal display, thin film transistor, Active matrix LCD and organic LED Displays.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Gain in-depth knowledge in
   - Display Optics
   - Display Technologies
   - Display Measurements.
2. Analyze problems in Measurements of parameters in display systems.
3. Conceptualize and implement various displays to address complex engineering problems for wide range of solutions in different display technologies.
4. Apply appropriate tools, models and technologies to enhance visualization in display Devices.

M. Tech. -II Semester

(16MT23807) OPTICAL COMMUNICATIONS AND NETWORKS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: --

COURSE DESCRIPTION:

Non linear properties of fibers; characteristics of fiber materials; optical cable design and connectors; optical components; modulation and demodulation schemes; error detecting and correcting codes; optical network management and control.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Demonstrate Knowledge in
   - Linear and Non-linear Characteristics of Optical fiber.
   - Fiber design considerations.
   - Minimization of Losses in Cable design.
   - Understanding the operation of advanced fiber optic components.
   - Modulation and demodulation techniques.
   - Access networks.
   - Network Control and Management.
2. Analyze complex engineering problems critically in the domain of optical communication for conducting research.
3. Design of optical cable and transmission layer in the field of optical Communications.
4. Solve engineering problems related to optical communication to meet societal and industrial needs.
5. Apply appropriate techniques to complex engineering activities in the field of optical communications.

M. Tech. -II Semester

(16MT23808) REAL TIME SYSTEMS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES:

Courses on Digital system design, Operating systems and embedded systems.

COURSE DESCRIPTION:

Real time system reference model; Real time scheduling approaches; Fault tolerant real time systems; Real time operating system concepts; Commercial RTOS.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Demonstrate advanced knowledge in
   - Characterizing Real Time Systems
   - Various Scheduling approaches
   - Fault tolerant techniques
   - Real Time Operating System Services
2. Analyze critically various Operating Systems using Contemporary bench marks.
3. Consider trade-offs in Real Time System designing to solve engineering problems to exhibit specific behavior, given a set of performance goals and technology.
4. Familiarize with fault tolerant and scheduling techniques to overcome ever increasing embedded system design complexity combined with reduced time-to-market window to revolutionize embedded system design process.
5. Initiate research in Real Time Systems.
6. Explore tools and derive pseudo code using RTOS, for developing efficient embedded Systems.
7. Carry out multidisciplinary research in designing RTOS based systems.

M. Tech. - II Semester

(16MT23809) SPEECH PROCESSING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C

40	60	100	4	-	-	4

PRE-REQUISITES: Courses on Signals & Systems and Digital Signal Processing in UG

COURSE DESCRIPTION:

Acoustic theory of speech production; Models for speech signals and speech processing systems; Mathematical analysis of speech signals - homomorphic and LPC models; Speech and speaker recognition systems.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Demonstrate in-depth knowledge in
   - Digital model representation of speech signal
   - LPC analysis
   - Homomorphic models
2. Analyze complex engineering problems critically for conducting research in speech signal processing.
3. Solve engineering problems using efficient algorithms for feasible and optimal solutions in Speech signal processing field.
4. Initiate research in speech signal processing.
5. Apply speech and speaker verification techniques to complex engineering activities in the field of speech processing.
6. Contribute to scientific research in Speech and speaker identification and verification systems with objectivity and rational analysis.

M.Tech. - II SEMESTER

(16MT23831) COMMUNICATIONS LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	4	2

PRE-REQUISITES: Simulation Lab at UG Level

COURSE DESCRIPTION:

Design and simulation of communication systems - QPSK communication system over AWGN channel, Baseband Direct Sequence Spread Spectrum (DS/SS) System; Generation of different density and distribution functions; Generation of maximal and Gold code sequences.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Demonsrate Knowledge in
   - Generation of Maximal and Gold Sequences & verification of their properties.
   - Design of communication system for band limited channels for Zero ISI.
   - Evaluating the performance of QPSK over AWGN Channel and Rayleigh Fading Channels.
   - Simulation of Code matched filter in Spread Spectrum Communication System.
   - Simulation of baseband Direct Sequence Spread Spectrum (DS/SS) System.
   - Performance evaluation of RAKE Receiver over Slow Fading Channel.
   - Simulation of Rayleigh Fading Channel Using Either Clarke’s Model or Jake’s Model for different Doppler Spreads.
2. Analyze engineering problems for feasible and optimal solutions in the core area of communication.
3. Design of Matched filter for spread spectrum communications.
4. Use MATLAB Toolbox to simulate complex engineering activities in the field of communication.
5. Demonstrate knowledge and understanding of engineering principles to execute the Projects effectively in the field of communications.

M. Tech. – II Semester

(16MT23832) EMBEDDED SYSTEMS LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	4	2

PRE-REQUISITES: Digital Logic Design, C-Programming, Embedded System Design Courses at UG Level

COURSEDESCRIPTION: MSP430 Programming; Timers; Interrupts; Parallel and Serial Ports; ADC; SPI; Applications

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Demonstrate knowledge in on-chip resources available in MSP430 Based microcontrollers such as: Parallel Ports, Timers, ADC, Serial ports.
2. Analyze critically various on-chip resources, programming alternatives towards efficient system design.
3. Solve complex engineering problems in embedded domain.
4. Design embedded systems using microcontrollers such as the MSP430.
5. Initiate research in embedded system design.
6. Contribute positively to multidisciplinary scientific research in Embedded domain.
7. Communicate effectively in verbal and written forms.

M. Tech. -II Semester

(16MT23833) SEMINAR

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
--	100	100	--	--	--	2

PRE-REQUISITES:--

COURSE DESCRIPTION:

Identification of seminar topic; literature survey; preparation of technical report and presentation.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Demonstrate capacity to identify an advanced topic for seminar in core and allied areas.
2. Extract information pertinent to the topic through literature survey.
3. Comprehend extracted information through analysis and synthesis critically on the topic.
4. Plan, organize, prepare and present effective written and oral technical report on the topic.
5. Adapt to independent and reflective learning for sustainable professional growth in Digital Electronics and Communication Systems.
6. Contribute to multidisciplinary scientific work in the field of Digital Electronics and Communication Systems.
7. Understand ethical responsibility towards environment and society in the field of Digital Electronics and Communication Systems.
8. Engage in lifelong learning for development of technical competence in the field of Digital Electronics and Communication Systems.

M. Tech. – II Semester

(16MT23810) INTELLECTUAL PROPERTY RIGHTS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	-	2	-	-

PRE-REQUISITES: --

COURSE DESCRIPTION:

Introduction to Intellectual Property; Trade Marks; Law of Copy Rights; Law of Patents; Trade Secrets; Unfair Competition; New Development of Intellectual Property.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Demonstrate in-depth knowledge on
    - Intellectual Property
    - Trade Marks & Secrets
    - Law of Copy Rights, Patents
    - New development of Intellectual Property
2. Analyze the different forms of infringement of intellectual property rights.

3. Solve problems pertaining to Intellectual Property Rights.
4. Stimulate research zeal for patenting of an idea or product.
5. Write effective reports required for filing patents.
6. Develop life-long learning capabilities.
7. Develop awareness of the relevance and impact of IP Law on their academic and professional lives.
8. Develop attitude for reflective learning.

M. Tech. -III & IV Semester

(16MT33831 & 16MT43831) PROJECT WORK

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
200	200	400	-	-	-	28

PRE-REQUISITES:--

COURSE DESCRIPTION:

Identification of topic for the project work; Literature survey; Collection of preliminary data; Identification of implementation tools and methodologies; Performing critical study and analysis of the topic identified; Time and cost analysis; Implementation of the project work; Writing of thesis and presentation.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Demonstrate capacity to identify an advanced topic for project work in core and allied areas.
2. Extract information pertinent to the topic through literature survey.
3. Comprehend extracted information through analysis and synthesis critically on the topic.
4. Solve engineering problems pertinent to the chosen topic for feasible solutions.
5. Use the techniques, skills and modern engineering tools necessary for project work.
6. Do time and cost analysis on the project.
7. Plan, prepare and present effective written and oral technical report on the topic.
8. Adapt to independent and reflective learning for sustainable professional growth.
9. Contribute to multidisciplinary scientific work in the field of Digital Electronics and Communication Systems
10. Understand ethical responsibility towards environment and society in the field of Digital Electronics and Communication Systems.
11. Engage lifelong learning for development of technical competence in the field of Digital Electronics and Communication Systems.

Program: M.Tech. VLSI

M. Tech. - I SEMESTER
(16MT15701) ANALOG IC DESIGN

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITE:

Courses on Semiconductor Devices and Circuits and VLSI design at UG Level.

COURSE DESCRIPTION:

MOS Device physics; Characteristics of amplifiers; Feedback circuits and operational amplifiers; Stability and frequency compensation of operational amplifiers; Nonlinear Analog circuits & other applications

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Demonstrate in-depth knowledge in
   - Sub threshold and Short Channel effects.
   - Current Mirrors.
   - Frequency response and Noise Characteristics of Amplifier.
   - Effect of Loading in Feedback Circuits.
   - One stage operational Amplifiers.
   - Ring Oscillator.
2. Analyze complex engineering problems critically in the domain of analog IC design for conducting research.
3. Design analog integrated Circuits for societal needs.
4. Develop Skills to solve engineering problems for feasible and optimal solutions in the core area of analog ICs.
5. Initiate research work on Reusable Design for the development of analog IC design.
6. Apply appropriate technique to implement accurate models for devices.

M. Tech. - I Semester
(16MT15702) COMPUTATIONAL METHODS IN MICROELECTRONICS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES:

A Course on Mathematics at UG Level.

COURSE DESCRIPTION:

Linear and Nonlinear Systems modeling; Approximation; Interpolation; Curve Fitting; Numerical Integration; Finite Difference Techniques; Initial Value problems; Energy Methods and Minimization; Finite Element Methods; Dynamic methods; Method of Characteristics; Finite Volume Methods; Grid Generation and Error Estimation; Device and Process Simulation; Layout and Yield estimation algorithms; Symbolic analysis and Synthesis of Analog ICs.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Gain in-depth knowledge in
   - Computation Tools.

- FDM, FEM, FVM.
- Grid Generation.
- Refinement Algorithms.
- Errors in Meshing.
- Application to device and process simulation.

2. Analyze the errors of Computational tools and judge independently the best suited Tool for fast Computation of simulation for conducting research in CAD Tools design.
3. Develop skills to solve problems of Meshing, Grid Generation to improve speed and accuracy of CAD Tools.
4. Initiate research work on designing methods to obtain accurate solutions.
5. Apply appropriate techniques, resources and tools to model devices for engineering activities to obtain fast and accurate designs.

M. Tech. - I Semester

(16MT15703) DEVICE MODELING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES:

A Course on Semiconductor Devices and Circuits at UG Level

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Gain in-depth knowledge in
   - Static and Dynamic Characteristics
   - Threshold Variations
   - Effects of MOS Layers
   - Modeling at low and High Frequencies.
2. Analyze complex engineering problems critically for conducting research in MOS device structures.
3. Solve engineering problems with wide range of solutions in different MOSFET technologies.
4. Initiate research methodologies in Modeling and Simulation of complex engineering activities in the field of VLSI Design at Circuit Level Implementation.
5. Apply appropriate techniques, resources and tools to engineering activities in modeling MOS structures.
6. Contribute positively to multidisciplinary scientific research in design and development of Integrated Circuits suited for wide range of applications.

M. Tech. I - Semester

(16MT15704) DIGITAL IC DESIGN

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES:

A Course on Digital IC Applications and VLSI Design at UG Level.

COURSE DESCRIPTION:

Introduction to MOS transistors; Characteristics of CMOS digital circuits; Transistor sizing; memory design; Design strategies; Design of subsystems.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Gain in-depth knowledge in
   - Static and dynamic characteristics of CMOS.
   - Alternative CMOS Logics
   - Transistor sizing
   - Adders Design
   - Design rules to develop layouts
   - Estimation of Delay and Power
2. Analyze complex engineering problems critically in the domain of CMOS Digital Integrated Circuits for conducting research.
3. Solve engineering problems for feasible and optimal solutions in the core area of CMOS Digital ICs.
4. Initiate research in Digital IC Applications.
5. Apply the Digital CMOS techniques for usage of modern CAD tools and their Limitations.
6. Contribute to multidisciplinary scientific work in the field of modern digital circuits like processor, memory designs.

M. Tech. - I Semester

(16MT15705) IC FABRICATION

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES:

A Course on Engineering Physics, Engineering Chemistry, Material Science, VLSI Design at UG Level

COURSE DESCRIPTION:

IC Fabrication process - Crystal growth, Wafer preparation, Epitaxial growth, Oxidation, Lithography, Etching, Deposition, Ion- Implantation, Metallization and Packaging of VLSI devices.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Demonstrate in-depth knowledge in
   - Wafer preparation.
   - Lithography and Etching.
   - Diffusion process.
   - Assembly Techniques and Packaging.
2. Analyze IC fabrication methodologies and evaluate component effects on IC design for VLSI and ULSI domain.
3. Solve engineering problems by proposing potential solutions leading to better IC chip designs.
4. Initiate research in IC fabrication
5. Contribute to multidisciplinary scientific work in the field of Low power IC Fabrication.
6. Apply appropriate techniques to complex engineering activities in the field of VLSI Technology.

M.Tech. – I Semester

(16MT23808) REAL TIME SYSTEMS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES:

Courses on Digital system design, Operating systems and embedded systems.

COURSE DESCRIPTION:

Real time system reference model; Real time scheduling approaches; Fault tolerant real time systems; Real time operating system concepts; Commercial RTOS.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

8. Demonstrate advanced knowledge in
   - Characterizing Real Time Systems
   - Various Scheduling approaches
   - Fault tolerant techniques
   - Real Time Operating System Services
9. Analyze critically various Operating Systems using Contemporary bench marks.
10. Consider trade-offs in Real Time System designing to solve engineering problems to exhibit specific behavior, given a set of performance goals and technology.
11. Familiarize with fault tolerant and scheduling techniques to overcome ever increasing embedded system design complexity combined with reduced time-to-market window to revolutionize embedded system design process.
12. Initiate research in Real Time Systems.
13. Explore tools and derive pseudo code using RTOS, for developing efficient embedded Systems.
14. Carry out multidisciplinary research in designing RTOS based systems.

I M. Tech. – I Semester

(16MT15706) ADVANCED DIGITAL SIGNAL PROCESSING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES: Courses on Digital Signal Processing at UG level

COURSE DESCRIPTION:

Digital filter banks; Parametric and Non-Parametric Power Spectrum Estimation methods; computationally efficient algorithms; Applications of DSP.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Gain in-depth knowledge in
   - Filter banks and Wavelets
   - Linear Prediction
   - Efficient power Spectral Estimation Techniques
   - Applications of Multirate signal processing
2. Analyze complex engineering problems critically in the field of Signal Processing.
3. Design optimum filters, multirate DSP systems and computationally efficient DSP algorithms for societal needs.
4. Solve engineering problems for feasible and optimal solutions in the field of digital signal processing.
5. Initiate research in advanced digital signal processing.
6. Learn and apply appropriate techniques, including prediction and modeling to complex engineering activities with an understanding of the limitations.
7. Contribute to scientific research in Radar signal processing ,Inter disciplinary areas like Speech and Image processing and Remote sensing with objectivity and rational analysis.

M. Tech. – I Semester

(16MT15707) FPGA ARCHITECTURES & APPLICATIONS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES:

A Course on VLSI Design at UG Level.

COURSE DESCRIPTION:

Fundamentals of Programmable devices; Logic Implementation using PLDs and FPGAs.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Demonstrate advanced knowledge in
   - Programmable Logic Devices
   - Different FPGA Architectures
   - Digital Implementation using FPGA
   - FPGA Applications
2. Analyze complex problems critically for digital implementation issues, to conduct research in Digital VLSI Design.
3. Solve engineering problems with wide range of solutions in FPGA Implementation.
4. Initiate research methodologies in Modeling, Simulation and Implementation of complex engineering applications in the field of Digital Design at different levels of abstraction.
5. Apply appropriate techniques, Resources and tools in, Modeling complex engineering applications with an understanding of limitations.
6. Contribute to multidisciplinary scientific work in the field of FPGA Devices.

M. Tech. – I Semester

(16MT15708) RFIC DESIGN

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES:

A Course on Analog IC Design at UG Level/ PG Level.

COURSE DESCRIPTION:

Basic Concepts of RF Circuits; Transceiver Architectures; Low Noise Amplifier; Mixers; Oscillators; Power Amplifiers and Phased Locked Loops.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Demonstrate in-depth knowledge in RFIC
   - Basic Concepts.
   - Transceiver Architectures.
   - Low Noise Amplifiers.
   - Mixers.
   - Voltage Controlled Oscillators.
   - Phase Locked Loop.
   - Power Amplifiers.
2. Analyze the problems in Radio Frequency Integrated Circuits.
3. Solve problems in transceiver architectures.
4. Initiate research work on designing RF systems for the wireless communications.
5. Apply appropriate techniques to overcome problem of non-idealities in the design of RFIC circuits, Implement various techniques to arrive at Efficient Designs of RFIC Circuits and Model techniques for Linearization of devices used in RFICs.

M. Tech. - I Semester

(16MT15731) ANALOG IC DESIGN LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	--	--	4	2

PRE-REQUISITES:

A Course on Linear IC Applications at UG Level.

COURSE DESCRIPTION:

Modeling and simulation of analog circuits using SPICE.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Demonstrate knowledge in design of analog circuits.
2. Exhibit skills in SPICE Coding and verification of analog circuits.
3. Solve problems in Modeling and analysis of MOSFETs and OPAMPs.
4. Develop Skills to solve problems of design and analysis of analog circuits.
5. Initiate research in analog IC design.
6. Able to use CAD Tools to arrive at an optimized solution for analog signal design.
7. Contribute positively to multidisciplinary scientific research in design and development of Analog Integrated Circuits to solve problems arising in Integrated circuit Technology.
8. Communicate effectively in Verbal and written form of designs developed.

M. Tech. - I Semester

(16MT15732) DIGITAL IC DESIGN LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	--	--	4	2

PRE-REQUISITES:

A Course on Digital IC Applications at UG Level.

COURSE DESCRIPTION:

Modeling, Simulation, Synthesis and Implementation of digital circuits using HDLs;

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Demonstrate advanced knowledge in design of digital circuits.
2. Exhibit analytical skills in
    - Behavioral system modeling: concurrency and event-driven simulation.
    - Digital design modeling using various styles (behavioral, structural and dataflow)
    - Designing Combinational and sequential circuits
    - Verifying the Functionality of Designed circuits using function Simulator
    - Checking for critical path time calculation
    - Placement and routing in FPGA
    - Implement digital designs on FPGA device for conducting research in the field of Digital Circuits.
3. Conceptualize and Solve problems in logic verification and timing calculation of Digital circuits.
4. Initiate research in digital IC design.
5. Acquire research skills in the domain of Digital Systems.
6. Create, develop and use modern CAD tools to analyze problems of RTL, Technology schematic, and system implementation.
7. Contribute positively to multidisciplinary scientific research in design and development of Digital Integrated Circuits to solve problems arising in Integrated circuit Technology.
8. Communicate effectively in Verbal and written forms for the designs developed.

M. Tech. – I Semester

(16MT13808) RESEARCH METHODOLOGY

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	-	2	-	-

PREREQUISITES: --

COURSE DESCRIPTION:

Overview of Research, research problem and design, various research designs, data collection methods, statistical methods for research, importance of research reports and its types.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

9. Acquire in-depth knowledge on
   - Research design and conducting research
   - Various data collection methods
   - Statistical methods in research
   - Report writing techniques.
10. Analyze various research design issues for conducting research in core or allied areas.
11. Formulate solutions for engineering problems by conducting research effectively in the core or allied areas.
12. Carryout literature survey and apply research methodologies for the development of scientific/technological knowledge in one or more domains of engineering.
13. Select and Apply appropriate techniques and tools to complex engineering activities in their respective fields.
14. Write effective research reports.
15. Develop attitude for lifelong learning to do research.
16. Develop professional code of conduct and ethics of research.

M. Tech. – II Semester

(16MT25701) LOW POWER VLSI DESIGN

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITE:

A Course on VLSI Design at UG Level.

COURSE DESCRIPTION:

Low Power Design Limitations; SOI and MOS/BICMOS Processes; Deep submicron processes; Integration/Isolation Considerations; CMOS/Bi-CMOS and Advanced Bi-CMOS Logic Gates; Design and Quality Measures of Low Power Latches & Flip-Flops; Special Low Power Techniques.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Demonstrate in-depth knowledge in
   - Limitations of Low Power Design.
   - SOI Technology.
   - BiCMOS Processes.
   - MOSFET and BJT Behavior and Modeling.
   - BiCMOS Logic Gates Design.
   - Special low power techniques.

1. Analyze the low power BiCMOS circuits, the effects of devices and judge independently the best suited device for fabrication of smart devices for conducting research in ULSI design.

3. Solve problems of Low power design challenges, tradeoff between area, speed and power requirements.

4. Initiate research in low power VLSI design.
5. Apply appropriate techniques, resources and tools to engineering Activities in low power VLSI circuits.
6. Contribute to multidisciplinary scientific work in the field of low power Circuits.

M. Tech. - II Semester

(16MT25702) MIXED SIGNAL DESIGN

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES:

A Course on Analog Design at UG Level.

COURSE DESCRIPTION:

Switched capacitor circuits - analysis and application; Design and characterization of Phase locked loops; Data converters – types; Design for different sampling rates.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Gain in-depth knowledge in
   - Switched Capacitor Circuits
   - PLL
   - Data Converters – ADC and DAC
2. Analyze complex engineering problems critically for conducting research in Data Converters for Communication Systems.
3. Solve engineering problems with wide range of solutions to increase Data Rate of ADC and DAC.
4. Design a mixed signal system/subsystem for societal needs.
5. Initiate research in mixed signal design.
6. Apply appropriate techniques, resources and tools to engineering activities in development of Data Converters.
7. Contribute positively to multidisciplinary scientific research in design and development of Mixed Integrated Circuits suited for wide range of applications.

M.Tech. - II Semester

(16MT25703) NANOELECTRONICS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES:

Courses on Basic Engineering Physics, Basic Engineering Chemistry and Electronic Devices at UG level.

COUSRE DESCRIPTION:

Introduction to wave particle nature and mechanics; Crystal structure of semiconducting material; Material for nanoelectronics; Different techniques of nanostructure fabrication; Nanostructure Characterization; Electron transport mechanism.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Demonstrate advanced knowledge in
   - wave particle nature, wave mechanics,

- crystal structure of semiconducting material
- different techniques of nanostructure fabrication,
- characterization of the nanostructure and electron in well

2. Analyze
   - Crystal structure of nanomaterials
   - Nanostructure based device
3. Design and develop new nanodevices for advanced technological applications.
4. Efficiently solve complex problems in the field of nanoelectronics.
5. Involve and resolve the future research challenges in the fields related to Nanoelectronics.
6. Contribute to multidisciplinary research in biotechnology, MEMS, other nanotechnology fields.

M. Tech. – II Semester

(16MT25704) PHYSICAL DESIGN AUTOMATION

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES:

A Course on VLSI Design and Digital IC Design at UG Level.

COURSE DESCRIPTION:

Basics of VLSI design; Layout optimization; Simulation and synthesis; Physical design of FPGAs and MCMs.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Demonstrate in-depth knowledge in
   - Algorithmic graph theory
   - Tractable and Intractable problems
   - Layout compaction such as floor planning, placement and routing
   - Binary-Decision diagrams
   - Simulation and Synthesis in High level abstraction
   - FPGA and MCM technologies
2. Analyze problems arising in circuit implementation.
3. Design an Integrated circuit with high level synthesis.
4. Solve engineering problems and arrive at optimal solutions pertaining to design automation.
5. Initiate research in physical design automation.
6. Apply appropriate techniques to Model and Simulate complex engineering designs using FPGA and MCM's.
7. Contribute positively to multidisciplinary applications in the design and development of Integrated Circuits.
8. Understand ethical responsibility towards environment and society in the development of automated designs.

M. Tech. - II Semester

(16MT25705) TESTING AND TESTABILITY

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITE:

A Course on Digital Logic Design at UG Level.

COURSE DESCRIPTION:

Design for testability; Fault modeling and simulation; Test analysis for digital circuits; Design strategies for testability.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Demonstrate advanced knowledge in
   - The basic faults that occur in digital systems
   - Testing of stuck at faults for digital circuits
   - Design for testability
2. Analyze testing issues in the field of digital system design critically for Conducting Research.
3. Solve engineering problems by modeling different faults for fault free Simulation in Digital circuits.
4. Apply appropriate research methodologies to develop New testing Strategies for digital and mixed signal circuits and systems.
5. Apply appropriate techniques, Resources and tools in, Modeling to Complex Engineering activities with an understanding of the limitations.
6. Contribute to multidisciplinary scientific work in the field of testing of Stuck at Faults for digital circuits.

M. Tech. – II Semester

(16MT13806) ASIC DESIGN

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES:

A Course on VLSI Design at UG Level.

COURSE DESCRIPTION:

ASIC design categories; Design Libraries; Design Entry; Logic Synthesis; Simulation; Testing; Physical design flow of ASIC.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

8. Gain in-depth knowledge in
   - ASIC Design Styles.
   - ASICs Design Libraries.
   - ASICs Design Issues.
   - ASIC Construction.
9. Analyze problems critically in the field of ASIC Design.
10. Design Application Specific ICs for use in various systems.
11. Solve engineering problems and arrive at optimal solutions in pertaining to ASIC Design.
12. Initiate research in ASIC Design.
13. Apply appropriate techniques, resources and tools to engineering activities to provide appropriate Solution for the development of ASICs.
14. Contribute to multidisciplinary scientific work in the field of ASIC Design.

M. Tech. – II Semester

(16MT25707) CO – DESIGN

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES:

Courses on Computer Architecture, Digital Design, Software Design, and Embedded Systems.

COURSE DESCRIPTION:

Issues and Algorithms in CO- Design; Prototyping and its Emulation on Target Architectures; Compilation Techniques; Design Specification; Verification Tools for Embedded Processor Architectures; System- Level Languages with its Specification and Design.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Demonstrate advanced knowledge in
   - Various design steps starting from system specifications to hardware/software implementation
   - Process optimization techniques while considering various design decisions
2. Analyze complex problems critically in the domains of case studies using contemporary high-level methods, for conducting research in VLSI Design.
3. Solve engineering problems by considering trade-offs in the way hardware and software components of a system work together to exhibit a specific behavior for given a set of performance goals and technology with wide range of solutions in Real time embedded system design.
4. Apply appropriate research methodologies in Modeling and Simulation of complex engineering activities in the field of Real time embedded system design.
5. Apply appropriate techniques, Resources and tools in, Modeling to complex engineering activities with an understanding of the limitations
6. Contribute to multidisciplinary scientific work in the field of Real time embedded system design.
7. Understand ethical responsibility towards environment and society in the field of Real time embedded system design.

M. Tech. - II SEMESTER

(16MT25708) SYSTEM-ON-CHIP DESIGN AND VERIFICATION

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITE:

Courses on Embedded systems and VLSI design.

COURSE DESCRIPTION:

System on Chip Design Process; System level Design Issues; Test Strategies; Macro Design and Verification; Reusable Macros; System on Chip Verification; Communication Architectures for SoCs.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Demonstrate in-depth knowledge in
   - System on Chip Design Processes.
   - Macro Level Design.
   - Verification Techniques.
   - On-Chip Communication Architectures.
   - Bus Functional Model based Verification.
2. Analyze the problems in SoC Design for Low Power Architecture Design.

3. Develop Skills to solve problems of Reusable Macros.
4. Initiate research work on Reusable Design for the development of SoC Architectures.
5. Implement various Verification techniques to arrive at Efficient Designs of SoC Architectures.

M. Tech. -II Semester

(16MT25709) WIRELESS SENSOR NETWORKS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES: --

A Course on Computer Networks and Wireless Communication and Networks at UG Level.

COURSE DESCRIPTION:

WSN architecture, types, Quality measures of wireless channels, various MAC protocols, Sensor deployment and routing related protocols, congestion control in WSNs.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Gain in-depth knowledge in
   - Wireless Sensor Networks
   - Physical layer
   - Data link layer
   - Network layer
   - Transport layer
2. Analyze various design issues for conducting research related to Datalink, network and transport protocols of wireless sensor network architecture.
3. Design and develop feasible and optimal solutions for societal use.
4. Solve complex engineering problems pertaining to the field of wireless sensor networks.

M.Tech. – II Semester

(16MT25731) MIXED SIGNAL AND PHYSICAL DESIGN AUTOMATION LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	4	2

PREREQUISITE:

A course on Circuit Level Design and Layouts.

COURSE DESCRIPTION:

Design and Verification of Analog and Mixed Signal Circuits.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Demonstrate advanced knowledge in backend and frontend design.
2. Exhibit analytical skills in
   - Backend Design - Schematic or SPICE Entry, Simulation, Layout, DRC, PEX, Post Layout Simulation.
   - Frontend Design - HDL Design Entry, Logic Simulation, RTL Logic Synthesis, Post Synthesis Timing Simulation, Partition, Floorplanning, Place & Route, Compaction, Verification, Design for Testability, Static Timing Analysis, Power Analysis.
3. Solve problems in physical design cycle, functional verification, timing and Power Analysis of Digital circuits.
4. Initiate research in the field of mixed signal and physical design automation.

5. Develop Skills to solve problems of layout design and build solutions for optimizing design for area, power and speed.
6. Use CAD Tools to arrive at an optimized solution for mixed signal design.
7. Contribute positively to multidisciplinary scientific research in design and development of Mixed/Analog Integrated Circuits to solve problems arising in
   physical design and Integrated circuit Technology.
8. Communicate effectively in Verbal and written form of designs developed.

M.Tech. - II Semester
(16MT25732) NANOELECTRONICS LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	--	--	4	2

PRE-REQUISITES:
A course on Circuit Level Design
COUSRE DESCRIPTION:
Demonstration of the lab; Design, fabrication and verification of the nanoelectronic devices.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
1. Demonstrate advanced knowledge in
   - Clean room,
   - Substrate preparation
   - Device fabrication
   - Device characterization
   - Device verification
2. Able to analyze
   - Nanostructure of the Devices
   - New material and Device characterization
3. Think laterally to get involved efficiently in research field of nanoelectronics.
4. Efficiently solve complex problem in the design of nanoelectronic devices.
5. Design and develop new nanodevice for advance technological application.
6. Use tools for verifying developed nanodevices.
7. Communicate effectively in verbal and written form for the experiments.
8. Utilize and implement the practical knowledge in multidiscipline areas.

M. Tech. - II Semester
(16MT25733) SEMINAR

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	100	100	-	-	-	2

PRE-REQUISITES: --
COURSE DESCRIPTION:
Identification of seminar topic; literature survey; preparation of technical report and presentation.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
1. Demonstrate knowledge to identify an advanced topic for seminar in core and
   allied areas of VLSI.

2. Extract and analyze information pertinent to the topic through literature survey.
3. Comprehend extracted information through analysis and synthesis critically.
4. Plan, prepare and present effective written and oral technical report on the work done.
5. Develop enthusiasm and commitment to engage in lifelong learning for technical competence in the field of VLSI.
6. Consider and assess the impact of the seminar topic outcome on environment and society.
7. Undertake corrective measures for both the technical and ethical mistakes.

M. Tech. – II Semester

(16MT23810) INTELLECTUAL PROPERTY RIGHTS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	-	2	-	-

PRE-REQUISITES: --

COURSE DESCRIPTION:

Introduction to Intellectual Property; Trade Marks; Law of Copy Rights; Law of Patents; Trade Secrets; Unfair Competition; New Development of Intellectual Property.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

9. Demonstrate in-depth knowledge on
    - Intellectual Property
    - Trade Marks & Secrets
    - Law of Copy Rights, Patents
    - New development of Intellectual Property
10. Analyze the different forms of infringement of intellectual property rights.
11. Solve problems pertaining to Intellectual Property Rights.
12. Stimulate research zeal for patenting of an idea or product.
13. Write effective reports required for filing patents.
14. Develop life-long learning capabilities.
15. Develop awareness of the relevance and impact of IP Law on their academic and professional lives.
16. Develop attitude for reflective learning.

M. Tech. - III & IV Semester

(16MT35731 & 16MT45731)PROJECT WORK

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
200	200	400	-	-	-	28

PRE-REQUISITES:--

COURSE DESCRIPTION:

Identification of topic for the project work; Literature survey; Collection of preliminary data; Identification of implementation tools and methodologies; Performing critical study and analysis of the topic identified; Time and cost analysis; Implementation of the project work; Writing of thesis and presentation.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Demonstrate capacity to identify an advanced topic for project work in core and allied areas.
2. Extract information pertinent to the topic through literature survey.
3. Comprehend extracted information through analysis and synthesis critically on the topic.

4. Solve engineering problems pertinent to the chosen topic for feasible solutions.
5. Use the techniques, skills and modern engineering tools necessary for project work.
6. Do time and cost analysis on the project.
7. Plan, prepare and present effective written and oral technical report on the topic.
8. Adapt to independent and reflective learning for sustainable professional growth.
9. Contribute to multidisciplinary scientific work in the field of VLSI.
10. Understand ethical responsibility towards environment and society in the field of VLSI.
11. Engage lifelong learning for development of technical competence in the field of VLSI.

Program: M.Tech. COMMUNICATION SYSTEMS

I M. Tech.– I Semester

(16MT15706) ADVANCED DIGITAL SIGNAL PROCESSING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES: Courses on Digital Signal Processing at UG level

COURSE DESCRIPTION:

Digital filter banks; Parametric and Non-Parametric Power Spectrum Estimation methods; computationally efficient algorithms; Applications of DSP.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

8. Gain in-depth knowledge in
    - Filter banks and Wavelets
    - Linear Prediction
    - Efficient power Spectral Estimation Techniques
    - Applications of Multirate signal processing
9. Analyze complex engineering problems critically in the field of Signal Processing.
10. Design optimum filters, multirate DSP systems and computationally efficient DSP algorithms for societal needs.
11. Solve engineering problems for feasible and optimal solutions in the field of digital signal processing.
12. Initiate research in advanced digital signal processing.
13. Learn and apply appropriate techniques, including prediction and modeling to complex engineering activities with an understanding of the limitations.
14. Contribute to scientific research in Radar signal processing ,Inter disciplinary areas like Speech and Image processing and Remote sensing with objectivity and rational analysis.

I M. Tech. – I Semester

(16MT13802) DIGITAL COMMUNICATION TECHNIQUES

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES: --

Course on Digital Communications at UG Level**,** Review of random Variables and Processes

COURSE DESCRIPTION:

Characterization of Communication Signals and Systems; Digital Modulation Techniques; Optimum Receivers for the Additive Gaussian Noise Channel; Spread Spectrum Technique; Multichannel and Multicarrier Systems.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

5. Demonstrate in-depth knowledge in
    - Characterization of communication signals and systems.
    - Digital modulation techniques
    - Communication over AWGN channels
    - Optimum receivers
    - Spread spectrum techniques
    - Multi-carrier communication system
6. Analyze numerical and analytical problems critically for conducting research in the field of Digital Communication Systems.
7. Solve engineering problems and arrive at optimal solutions pertaining to digital communications.

8. Apply appropriate techniques to complex engineering activities in the field of signal processing and communications.

M. Tech. - I Semester

(16MT23803) INFORMATION THEORY AND CODING TECHNIQUES

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES:

A Course on Digital Communications at UG Level

COURSE DESCRIPTION:

Information theory; Channel capacity; Channel coding techniques – Linear block codes, Cyclic codes, Convolutional codes; Reed-Solomon and Turbo codes.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

7. Demonstrate knowledge in
    - Various aspects of source and channel coding techniques
    - Channel capacity
    - Performance evaluation of various source coding techniques
8. Analyze complex engineering problems critically in the domain of information, source encoding.
9. Design encoder, Syndrome circuits to solve complex engineering problems.
10. Conceptualize and Solve engineering problems for feasible and optimal solutions in the core area of information theory and coding techniques.
11. Initiate research in information theory and coding techniques.
12. Contribute positively to multidisciplinary scientific research in communications with objectivity and rational analysis.

M. Tech. - I Semester

(16MT23807) OPTICAL COMMUNICATIONS AND NETWORKS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES: --

COURSE DESCRIPTION:

Non linear properties of fibers; characteristics of fiber materials; optical cable design and connectors; optical components; modulation and demodulation schemes; error detecting and correcting codes; optical network management and control.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

6. Demonstrate Knowledge in
    - Linear and Non-linear Characteristics of Optical fiber.
    - Fiber design considerations.
    - Minimization of Losses in Cable design.
    - Understanding the operation of advanced fiber optic components.
    - Modulation and demodulation techniques.
    - Access networks.
    - Network Control and Management.
7. Analyze complex engineering problems critically in the domain of optical communication for conducting research.
8. Design of optical cable and transmission layer in the field of optical Communications.
9. Solve engineering problems related to optical communication to meet societal and industrial needs.
10. Apply appropriate techniques to complex engineering activities in the field of optical communications.

M. Tech. - I Semester

(16MT16101) RF CIRCUIT DESIGN

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES:

Concept of Basic Electronics and Wave Theory at UG level

COURSE DESCRIPTION:

Fundamental concepts of transmission line theory; RF Electronics; high frequency circuit behavior; design of tuning and matching networks; RF Passive and active components; RF Transistor amplifier design; Oscillators and RF Mixers.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Demonstrate in-depth knowledge in
   - RF Electronics
   - Transmission line analysis
   - Matching and biasing networks
   - RF Passive and Active components
   - RF Transistor amplifier design
   - Oscillators and RF Mixers.
2. Analyze complex problems critically in the domains of RF field, RF Passive and Active components as well as a smart antenna techniques in the field of RF Circuits.
3. Design RF circuits for use in various systems as per societal needs.
4. Solve engineering problems to arrive at optimal solutions in compliance with public health and safety, societal and environmental factors in the core areas of RF Circuit design.
5. Apply appropriate techniques to complex engineering activities in the field of wireless communication systems and allied areas.
6. Understand ethical responsibility towards environment and society in the field of microwave and wireless systems.

M. Tech. - I Semester

(16MT13801) COMPUTER NETWORKS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES: --

A Course on Computer Networks and Wireless Communication and Networks at UG Level

COURSE DESCRIPTION:

Advanced computer networks and its architectures; Protocols & Network security; Mobile adhoc networks.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

8. Demonstrate in-depth knowledge on
   - Architectures and functioning of advanced computer networks like Ethernet, SONET/SDH, Wi-Fi, Frame Relay, ATM networks etc.
   - Protocols like IPv6, MPLS, RSVP, VoIP associated with advanced computer networks.
   - Security features associated with advanced computer networks.
9. Analyze various design issues for conducting research related to the Internet protocol (IP), Wireless LANs and ATM network technologies prominent in high performance scenario.

10. Design and develop techniques for solutions pertaining to the advanced networking technologies.
11. Formulate solutions for engineering problems pertaining to the advanced networking technologies.
12. Initiate research in advanced computer networks.
13. Apply appropriate techniques and tools to complex engineering activities in the field of advanced computer networks.
14. Contribute positively to multidisciplinary scientific research in design and development of Protocols for adhoc network architectures.

M. Tech.-I Semester

(16MT16102) DIGITAL SATELLITE COMMUNICATIONS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PREREQUISITES: A Course on Satellite Communications at UG level

COURSE DESCRIPTION:

Orbital mechanics and satellite sub-systems; Non-geostationary satellite systems; Demand assignment multiple access techniques and packet communications; Spread spectrum communications; Satellite applications.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Demonstrate advanced knowledge in
   - Satellite Orbits and Sub-Systems
   - NGSO Constellation Designs
   - DAMA Interfaces
   - Satellite Packet Communications and ALOHA systems
   - Spread spectrum Communications
   - Satellite Applications such as VSAT, MSAT, Direct Broadcast Satellite Television.
2. Investigate and analyze engineering problems critically in the field of satellite system design and communications.
3. Design efficient Digital Satellite Systems/ Subsystems and solve engineering problems in the area of satellite communications.
4. Solve engineering problems with feasible and economical solutions in digital satellite communications.
5. Apply appropriate techniques, resources and tools to engineering activities in the field of digital satellite communications.
6. Develop ethical attitude towards environment in the field of digital satellite communications.

M. Tech. -I Semester

(16MT16103) SOFTWARE DEFINED RADIO

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PREREQUISITES:

A Course on Wireless Communication, Digital Signal Processing and Antennas at UG Level.

COURSE DESCRIPTION:

Principles of software defined radio; Multirate digital filter banks; Analysis and Synthesis of signals performance; Smart antennas with applications.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Demonstrate advanced knowledge in the evolving paradigm of Software defined radio and technologies for its implementation.
2. Analyze complex problems critically in the domains of Radio frequency Implementation issues, multirate signal processing in SDR, as well as Smart antenna techniques for better spectrum exploitation for conducting research.
3. Design a Software defined Radio System/ Subsystem for public needs.

4. Initiate research in Software Defined Radio.
5. Apply appropriate techniques for the development of scientific and technological knowledge in designing software defined radios and their usage for cognitive radio.
6. Contribute to multidisciplinary scientific work in the fields of Satellite and Microwave Communications.
7. Understand ethical responsibility towards environment and society in the field of SDR.

M. Tech. -I Semester

(16MT13807)TRANSFORM TECHNIQUES

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES:

Course on Signal Processing at UG Level.

COURSE DESCRIPTION:

Continuous Wavelet Transforms; Discrete Wavelet Transforms; Multi Resolution Analysis; Wavelet packets; Applications of Wavelet Transforms.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

8. Gain in-depth knowledge in
    - Multiresolution Analysis
    - Continuous wavelets
    - Discrete wavelets and Filter design.
    - Alternative Wavelets & Wavelet packets
9. Analyze complex engineering problems critically in the area of Signal Processing and communications.
10. Design, conduct experiments, analyze and interpret complex engineering problems and apply appropriate research methodologies for conducting research in Signal Processing.
11. Solve engineering problems with wide range of solutions in the areas of Biomedical Signal Processing, Image Processing, Radar Signal Processing and Communications and arrive at optimum solutions.
12. Initiate research in Transform Techniques.
13. Use appropriate techniques, resources and tools to engineering activities in the fields of Signal Processing and Communications.
14. Contribute to collaborative multidisciplinary scientific work/research by initiating research work on Data compression, Noise reduction, Communications, Image and signal Processing.

M. Tech. - I SEMESTER

(16MT16131) COMMUNICATIONS LAB-I

Int. Marks	Ext. Marks	Max. Marks	L	T	P	C
50	50	100	-	-	4	2

PRE-REQUISITES: Simulation Lab at UG Level

COURSE DESCRIPTION:

Design and simulation of communication systems - Baseband Communication Systems with Optimum terminal filters, QPSK communication system for AWGN channel, Baseband Direct Sequence Spread Spectrum (DS/SS) System; Generation of different density and distribution functions; Generation of maximal and Gold code sequences.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Gain advanced knowledge in
    - Generation of Maximal and Gold Sequences & verification of their properties.
    - Design of communication system for band limited channels for Zero ISI.

- Evaluating the performance of QPSK over AWGN Channel, 16MPSK and 16QAM.
- Simulation of Code matched filter in Spread Spectrum Communication System.
- Design of Baseband Communication Systems with Optimum terminal filters.
- Simulation of baseband Direct Sequence Spread Spectrum (DS/SS) System.
- Equalization of Multipath Channel using LMS or RLS Algorithms.

2. Analyze complex and critical engineering problems in the field of communications.
3. Use MATLAB Toolbox to simulate complex engineering activities in the field of communication.
4. Demonstrate knowledge and understanding of engineering principles to execute the Projects effectively in the field of communications.
5. Understand ethical responsibility towards environment & society in the field of communications.
6. Communicate effectively in verbal & written forms.

M. Tech. - I SEMESTER

(16MT16132) RF CIRCUITS & OPTICAL COMMUNICATIONS LAB

Int. Marks	Ext. Marks	Max. Marks	L	T	P	C
50	50	100	-	-	4	2

PRE- REQUISITES:

Antennas, Microwaves and Optical Communication lab at UG level

COURSE DESCRIPTION:

Design and simulation of Various antennas; Measurement of various parameters; characteristics of couplers; non-ideal behaviour of lumped circuit components; characteristics of microwave passive components; Measurement of 4 channel CWDM using modulation; PC to PC communication; Characterization of Optial circulator and Bragg-grating.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Demonstrate advanced knowledge required in
   - Measurement of Impedance, Coupling and cross talk in 3 wire pickup.
   - Design and simulation of different antennas.
   - Design and measurement of PC to PC communication.
   - Characterization of branch line directional copupler, capacitive coupling and inductive coupling.
   - Study of non ideal behaviour of lumped circuit components, 3 dB power divider and filters.
   - Designing WDM system and measurement of 4 channel CWDM by internal and external modulation.
   - Wavelength division multiplexing & de-multiplexing of analog/digital signals over 1310 nm and 1550 nm wavelengths.
2. Analyse of engineering problems for feasible and optimal solutions in the core area of RF, Microwave and Optical Communications.
3. Use RF Spice Pro Software to complex engineering activities in the domain of RF, Microwave and Optical communications.
4. Demonstrate Knowledge and understanding of Engineering Principles to execute the Projects effectively in the field of RF, Microwave and Optical communications.
5. Understand ethical responsibility towards environment & society in the field of communications.
6. Communicate effectively in verbal & written forms in the core area of RF, Microwave and Optical communications

M. Tech. – I Semester

(16MT13808) RESEARCH METHODOLOGY

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	-	2	-	-

PREREQUISITES: --

COURSE DESCRIPTION:

Overview of Research, research problem and design, various research designs, data collection methods, statistical methods for research, importance of research reports and its types.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

17. Acquire in-depth knowledge on
    - Research design and conducting research
    - Various data collection methods
    - Statistical methods in research
    - Report writing techniques.
18. Analyze various research design issues for conducting research in core or allied areas.
19. Formulate solutions for engineering problems by conducting research effectively in the core or allied areas.
20. Carryout literature survey and apply research methodologies for the development of scientific/technological knowledge in one or more domains of engineering.
21. Select and Apply appropriate techniques and tools to complex engineering activities in their respective fields.
22. Write effective research reports.
23. Develop attitude for lifelong learning to do research.
24. Develop professional code of conduct and ethics of research.

M. Tech. -II Semester

(16MT26101) ADAPTIVE SIGNAL PROCESSING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES:

A Course on Signal Processing at UG Level

COURSE DESCRIPTION: Development of adaptive filter theory: Method of steepest descent, Least-Mean-Square Algorithm, recursive least square algorithm, Kalman filtering algorithm and order-recursive adaptive filters.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Demonstrate in-depth knowledge in
    - Adaptive systems
    - Linear Optimum Filters
    - steepest descent
    - LMS,RLS Algorithms
    - Kalman filtering
    - Order-recursive adaptive filtering
    - Blind deconvolution
2. Analyze problems critically in the field of adaptive signal processing.
3. Design an Optimum adaptive filter for solving problems in the field of analog and digital communications.
4. Solve engineering problems and arrive at optimal solutions pertaining to communications.
5. Initiate research in adaptive signal processing.
6. Apply appropriate techniques to complex engineering activities in the field of signal processing and communications.
7. Contribute to multidisciplinary scientific work in the field of communications, Bio-Medical, Instrumentation, and control engineering.

M. Tech.-II Semester

(16MT23801) DETECTION AND ESTIMATION OF SIGNALS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES:

A Course on Probability and Stochastic Processes at UG Level

COURSE DESCRIPTION:

Decision criteria for single and multiple observations; Estimation techniques; Properties of estimators; parameter Estimation.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

8. Demonstrate advanced knowledge in
    - Different decision criteria
    - Estimation techniques and their properties
    - Selection of a good estimator for the given specifications.
    - Kalman Filter
    - Statistical estimation of parameters
9. Analyze complex engineering problems critically for conducting research in the field of signal detection and estimation.
10. Design optimum filters for solving problems in the field of Communications.
11. Solve engineering problems to obtain solutions for the design of optimum receivers.
12. Initiate research in detection and estimation of signals.
13. Apply appropriate techniques, resources to complex engineering activities in the field of Communications.
14. Contribute to multidisciplinary scientific work in the field of Communications and Radar Systems.

M. Tech.-II Semester

(16MT13804) IMAGE & VIDEO PROCESSING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES:

A Course on Digital Communications & Digital Signal Processing at UG Level

COURSE DESCRIPTION:

Image Fundamentals and its transforms; image enhancement techniques; Image compression, Image Restoration & Image Segmentation; Video Processing basics like Representation, Sampling, Motion estimation, Filtering and Compression.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

7. Gain in-depth knowledge in
    e. Image Transforms
    f. Image Enhancement & Restoration Techniques
    g. Image Segmentation & Compression Techniques
    h. Video Processing
8. Analyze complex engineering problems critically in the domain of Image Processing for conducting research.
9. Solve engineering problems for feasible and optimal solutions in the core area of Image Processing.
10. Initiate research in image and video processing.
11. Apply appropriate tools and techniques to complex engineering activities in the field of Image Processing.
12. Contribute positively to multidisciplinary scientific research in Image Processing.

M. Tech. - II Semester

(16MT26102) SMART ANTENNAS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES: --
A Course on Antennas and Wave Propagation at UG Level

COURSE DESCRIPTION:
Smart antenna configurations and architecture; Beam forming methods; Direction of Arrival (DOA) estimating methods, simulation of smart antennas and space time processing.

COURSE OUTCOMES:
After successful completion of the course, students will be able to:

1. Demonstrate in-depth knowledge on
   - Smart antenna architecture and configurations
   - Methods of estimating DOA
   - Beam forming techniques
   - Design and simulation of smart antennas
   - Space time processing
2. Analyze various design issues for conducting research related to smart antennas.
3. Design and develop smart antennas for wireless applications.
4. Formulate solutions for engineering problems pertaining to smart antennas in the field of communication.
5. Apply appropriate techniques to complex engineering activities in the field of Smart antennas.

M. Tech. - II Semester
(16MT23805) WIRELESS COMMUNICATIONS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PREREQUISITES: A Course on Digital Communications at UG Level.
COURSE DESCRIPTION:
Introduction to cellular wireless communication; Radio propagation in mobile atmosphere; Equalization along with Diversity techniques; several access techniques; Introduction to wireless networking; Multicarrier modulation techniques.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:

6. Demonstrate advanced knowledge in
   - Cellular systems and wireless standards
   - Radio wave propagation in wireless environment
   - Equalization and diversity techniques
   - Multiple access techniques and networking
   - Multicarrier modulation
7. Analyze complex engineering problems critically for conducting research in wireless systems.
8. Design a Digital Communication System/ Subsystem for societal needs.
9. Solve engineering problems with wide range of solutions in wireless communications.
10. Apply appropriate techniques to engineering activities in the field of wireless communications.

M. Tech. -II Semester
(16MT26103) EMI/EMC

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES:
Courses on Electromagnetic waves and Transmission lines, Antennas and wave propagation & Microwave engineering at UG Level.

COURSE DESCRIPTION:
Electromagnetic interference & compatibility; EMI/EMC Standards; Radiated Interference Measurement; Conducted Interference Measurement; Effects of Grounding, Shielding, Bonding; EMI Filters; EMI Cables; EMI Connectors; EMI Components.

COURSE OUTCOMES:
After successful completion of the course, students will be able to:

1. Demonstrate in-depth knowledge in
    - electromagnetic interference effects
    - standards of EMC
    - Radiated and conducted interference measurements
    - Effects of grounding at high frequencies
    - EMC Filters, Cables, Connectors, and Components
2. Analysis and design of electronic systems for real time applications.
3. Solve engineering problems and arrive at optimal solutions pertaining to EMI/EMC.
4. Initiate research in electromagnetic interference and compatibility.
5. Apply appropriate techniques to complex engineering activities in the field of electronic systems.
6. Ability to contribute multidisciplinary scientific research on radiated measurements.
7. Demonstrate knowledge and understanding of effects of Electromagnetic Interference and apply the same in practice, manage projects effectively in practical implementing issues.
8. Understand ethical responsibility towards environment and society in the field of communication applications.

M. Tech. -II Semester
(16MT26104) RADAR SIGNAL PROCESSING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

Pre-requisite: A course on Radar systems at UG level.

Course Description: Radar range equation and matched filter; Detection of radar signals in the presence of noise; Wave form selection and radar clutter; Pulse compression and Phase coding techniques.

Course Outcomes:
After successful completion of the course, students will be able to:

1. Demonstrate knowledge in
    - Characteristics of matched filter
    - Detection criteria of radar signals in noise environment.
    - Radar waveform design requirements.
    - Pulse compression techniques
    - Different coding techniques.
2. Analyze complex engineering problems critically in the domain of information, source encoding.
3. Conceptualize and Solve engineering problems for feasible and optimal solutions in the core area of information theory and coding techniques.
4. Initiate research in radar signal processing.

5. Apply different detection techniques to extract the radar echo signals in the presence of Noise.
6. Contribute to multidisciplinary scientific work in the field of Communication and dynamics of environment.

M. Tech. - II Semester

(16MTL23809) SPEECH PROCESSING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES: Courses on Signals & Systems and Digital Signal Processing in UG

COURSE DESCRIPTION:

Acoustic theory of speech production; Models for speech signals and speech processing systems; Mathematical analysis of speech signals - homomorphic and LPC models; Speech and speaker recognition systems.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

2. Demonstrate in-depth knowledge in
   - Digital model representation of speech signal
   - LPC analysis
   - Homomorphic models
7. Analyze complex engineering problems critically for conducting research in speech signal processing.
8. Solve engineering problems using efficient algorithms for feasible and optimal solutions in Speech signal processing field.
9. Initiate research in speech signal processing.
10. Apply speech and speaker verification techniques to complex engineering activities in the field of speech processing.
11. Contribute to scientific research in Speech and speaker identification and verification systems with objectivity and rational analysis.

M. Tech. -II Semester

(16MT25709) WIRELESS SENSOR NETWORKS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES: --

A Course on Computer Networks and Wireless Communication and Networks at UG Level.

COURSE DESCRIPTION:

WSN architecture, types, Quality measures of wireless channels, various MAC protocols, Sensor deployment and routing related protocols, congestion control in WSNs.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

5. Gain in-depth knowledge in
   - Wireless Sensor Networks
   - Physical layer
   - Data link layer
   - Network layer
   - Transport layer
6. Analyze various design issues for conducting research related to Datalink, network and transport protocols of wireless sensor network architecture.
7. Design and develop feasible and optimal solutions for societal use.
8. Solve complex engineering problems pertaining to the field of wireless sensor networks.

M. Tech. - II SEMESTER

(16MT26131) COMMUNICATIONS LAB-II

Int. Marks	Ext. Marks	Max. Marks	L	T	P	C
50	50	100	-	-	4	2

PRE- REQUISITES: Simulation lab at UG level

COURSE DESCRIPTION:

Simulation of communication systems over communication channels with and without line coding; Design and simulation of Bussgang Blind channel; Minimum Mean Square Error and zero force equalizer; Adaptive equalizers using LMS and RLS algorithms.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Demonstarte in-depth knowledge in
    - Design of CDMA communication system and evluate its performance over a Gaussian and multipath Rayleigh fading channel.
    - Design and simulation of an adaptive equalizer using LMS and RLS algorithms.
    - Design and simulation of M-ary QAM system over an AWGN fading channel and evaluate its performance.
    - Simulating communication system using convolutional codes & Viterbi Decoding.
    - BER evaluation for BPSK modulation system with Minimum Mean Square Error (MMSE) equalization and Zero force Equalization in 3 tap ISI channel.
2. Analyze engineering problems for feasible and optimal solutions in the core area of advanced Communications.
3. Design of various components of communication systems.
4. Use MATLAB Toolboxes to solve complex engineering activities in the domain of advanced communications.
5. Understand ethical responsibility towards environment & society in the field of communications.
6. Communicate effectively in verbal & written forms.

M.Tech – II Semester

(16MT13832) IMAGE & VIDEO PROCESSING LAB

Int. Marks	Ext. Marks	Max. Marks	L	T	P	C
50	50	100	-	-	4	2

PREREQUISITE:

A course on Image & Video Processing

COURSE DESCRIPTION: Fundamentals of images, image transforms, enhancement, restoration, image compression and coding and video processing.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

8. Demonstrate knowledge in
    - Image Transforms
    - Image Enhancement & Restoration Techniques
    - Image Segmentation & Compression Techniques
    - Video Processing
9. Understand various applications of image processing in industry, Medicine, and defense.
10. Solve engineering problems for feasible and optimal solutions in the core area of Image and video Processing.
11. Initiate research in image and video processing.

12. Acquire an appreciation for the Image and video processing issues and techniques and be able to apply these techniques to real world problems.
13. Contribute positively to multidisciplinary scientific research in Image and video Processing.
14. Communicate effectively in verbal and written forms.

M. Tech. -II Semester

(16MT26133) SEMINAR

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
--	100	100	--	--	--	2

PRE-REQUISITES:--

COURSE DESCRIPTION:

Identification of seminar topic; literature survey; preparation of technical report and presentation.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Demonstrate capacity to identify an advanced topic for seminar in core and allied areas.
2. Extract information pertinent to the topic through literature survey.
3. Comprehend extracted information through analysis and synthesis critically on the topic.
4. Plan, organize, prepare and present effective written and oral technical report on the topic.
5. Adapt to independent and reflective learning for sustainable professional growth in communication systems.
6. Contribute to multidisciplinary scientific work in the field of Communication Systems.
7. Understand ethical responsibility towards environment and society in the field of Communication Systems.
8. Engage in lifelong learning for development of technical competence in the field of Communication Systems.

M. Tech. – II Semester

(16MT23810) INTELLECTUAL PROPERTY RIGHTS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	-	2	-	-

PRE-REQUISITES: --

COURSE DESCRIPTION:

Introduction to Intellectual Property; Trade Marks; Law of Copy Rights; Law of Patents; Trade Secrets; Unfair Competition; New Development of Intellectual Property.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

17. Demonstrate in-depth knowledge on
    - Intellectual Property
    - Trade Marks & Secrets
    - Law of Copy Rights, Patents
    - New development of Intellectual Property
18. Analyze the different forms of infringement of intellectual property rights.
19. Solve problems pertaining to Intellectual Property Rights.
20. Stimulate research zeal for patenting of an idea or product.
21. Write effective reports required for filing patents.
22. Develop life-long learning capabilities.
23. Develop awareness of the relevance and impact of IP Law on their academic and professional lives.
24. Develop attitude for reflective learning.

M. Tech.-III & IV Semester

(16MT36131 & 16MT46131) PROJECT WORK

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
200	200	400	--	--	--	28

PRE-REQUISITES:--

COURSE DESCRIPTION:

Identification of topic for the project work; Literature survey; Collection of preliminary data; Identification of implementation tools and methodologies; Performing critical study and analysis of the topic identified; Time and cost analysis; Implementation of the project work; Writing of thesis and presentation.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

1. Demonstrate capacity to identify an advanced topic for project work in core and allied areas.
2. Extract information pertinent to the topic through literature survey.
3. Comprehend extracted information through analysis and synthesis critically on the topic.
4. Solve engineering problems pertinent to the chosen topic for feasible solutions.
5. Use the techniques, skills and modern engineering tools necessary for project work.
6. Do time and cost analysis on the project.
7. Plan, prepare and present effective written and oral technical report on the topic.
8. Adapt to independent and reflective learning for sustainable professional growth.
9. Contribute to multidisciplinary scientific work in the field of Communication Systems.
10. Understand ethical responsibility towards environment and society in the field of Communication Systems.
11. Engage lifelong learning for development of technical competence in the field of Communication Systems.

Program: M.Tech. ELECTRICAL POWER SYSTEMS

M. Tech. I-Semester
16MT10701:ADVANCED CONTROL SYSTEMS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES: Control Systems at UG level.
COURSE DESCRIPTION:
Advanced concepts of controllability, observability; Analysis of non-linear systems; Lyapunov stability; design of controllers and observers; optimal control concepts.
COURSE OUTCOMES:On successful completion of the course, student will be able to
CO1. demonstrateknowledge in canonical forms, principle of duality, controllability, observability, effect of feedback, stability of nonlinear control systems and the concept of optimal control.
CO2. apply/analyse describing function, Phase-Plane methods and Lyapunov's stability criterion forstability analysis of non-linear systems.
CO3. solve problems in the area of non-linear systems.
CO4. initiate research in stability and optimal control systems applied to various real-time applications**.**
CO5. use modern techniques in the design and study of controllers,observers for stability of non-linear systems.

M. Tech. I-Semester
16MT10702: HIGH VOLTAGE ENGINEERING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES: Engineering Mathematics, Electromagnetic fields and Electrical Circuits at UG level.
COURSE DESCRIPTION:
Breakdown mechanisms in solids, liquids, gases and composite dielectrics materials; conventional methods of generation and measurement of high DC, AC, impulse voltages and currents; determine the ability of an electrical apparatus to meet guaranteed test procedures and standards.
COURSE OUTCOMES: On successful completion of the course, student will be able to
CO1. demonstrate knowledge on
- behavior of various insulation materials,
- generation of high voltage and currents,
- measuring techniques for high voltage and currents,
- testing of various electrical apparatus,
- overvoltage phenomena and protection against them.

CO2. analyze the
- behavior of insulation materials,
- circuits for generation and measurement of high voltages,
- testingcircuits for testing of high voltage equipment.

CO3. evaluate various high voltage generation, measuring and testing parameters of high voltage circuits.
CO4. initiate research skills in design of
- new methods of generation of high voltages,
- measuring and testing circuits for high voltage systems,
- composite insulation systems to improve the dielectric strength.

M. Tech. I-Semester
16MT10703: POWER ELECTRONIC CONVERTERS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES: Power Electronics at UG level
COURSE DESCRIPTION:
Power semiconductor devices; Characteristics of power switching devices; Gate and base drive circuits; Multipulse controlled rectifiers; Power factor improvement techniques; Voltage source converters; Current source converters; Switching mode regulators; Resonant converters; Voltage control of single phase and three phase inverters; Multilevel inverters.
COURSE OUTCOMES: On successful completion of the course, student will be able to

CO1. demonstrate knowledge on
- operation and performance of power electronic converters,
- control strategies of power devices and converters.

CO2. analyze the performance of multi pulse AC/DC converters and DC/DC converters.
CO3. evaluate the power converter modules for various operating/control parameters.
CO4. initiate research in designing appropriate power converter schemesto meet/solve the industrial requirements/problems.

M. Tech. I-Semester
16MT10704: POWER SYSTEM SECURITY AND STATE ESTIMATION

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES: Engineering mathematics, numerical methods, fundamental of power system, Power system operation and Control and Power system Analysis at UG level
COURSE DESCRIPTION:
Power system network matrices; Balanced and unbalanced short circuit analysis; AC and DC Load flow studies; Power system security; Methods of power system state estimation
COURSE OUTCOMES: On successful completion of the course, student will be able to
CO1. demonstrate in-depth knowledge on
- formation of power system network matrices,
- load flow solutions and fault analysis for various operating conditions,
- state estimation and security analysis of power systems,
- Energy Management System (EMS) and control center.

CO2. analyze state and security aspects of power system network for various operational issues and contingencies.
CO3. develop skills in evaluating the state and security of power system network.
CO4. initiate research in developing algorithms to investigate the state &securityof power system network and design appropriate control strategy to meet the required specifications.

M. Tech. I-Semester
16MT10705: REACTIVE POWER COMPENSATION AND MANAGEMENT

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES: Power Systems at UG level
COURSE DESCRIPTION:
Reactive Power compensation: Ideal compensator; Line and load compensation ; Compensating devices; Reactive power coordination; Quality of power supply; Distribution side management; Reactive power management in domestic and industrial sectors.
COURSE OUTCOMES: On successful completion of the course, student will be able to
CO1. demonstrate knowledge on
- concepts of reactive power compensation,
- different methods of reactive power compensation,
- load patterns and loss reduction methods in distribution lines.

CO2. analyze different types of reactive power compensation methods
CO3. develop skills in evaluating size and location of compensator to improve power system profile.
CO4. initiate research in reactive power management for commercial and industrial applications.
CO5. follow standards and practices for maintaining quality of power.

M. Tech. I-Semester
16MT10706: EHVAC TRANSMISSION

Int. Marks	Ext. Marks	Total marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES: Transmission of electric power, Distribution of Electric Power and Power System Analysis at UG level.
COURSE DESCRIPTION:

Transmission Line Trends and Preliminaries, Voltage Gradients of Conductors, Corona Effects, Electrostatic Fields, Power-Frequency Voltage Control and Over Voltages.

COURSE OUTCOMES: On successful completion of the course, student will be able to

CO1. demonstrate knowledge on
- EHVAC conductor parameters, configurations, electrical and mechanical aspects,
- corona interference, effects and relevant parameters in EHVAC systems,
- electrostatic field interference and effects,
- voltage control methods in EHVAC system.

CO2. analyze
- various electrical parameters of conductor with various configurations,
- various parameters of corona phenomenon in EHVAC system.

CO3. demonstrate skills in evaluation of various parameters of EHV lines

CO4. initiate research in designing strategies to minimize adverse effects of EHVAC system.

M. Tech. I-Semester
16MT10707: MICROCONTROLLERS AND APPLICATIONS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES: Digital logic design, Microprocessors and Microcontrollers at UG level

COURSE DESCRIPTION:

8051 Microcontroller: Architecture, Programming and Interfacing; PIC Microcontrollers: Architecture, features, programming and Interfacing

COURSE OUTCOMES: On successful completion of the course, student will be able to

CO1. demonstrate knowledge onarchitecture and salient features of 8051 and PIC microcontrollers.

CO2. critically analyze a microcontroller and develop a suitable interface for interfacing and control operations.

CO3. develop skills in evaluating stand-alone systems and develop programs for interfacing and control.

CO4. undertake research by identifying a suitable microcontroller for solving complex electrical engineering problems.

CO5. use modern tools like PROTEUS, MPLAB, SCILAB, PIC 'C' Compiler etc., for the design, analysis and implementation of the system.

M. Tech. I-Semester
16MT10708: POWER SYSTEM RELIABILITY

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES: Probability and Statistics at UG level

COURSE DESCRIPTION:

Fundamentals of Reliability Engineering; Evaluation of Power system operating capacity reserve; Evaluation of Frequency and Duration Techniques; Reliability Analysis of Interconnected Systems; Power Distribution System Reliability Analysis

COURSE OUTCOMES: On successful completion of the course, student will be able to

CO1. demonstrate knowledge on
- conceptual algorithms for planning, security and reliable operation of power system,
- system risks during normal and adverse weather conditions.

CO2. analyze complex power system network structures for computation of reliability indices.

CO3. evaluatethe reliability of power system network using reliability indices.

CO4. initiate research indeveloping various algorithms for determining the power system network reliability for various operating scenarios.

M. Tech. I-Semester
16MT10709: SOLAR AND WIND ENERGY CONVERSION SYSTEMS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES: Power Electronics and Non-Conventional Energy Resources at UG level
COURSE DESCRIPTION:
Non-Conventional energy resources; Wind and Solar energy systems: design and operation; Power Conditioning Schemes for Solar and Wind Energy systems; Impact of power quality problems.
COURSE OUTCOMES: On successful completion of the course, student will be able to
CO1. demonstrate knowledge on various renewable energy sources.
CO2. analyze
- various operational aspects of renewable energy sources,
- various power quality and conditioning issues while integrating renewable energy sources.

CO3. develop skills in estimating wind &solar power generation and other parameters.
CO4. initiate research in designing of wind and solar power systems.

M. Tech. I-Semester
16MT10731: HIGH VOLTAGE ENGINEERING LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	--	--	4	2

PRE-REQUISITES: High Voltage Engineering and Electrical Measurements at UG level.
COURSE DESCRIPTION:
To conduct experiments on Breakdown mechanisms in dielectrics materials; Generation &measurement of high DC, AC, impulse voltages and currents and testinghigh voltageelectrical apparatus.
COURSE OUTCOMES: On successful completion of the course, student will be able to
CO1. demonstrate knowledge on
- behavior of various insulation materials,
- generation of high voltage and currents,
- measuring techniques for high voltage and currents,
- testing of various electrical apparatus.

CO2. analyze the behavior of insulation systems, circuits for high voltage generation, measurement and testing.
CO3. evaluate various parameters of high voltage generating, measuring and testing circuits.
CO4. initiate research to design a suitable setup for measuring and testing of High Voltage.
CO5. follow the IEC standards and safety measures for efficient operation and testing of high voltage equipment.
CO6. function effectively as an individual and as a member in a team
CO7. prepare laboratory report that clearly communicates the experimental information.
CO8. practice professional code of ethics.

M. Tech. I-Semester
16MT10732: POWER SYSTEMS SIMULATION-I LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	--	--	4	2

PRE-REQUISITES:
Power system operation and control, Power system analysis, Power quality, Power electronics and Control Systems at UGand PG level.
COURSE DESCRIPTION:
Modelling, simulation and analyze operation, control of power system Networks and Power electronics converters.
COURSE OUTCOMES: On successful completion of the course, student will be able to
CO1. demonstrate knowledge on various problems in electrical engineering through modern tools and simulate the methods to mitigate using software packages in field of power system and power electronics.
CO2. analyze the simulated observations of power system networks, power electronic circuits and their behavior through theoretical perspective.
CO3. evaluate various parameters of the power systems/power electronic circuits
CO4. interpret the observations of network/circuits and design a suitable control strategy to meet the required specifications.

CO5. select and apply modern software tools for solving problems in the existing power system.
CO6. function effectively as an individual and as a member in a team
CO7. prepare laboratory report that clearly communicates the experimental information.
CO8. practice the professional code of ethics.

M. Tech. I-Semester
16MT13808: RESEARCH METHODOLOGY

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	-	2	-	-

PRE-REQUISITES:
COURSE DESCRIPTION:
Overview of Research, research problem and design, various research designs, data collection methods, statistical methods for research, importance of research reports and its types
COURSE OUTCOMES: On successful completion of the course, student will be able to
CO1. demonstrate knowledge on
- research design and conducting good research,
- various data collection methods,
- statistical methods in research,
- report writing techniques.

CO2. analyze various research design issues for conducting research in core or allied areas
CO3. formulate solutions for engineering problems by conducting research effectively in the core or allied areas
CO4. carryout literature survey and apply good research methodologies for the development of scientific/technological knowledge in one or more domains of engineering.
CO5. select and apply appropriate techniques and tools to complex engineering activities in their respective fields
CO6. write effective research reports.
CO7. develop attitude for lifelong learning to do research
CO8. develop professional code of conduct and ethics of research.

M. Tech. II-Semester
16MT20701: FLEXIBLE AC TRANSMISSION SYSTEM

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES: Power Electronics and Power Systems at UG level and Power Electronic Converters and Reactive Power Compensation and management at I-Sem. of M.Tech. EPS
COURSE DESCRIPTION:
Need for Flexible AC transmission systems; objectives of shunt and series compensation, phase angle regulators; FACTS controllers: shunt, series and combined; Coordination of various FACTS controllers.
COURSE OUTCOMES: On successful completion of the course, student will be able to
CO1. demonstrate knowledge on
- compensation schemes for real and reactive power control,
- Static Shunt, Series and Shunt-Series compensation,
- FACTS devices.

CO2. analyze FACTS devices for the appropriate control operation.
CO3. evaluate feasibility of FACTS device and controllers for flexible operation of system.
CO4. initiate research to develop/design new FACTS controllers for reliable operation of power system.

M. Tech. II-Semester
16MT20702:INTELLIGENT SYSTEMS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES: Engineering Mathematics, Electrical Machines & Power Systems at UG level.

COURSE DESCRIPTION:
Neural Networks; Fuzzy Logic Systems; Genetic Algorithms; Hybrid Intelligent Systems; Swarm intelligence; Applications.

COURSE OUTCOMES: On successful completion of the course, student will be able to

CO1. demonstrate knowledge on soft computing techniques.

CO2. analyze complex engineering problems with intelligent techniques.

CO3. solve electrical engineering problems using intelligent systems.

CO4. initiate research related to applications of soft computing in the fields of electrical engineering and allied areas.

CO5. select and apply suitable intelligent techniques for engineering problems.

M. Tech. II-Semester
16MT20703:POWER SYSTEM STABILITY AND CONTROL

1nt. marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES: Electrical Machines, Control systems, Power system analysis, Power System operation and control at UG level and Advanced control systems and Power System Security and State Estimation at PG level.

COURSE DESCRIPTION:

Introduction to the synchronous machine classical model; state space models of synchronous machine; Methods of Excitation systems and modelling; Effect of excitation on stability; Analysis of Voltage stability

COURSE OUTCOMES: On successful completion of the course, student will be able to

CO1. demonstrate knowledge on
- various power system stability issues of a small and large power system networks,
- modeling of SMIB, multi-machine and excitation systems,
- voltage control and reactive power management concepts.

CO2. analyzethe power system network for stability and control.

CO3. develop skills in evaluating power system stability.

CO4. initiate research to develop / design new control strategies or methodology for enhancing stability of power system.

M. Tech. (EPS), II-Semester
16MT20704: RESTRUCTURED POWER SYSTEM

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES: Power system operation and control, FACTS and Reactive Power Compensation and Management at UG level.

COURSE DESCRIPTION:

Features of Restructured Power systems; Market models; Information and transmission services; Electricity pricing and forecasting; Ancillary services management.

COURSE OUTCOMES: On successful completion of the course, student will be able to

CO1. demonstrate knowledge on:
- operation of deregulated electricity market,
- key issues of electricity market models and their functionalities in different scenarios,
- electricity pricing, forecasting methods and ancillary service management in competitive market.

CO2. analyze market models to provide power exchange among various entities of deregulated power system.

CO3. solve market models, evaluating transmission losses and to regulate congestion in tie-lines for reliable operation in the competitive premise

CO4. design and developvarious forecasting methods for pricing, planning and operation of deregulated power systems.

M. Tech. II-Semester
16MT20705: STATICAND DIGITAL PROTECTION OF POWER SYSTEMS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES: Switchgear and Protection, Microprocessors and Microcontrollers at UG level.
COURSE DESCRIPTION:
Fundamentals of static and digital relays; Amplitude and Phase Comparators; characteristics of Static over current and differential relays; Static Distance relays; Numerical relays.
COURSE OUTCOMES: On successful completion of the course, student will be able to
CO1. demonstrate knowledge on
- digital and numerical relays,
- operation of static and microprocessor based relays.

CO2. analyze different power system protection schemes.
CO3. evaluatevarious protection schemes for power system components.
CO4. initiate research related to design and application of appropriate digital relays in the fields of electrical engineering.

M. Tech. II-Semester
16MT20706:ENERGY AUDITING, CONSERVATION AND MANAGEMENT

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES: Generation of Electric Power and Managerial Economics and Financial Analysis at UG level.
COURSE DESCRIPTION:
Basic Principles of Energy Audit;Energy Management; Energy Efficient Motors and Lighting; Energy Instruments; Computation of Economic Aspects and Analysis.
COURSE OUTCOMES:On successful completion of the course, student will be able to
CO1. demonstrate knowledge on energy conservation and management.
CO2. analyze the economic aspects of energy management.
CO3. evaluateand practice various auditing schemes for domestic and industrial systems.
CO4. design and apply various energy instruments for energy auditing and lighting systems.

M. Tech. II-Semester
16MT20707: HIGH VOLTAGE DC TRANSMISSION

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES: Power Electronics and Power systems at UG level and Power Electronic converters at PG level
COURSE DESCRIPTION:
HVDC Transmission: Capabilities, Applications and planning; Analysis and control of power converter; Harmonics and Filters; Types of Multi-Terminal DC Systems and control; Faults and Protection.
COURSE OUTCOMES: On successful completion of the course, student will be able to
CO1. demonstrate knowledge on:
- HVDC transmission systems,
- operation of static converters and its control,
- different types of faults and protection schemes in HVDC systems.

CO2. analyze various static converters in HVDC systems, harmonics, filters and MTDC systems.
CO3. evaluate the performance of HVDC systems.
CO4. initiate research in designing filter circuits and control techniques for HVDC systems.

M. Tech. II-Semester
16MT20708:POWER QUALITY

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES: Distribution of Electric Power and Power Electronics at UG level

COURSE DESCRIPTION:
Power Quality concepts; harmonics and voltage regulation using conventional methods; power quality enhancement using custom power devices; power quality issues in distributed generation.
COURSE OUTCOMES: On successful completion of the course, student will be able to
CO1. demonstrate knowledge on
- various power quality issues and mitigation techniques,
- operational issues in distributed generation.

CO2. analyze
- harmonic distortion due to commercial and industrial loads,
- the suitability of various custom power devices.

CO3. evaluate various power quality indices.
CO4. initiate research to develop/designnew schemes and techniques for power quality enhancement.
CO5. apply the appropriate principles and techniques for integration of distributed generation and utilities.

M. Tech. II-Semester
16MT20709:SMART GRID TECHNOLOGY

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES: Power Systems at UG level
COURSE DESCRIPTION:
Concept of smart grid; various information and communication technologies for Smart Grid; Smart metering; Demand side integration; Energy management systems
COURSE OUTCOMES: On successful completion of the course, student will be able to
CO1. demonstrate knowledge on
- smart grid initiatives and technologies,
- information and communication technologies for the smart grid,
- sensing, measurement, control and automation.

CO2. demonstrateskills in analyzing fault levels and state of the system.
CO3. evaluate various information security protocols adhering the standards of smart grid.
CO4. initiate research on modern techniques for implementation in smart grid.

M. Tech. II-Semester
16MT20731: POWER SYSTEMS AND RELAYS LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	--	--	4	2

PRE-REQUISITES: Electrical Machines and Power Systems at UG Level
COURSE DESCRIPTION:
Relay testing, fault analysis, determination of sequence reactances of power system components, dielectric strength of transformer oil and synchronous machine power angle characteristics.
OUTCOMES: On successful completion of the course, student will be able to
CO1. demonstrate knowledge in power system protection and testing of relays bycombining existing and novel technology.
CO2. analyze protective schemes and testing methods in the field of power systems.
CO3. demonstrate skills in evaluating the power system network parameters and relay settings for appropriate protection.
CO4. initiate research to design/develop a suitable protection scheme for power system components/networks.
CO5. apply modern numerical and processor based relays for protection and relaying.
CO6. function effectively as an individual and as a member in a team
CO7. prepare laboratory report that clearly communicates the experimental information.
CO8. practice professional code of ethics

M. Tech. II-Semester
16MT20732:POWER SYSTEMS SIMULATION-II LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	**50**	**100**	**--**	**--**	**4**	**2**

PRE-REQUISITES: Power system analysis, FACTS, Power system operation & control, Power quality and Switchgear and protection at UG and PG level.

COURSE DESCRIPTION:

Modelling, simulation and analyze operation and control of power system networks.

COURSE OUTCOMES: On successful completion of the course, student will be able to

CO1. demonstrate knowledge on various power system problems through modern tools and disseminate them using software packages in field of power system and power electronics.
CO2. analyze the simulated observations of power system networks, power electronic circuits and their behavior through theoretical perspective.
CO3. evaluate various parameters of the power systems
CO4. interpret the observations of power system network and design a suitable control strategy to meet the required specifications.
CO5. select and apply modern software tools for solving real time problems in the existing power system
CO6. function effectively as an individual and as a member in a team
CO7. prepare laboratory report that clearly communicates the experimental information.
CO8. practice professional code of ethics.

M. Tech. II-Semester
16MT20733: SEMINAR

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
--	**100**	**100**	**--**	**--**	**--**	**2**

PRE-REQUISITES:--

COURSE DESCRIPTION:

Identification of seminar topic; literature survey; preparation of technical report and presentation.

COURSE OUTCOMES:On successful completion of the course, student will be able to

CO1. demonstrate capacity to identify an advanced topic for seminar in core and allied areas.
CO2. extract information pertinent to the topic through literature survey.
CO3. comprehend the extracted information through analysis and synthesis critically on the topic.
CO4. contribute to multidisciplinary scientific workin the field of Power systems.
CO5. manage time and resources effectively and efficiently.
CO6. plan, organize, prepare and present effective written and oral technical report on the topic.
CO7. engage in lifelong learning for development of technical competence in the field of Power Systems.
CO8. understand ethical responsibility towards environment and society in the field of Electrical engineering.
CO9. adapt to independent and reflective learning for sustainable professional growth in Electrical power systems.

M. Tech. II-Semester
16MT23810: INTELLECTUAL PROPERTY RIGHTS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	**-**	**-**	**-**	**2**	**-**	**-**

PRE-REQUISITES: -

COURSE DESCRIPTION:

Introduction to Intellectual Property; Trade Marks; Law of Copy Rights; Law of Patents; Trade Secrets; Unfair Competition; New Development of Intellectual Property.

COURSE OUTCOMES: On successful completion of the course, student will be able to

CO1. demonstrate knowledge on
- Intellectual Property,
- Trade Marks & Secrets,
- Law of Copy Rights, Patents,
- New development of Intellectual Property.

CO2. analyze the different forms of infringement of intellectual property rights.
CO3. solve problems pertaining to Intellectual Property Rights.
CO4. stimulate research zeal for patenting of an idea or product.
CO5. write effective reports required for filing patents.
CO6. develop life-long learning capabilities.
CO7. develop awareness of the relevance and impact of IP Law on their academic and professional lives.
CO8. develop attitude for reflective learning.

M. Tech. III & IV-Semester
16MT30731 & 16MT40731: PROJECT WORK

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
200	**200**	**400**	**--**	**--**	**--**	**28**

PRE-REQUISITES:--
COURSE DESCRIPTION:
Identification of topic for the project work; Literature survey; Collection of preliminary data; Identification of implementation tools and methodologies; Performing critical study and analysis of the topic identified; Time and cost analysis; Implementation of the project work; Writing of thesis and presentation.
COURSE OUTCOMES:On successful completion of the course, the student will be able to
CO1. demonstrate capacity to identify an advanced topic for project work in core and allied areas.
CO2. analyze the problem and derive an optimal solution pertinent to the chosen topic.
CO3. solve engineering problems and provide a wide range of potential solutions.
CO4. comprehend extracted information through the literature survey for design and development of engineering problems pertinent to the chosen topic.
CO5. use the techniques, skills and modern engineering tools necessary for project work.
CO6. contribute to multidisciplinary scientific workin the field of Electrical power Systems.
CO7. execute the project effectively and efficiently considering economical and financial factors.
CO8. plan, prepare and present effective written and oral technical report on the topic.
CO9. engage in lifelong learning for development of technical competence in the field of Electrical power systems and allied fields.
CO10. understand ethical responsibility towards environment and society in the field of Electrical Engineering.
CO11. adaptto independent and reflective learning for sustainable professional growth.

Program: M.Tech. POWER ELECTRONICS AND DRIVES

M. Tech. (PED) – I Semester
(16MT1BS01)APPLIED MATHEMATICS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PREREQUISITES: Course on Engineering Mathematics at UG Level.
COURSE DESCRIPTION:
Matrix theory, Calculus of variations, One dimensional random variables, Linear programming and Fourier series.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. demonstrate knowledge on
- matrix theory and eigen vectors
- functions of several variables
- probability theory and distributions
- optimization processes
- fourier series

CO2. analyze and solve problems involving
- matrix factorizations
- variations in moving boundaries
- probability distributions
- optimization methods
- power signals

CO3. design mathematical models for power signals, power electronic circuits and drives.
CO4. develop advanced skills in analyzing the complex problems involving periodic and non-periodic functions in power signals, power electronic circuits and allied areas.

M. Tech. (PED) – I Semester
(16MT12301)ADVANCED POWER SEMICONDUCTOR DEVICES

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PREREQUISITES: Courses on Electronic Devices and Power Electronics at UG Level.
COURSE DESCRIPTION:
Construction, types, switching, operating characteristics and applications of power semiconductor devices; Design of firing, protective circuits and heat sinks for various power semiconductor devices.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. demonstrate knowledge on
- construction, operation and characteristics of various power semiconductor devices.
- applications of power semiconductor devices.
- operation of firing and protection circuits.
- thermal protection of power semiconductor devices.

CO2. analyze various characteristics of power semiconductor devices.
CO3. design firing and protective circuits for power converters.
CO4. initiate research ideas in selecting the appropriate power semiconductor devices for desired applications.
CO5. select and apply the appropriate controlling and firing circuits for different power converters.

M. Tech. (PED) – I Semester
(16MT12302)ANALYSIS OF INVERTERS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PREREQUISITES: Courses on Power Electronics at UG Level.
COURSE DESCRIPTION:
Operation and performance of single phase and three phase voltage source inverters; Voltage control of single phase and three phase inverters; Design of PWM inverter; Current Source Inverters; Multilevel inverters and resonant inverters.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. demonstrate knowledge on
- operation of various configurations of inverters.
- various voltage control methods.
- Pulse Width Modulation techniques.

CO2. analyze& comprehend the operating modes of inverters under different configurations subjected to various loads.
CO3. evaluate the performance of various types of inverters and PWM controllers.
CO4. conduct investigations to provide feasible solutions for the problems in the field of power inverters.
CO5. select appropriate controlling technique for improving the performance of inverters.

M. Tech. (PED) – I Semester
(16MT12303)ANALYSIS OF POWER CONVERTERS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PREREQUISITES: Courses on Engineering Mathematics, Electrical circuits and Power Electronics at UG Level.
COURSE DESCRIPTION:
Single phase and three phase converters - Types, operation of controlled and uncontrolled converters; Analysis of isolated and non-isolated converters; AC voltage controllers; Choppers.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. demonstrate knowledge on
- operation of various types of AC–DC and DC-DC converters,AC voltage controllers.
- Total Harmonic Distortion.
- forced commutation circuits.

CO2. analyze& comprehend the operating modesof converters with different configurations subjected to various loads.
CO3. develop skills in evaluating the performance of various power converters.
CO4. initiateresearch ideas to provide feasible solutions for AC-DC and DC-DC converters.
CO5. select appropriate controlling techniques for improving the performance of Chopper.

M. Tech. (PED) – I Semester
(16MT12304)MODELLING OF ELECTRICAL MACHINES

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PREREQUISITES: Courses on DC Machines, Transformers and Induction Machines, Synchronous Machines.

COURSE DESCRIPTION:
Modelling and analysis of DC,induction andsynchronous machines in stationary and rotating reference frames

COURSEOUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate potential knowledge on modelling of DC, induction and synchronous machines.
CO2. analyze the performance of DC, induction and synchronous machines.
CO3. design DC, induction and synchronous machines meeting the needs of industry.
CO4. apply appropriate transformation technique to obtain reference frame variables.

M. Tech. (PED) – I Semester
(16MT12305)ELECTRIC AND HYBRID-ELECTRIC VEHICLES

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PREREQUISITES: Courses on Power Electronics, Special Electrical Machines and Power Semiconductor Drives at UG Level

COURSE DESCRIPTION:
Transportation vehicles and their impact in society; Concept and configurations of Electric Vehicles (EV); Principle, Types and operation of Hybrid-Electric Vehicles (HEVs); Power Electronic converters in HEVs; Different motor drives & energy storage technologies in EVs and HEVs.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on
- fundamental concepts of Electric Vehicles (EVs) and Hybrid-Electric Vehicles (HEVs).
- utilization of power converters in electric mobility.
- deployment of various electrical drives used in EVs and HEVs.
- battery energy storage technologies used in EVs and HEVs.
- different applications of EVs and HEVs such as aircraft, ships and locomotives.

CO2. analyze
- the practical aspects of power converters in EVs/HEVs.
- suitability of a motor drive in a vehicle application.

CO3. develop skills in evaluating the basic schemes of series & parallel HEVs and energy storage technologies in EVs/HEVs.

CO4. undertake research by implementing
- special electrical machines such as Switched Reluctance Motor and Permanent Magnet Brushless DC Motor for EVs/HEVs.
- DC-DC boost converter for HEVs.

CO5. select and apply the appropriate power converter & energy storage techniques for designing EVs and HEVs in the applications of aircraft, ships and locomotives.

CO6.demonstrate
- the effects of modern transportation on society and environment.
- the need to develop sustainable technologies in place of conventional vehicles.

M. Tech. (PED) – I Semester
(16MT12306)INTELLIGENT CONTROLLERS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PREREQUISITES: Engineering Mathematics, Power Electronics, Electrical machines and Control Systems at UG level.

COURSE DESCRIPTION:
Neural Networks; Fuzzy Logic Systems; Genetic Algorithms; Hybrid Intelligent Systems; Swarm Intelligence; Applications.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge of soft computing techniques to build intelligent systems.
CO2. analyze complex engineering problems with intelligent techniques.

CO3. design and develop intelligent systems for power electronic controllers.
CO4. initiate research related to applications of soft computing in the fields of power converters and allied areas.
CO5. select and apply suitable intelligent techniques for appropriate power converter fed drives

M. Tech. (PED) – I Semester
(16MT10707)MICROCONTROLLERS AND APPLICATIONS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PREREQUISITES: Digital logic design, Microprocessors and Microcontrollers at UG level.
COURSE DESCRIPTION:
8051 Microcontroller: Architecture, Programming and Interfacing; PIC Microcontrollers: Architecture, features, programming and Interfacing
COURSE OUTCOMES: On successful completion of the course, the students will be able to
CO1. demonstrate knowledge on
- architecture of 8051 and PIC microcontroller
- salient features of 8051 and PIC

CO2. analyze and develop a suitable interface with an appropriate microcontroller for the control operations.
CO3. develop programs for stand-alone systems.
CO4. do research by identifying a suitable microcontroller for solving complex problems in the domain of Power Electronics and Drives.
CO5. use tools like PROTEUS, MPLAB, SCILAB, PIC 'C' Compiler etc., for the design, analysis and implementation of the system.

M. Tech. (PED) – I Semester
(16MT10705)REACTIVE POWER COMPENSATION AND MANAGEMENT

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: Power Systems at UG level
COURSE DESCRIPTION:
Reactive Power compensation: Ideal compensator; Line and load compensation ; Compensating devices; Reactive power coordination; Quality of power supply; Distribution side management; Reactive power management in domestic and industrial sectors.
COURSE OUTCOMES: On successful completion of the course the students will be able to
CO1. demonstrate advanced knowledge on:
- necessity for reactive power compensation
- different methods of reactive power compensation.
- types of load patterns and loss reduction methods in distribution lines.

CO2. analyzedifferent types of compensations
CO3. developskills in designing a compensator for industrial applications**.**
CO4. do research in reactive power management in commercial and industrial applications

M. Tech. (PED) – I Semester
(16MT12331)POWER ELECTRONICS DESIGN LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	--	--	4	2

PREREQUISITES: Courses on Electronic Devices and Power Electronics at UG Level.

COURSE DESCRIPTION: Design and development of various power converters.
COURSEOUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate practical knowledge on:
- design and development of power converters.
- Understanding of gate firing circuits.

CO2. analyze and relate physical observations and measurements of various power converters with theoretical principles.

CO3. solve engineering problems related to power converters and firing circuits to provide feasible solutions.

CO4. initiateresearch ideas to provide solutions for design of power converters.

CO5. select and apply
- suitable commutation circuit for various power converters.
- PWM technique for multilevel inverters.

CO6. prepare laboratory reports that clearly communicate experimental information.

CO7. practice professional code of ethics.

CO8. function effectively as an individual and as a member in the team to solve various problems.

M. Tech. (PED) – I Semester
(16MT12332)POWER ELECTRONICS SIMULATION LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	--	--	4	2

PREREQUISITES: Courses on Electronic Devices and Power Electronics at UG Level.
COURSE DESCRIPTION: Design and analysis of various converters and inverters.
COURSEOUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on various power converters.
CO2. analyze the performance of various power converters.
CO3. evaluate the output characteristics of different types of Power converters.
CO4. initiate research ideas to provide solutions for design of power converters.
CO5. select and apply appropriate control techniques for power converters.
CO6. function effectively as an individual and as a member in the team to solve various problems.
CO7. prepare laboratory reports that clearly communicate experimental information.
CO8. practice professional code of ethics.

M. Tech. (PED) – I Semester
(16MT13808)RESEARCH METHODOLOGY

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	--	2	--	--

PREREQUISITES:--
COURSE DESCRIPTION:
Overview of Research, research problem and design, various research designs, data collection methods, statistical methods for research, importance of research reports and its types
COURSE OUTCOMES: On successful completion of the course, student will be able to

CO9. demonstrate knowledge on
- research design and conducting good research,
- various data collection methods,
- statistical methods in research,
- report writing techniques.

CO10. analyze various research design issues for conducting research in core or allied areas

CO11. formulate solutions for engineering problems by conducting research effectively in the core or allied areas

CO12. carryout literature survey and apply good research methodologies for the development of scientific/technological knowledge in one or more domains of engineering.
CO13. select and apply appropriate techniques and tools to complex engineering activities in their respective fields
CO14. write effective research reports.
CO15. develop attitude for lifelong learning to do research
CO16. develop professional code of conduct and ethics of research.

M. Tech. (PED) – II Semester
(16MT22301)LINEAR AND NON-LINEAR CONTROL SYSTEMS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PREREQUISITES: Course on Control systems in UG Level.
COURSE DESCRIPTION:
Design of compensators and controllers; describing function, phase plane analysis, Lyapunov's stability analysis; Full order observer and reduced order observer;Nonlinearcontrol design.
COURSEOUTCOMES: On successful completion of the course, students will be able to
CO1. demonstrate knowledge on
- various compensators and controllers.
- stability in the sense of Lyapunov.
- nonlinear control design.

CO2. analyze the stability of nonlinear system using
- describing function approach.
- phase plane analysis.
- Lyapunov's method.

CO3. design suitable compensator and controllers using root locus and Bode plot.
CO4. solve stability problems using Lyopunov method.
CO5. select appropriate techniques for analyzing stability of the system.

M. Tech. (PED) – II Semester
(16MT22302)POWER ELECTRONICS IN RENEWABLE ENERGY SYSTEMS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PREREQUISITES: Courses on Analysis of power converters, Analysis of inverters and Modelling of electrical machines.
COURSE DESCRIPTION:
Solar energy conversion system; Types of photovoltaic systems – Stand-alone, hybrid and grid connected systems; Wind Energy Conversion Systems; Types of WECS - stand-alone, hybrid and grid connected systems; Hybrid systems – PV-diesel, PV-wind and wind-diesel hybrid systems.
COURSE OUTCOMES: On successful completion of this course, student will be able to
CO1. demonstrate potential knowledge on
- photo-voltaic panels and wind turbines.
- various possible hybrid systems.
- operation of stand-alone and grid connected renewable energy systems.
- applications of various renewable energy systems.

CO2. analyze the performance of converters used for various conversion systems.
CO3. solve engineering problems pertaining to Renewable Energy Conversion Systems to provide feasible solutions.
CO4. initiate research to design PV system, wind energy system and controller for power converters.
CO5. select and apply appropriate controlling technique and converters for applications of various Renewable energy systems.
CO6. possess knowledge in turbines, gears and generators and contribute positively to collaborative-multidisciplinary scientific research.
CO7. Follow professional code for safe and reliable operation of electrical appliances and power grid.

M. Tech. (PED) – II Semester
(16MT22303)SOLID STATE AC DRIVES

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PREREQUISITES: Courses on Analysis of inverters and modeling of electrical machines.
COURSE DESCRIPTION:
Open loop and closed loop speed control of induction motor; Synchronous motor drive; Induction motor drive, torque control, field oriented control, flux vector estimation, synchronous motor control.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. demonstrate knowledge on
- operating regions of various AC drives.
- speed control of induction motor drives.
- control of synchronous motor drives.
- field oriented control of induction machines.

CO2. analyze the operation and performance of power converter fed AC motors.
CO3. solve engineering problems pertaining to AC drives to provide feasible solutions.
CO4. initiate research to design open loop and closed loop controllers for controlling of AC motors.
CO5. select and apply appropriatepower circuit configuration for the speed control of AC motor drives.

M. Tech. (PED) – II Semester
(16MT22304)SOLID STATE DC DRIVES

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PREREQUISITES: Courses on Analysis of power converters and Modelling of electrical machines.
COURSE DESCRIPTION:
Operation, characteristics, speed control and applications of DC motors;Performance characteristics and parameters of single phase, three phase and twelve pulse converters fed DC motor; Open loop, closed loop and digital control of DC drives.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. demonstrate knowledge on
- power circuit configuration.
- steady state operation and transient dynamics of motor load system.
- characteristics of DC motors.

CO2. analyze
- the operation of converter/chopper fed DC drives.
- single phase and three phase converter fed drives.
- the closed loop control and digital control of DC drives.

CO3. design speed controllers for closed loop solid-state DC drives.
CO4. solve engineering problems pertaining to electrical drives to provide feasible solutions.
CO5. select and apply appropriatepower circuit configuration of the phase controlled rectifiers and choppers for the speed control of DC drives.

M. Tech. (PED) – II Semester
(16MT22305)SPECIAL ELECTRICAL MACHINES

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PREREQUISITES: Courses on Electrical Machines, Control Systems and power electronics at UG level and Modelling of electrical machines at PG level

COURSE DESCRIPTION:
Construction, operation, types, characteristics and applications of Stepper Motors, Switched Reluctance Motor, PM Brushless DC Motor, Synchronous Reluctance, Linear Induction and synchronous Motors.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. demonstrate knowledge on
- construction and operation of various types of special electrical machines.
- characteristics of special electrical machines.
- open loop and closed loop operation of special electrical machines.

CO2. analyze the operation and performance of special electrical machines for various operating conditions.
CO3. design suitable accessories / controllers for desired operation and control of special electrical machines.
CO4. solve engineering problems pertaining to special electrical machines to provide feasible solutions.
CO5. select and apply appropriate technique and tools for control and operation of special electrical machines in domestic and industrial applications.
CO6. apply the conceptual knowledge of special electrical machines in relevance to industry and society.

M. Tech. (PED) – II Semester
(16MT20701)FLEXIBLE AC TRANSMISSION SYSTEMS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES: Power Electronics and Power Systems at UG level, Analysis of Power Converters and Analysis of Inverters
COURSE DESCRIPTION:
Need for Flexible AC transmission systems; objectives of shunt and series compensation, phase angle regulators; FACTS controllers: shunt, series and combined; Coordination of various FACTS controllers.
COURSE OUTCOMES: On successful completion of the course, student will be able to
CO5. demonstrate knowledge on:
- compensation schemes for real and reactive power control.
- Static Shunt, Series and Shunt-Series compensation.
- FACTS devices and controllers

CO6. analyze and adopt a suitable FACTS device for the appropriate control.
CO7. develop skills in coordination of multiple FACTS controllers in an interconnected power systems.
CO8. develop new FACTS controllers for reliable and flexible control of power system.
CO9. employ modern techniques in coordination of FACTS devices for reliable and efficient operation.

M. Tech. (PED) – II Semester
(16MT20707)HIGH VOLTAGE DC TRANSMISSION

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES: Power Electronics and Power Systems at UG level, Analysis of Power Converters and Analysis of Inverters.
COURSE DESCRIPTION:
HVDC Transmission: Capabilities, Applications and planning; Analysis and control of power converter; Harmonics and Filters; Types of Multi-Terminal DC Systems and control; Faults and Protection.
COURSE OUTCOMES: On successful completion of the course the students will be able to
CO5. demonstrate knowledge on:
- HVDC transmission systems.
- operation of static converters and its analysis.
- different types of faults and protection schemes in HVDC systems.

CO6. analyze various static converters operation in HVDC systems, harmonics, filters and MTDC systems.

CO7. evaluate the performance of HVDC systems under various operating conditions.
CO8. develop new control techniques forHVDC converter systems.
CO9. follow professional code of ethics.

M. Tech. (PED) – II Semester
(16MT20708)POWER QUALITY

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PREREQUISITES: --
COURSE DESCRIPTION:
Power Quality concepts; harmonics and voltage regulation using conventional methods; power quality enhancement using custom power devices; power quality issues in distributed generation.
COURSE OUTCOMES: On successful completion of the course the students will be able to
CO6. demonstrate knowledge on:
- various power quality issues and mitigation.
- operating conflicts in distributed generation.

CO7. analyze
- harmonic distortion due to commercial and industrial loads.
- the suitability of various custom power devices.

CO8. evaluate various power quality indices.
CO9. initiate research to develop/design new schemes and techniques for power quality enhancement.
CO10. apply the appropriate principles and techniques for integration of distributed generation and utilities.

M. Tech.(PED) – II Semester
(16MT20709)SMART GRID TECHNOLOGY

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PREREQUISITES:--
COURSE DESCRIPTION:
Concept of smart grid; various information and communication technologies for Smart Grid; Smart metering; Demand side integration; Energy management systems
COURSE OUTCOMES: On successful completion of the course the students will be able to
CO1. demonstrate knowledge in
- Smart grid initiatives and technologies
- Information and communication technologies for the smart grid.
- Sensing, measurement, control and automation.

CO2. apply skills in fault calculation and state estimation.
CO3. apply various information security tools in the smart grid technology.
CO4. extend research activities on implementation of smart grid.
CO5. develop usage of modern techniques to integrate renewable energy sources into the smart grid.

M. Tech. (PED) – II Semester
(16MT22331)ELECTRIC DRIVES LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	--	--	4	2

PREREQUISITES: Courses on Analysis of inverters and converters.
COURSE DESCRIPTION: Design and development of various AC and DC drives.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. demonstrate practical knowledge on design and development of power converter fed drives.

CO2. analyze and relate physical observations and measurements of various power converter fed drives with theoretical principles.
CO3. solve engineering problems related to power converter fed drives to provide feasible solutions.
CO4. initiate research ideas to provide solutions for design of power converter fed drives.
CO5. select and apply suitable controlling techniques for various power converter fed drives.
CO6. prepare laboratory reports that clearly communicate experimental information.
CO7. practice professional code of ethics.
CO8. function effectively as an individual and as a member in the team to solve various problems.

M. Tech. (PED) – II Semester
(16MT22332)ELECTRIC DRIVES SIMULATION LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	--	--	4	2

PREREQUISITES: Courses on Analysis of inverters and Analysis of converters.
COURSE DESCRIPTION: Design and analysis of various converter fed drives.
COURSEOUTCOMES: On successful completion of the course, students will be able to
CO1. demonstrate knowledge on various power converter fed drives.
CO2. analyze the operating characteristics of various power converter fed drives.
CO3. provide feasible solutions pertaining to electric drives.
CO4. initiate research related to applications of electric drives.
CO5. select and apply appropriate speed control techniques for power converter fed drives.
CO6. prepare laboratory reports that clearly communicate experimental information.
CO7. practice professional code of ethics.
CO8. function effectively as an individual and as a member in the team to solve various problems.

M. Tech. (PED) – II Semester
(16MT22333)SEMINAR

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
--	100	100	--	--	--	2

PREREQUISITES: --
COURSE DESCRIPTION:
Identification of seminar topic; literature survey; preparation of technical report and presentation.
COURSE OUTCOMES: On successful completion of the course, student will be able to
CO10. demonstrate capacity to identify an advanced topic for seminar in core and allied areas.
CO11. extract information pertinent to the topic through literature survey.
CO12. comprehend the extracted information through analysis and synthesis critically on the topic.
CO13. contribute to multidisciplinary scientific workin the field of Power systems.
CO14. manage time and resources effectively and efficiently.
CO15. plan, organize, prepare and present effective written and oral technical report on the topic.
CO16. engage in lifelong learning for development of technical competence in the field of Power Systems.
CO17. understand ethical responsibility towards environment and society in the field of Electrical engineering.
CO18. adapt to independent and reflective learning for sustainable professional growth in Electrical power systems.

M. Tech. (PED) – II Semester
(16MT23810)INTELLECTUAL PROPERTY RIGHTS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	-	2	-	-

PREREQUISITES: -
COURSE DESCRIPTION:
Introduction to Intellectual Property; Trade Marks; Law of Copy Rights; Law of Patents; Trade Secrets; Unfair Competition; New Development of Intellectual Property.
COURSE OUTCOMES: On successful completion of the course, student will be able to
CO1. demonstrate knowledge on
- Intellectual Property,
- Trade Marks & Secrets,
- Law of Copy Rights, Patents,
- New development of Intellectual Property.

CO2. analyze the different forms of infringement of intellectual property rights.
CO3. solve problems pertaining to Intellectual Property Rights.
CO4. stimulate research zeal for patenting of an idea or product.
CO5. write effective reports required for filing patents.
CO6. develop life-long learning capabilities.
CO7. develop awareness of the relevance and impact of IP Law on their academic and professional lives.
CO8. develop attitude for reflective learning.

M. Tech. (PED) III & IV-Semester
(16MT32301 & 16MT42301)PROJECT WORK

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
200	200	400	--	--	--	28

PREREQUISITES: --
COURSE DESCRIPTION:
Identification of topic for the project work; Literature survey; Collection of preliminary data; Identification of implementation tools and methodologies; Performing critical study and analysis of the topic identified; Time and cost analysis; Implementation of the project work; Writing of thesis and presentation.
COURSE OUTCOMES: On successful completion of the course, the student will be able to
CO1. demonstrate capacity to identify an advanced topic for project work in core and allied areas.
CO2. analyze the problem and derive an optimal solution pertinent to the chosen topic.
CO3. solve engineering problems and provide a wide range of potential solutions.
CO4. comprehend extracted information through the literature survey for design and development of engineering problems pertinent to the chosen topic.
CO5. use the techniques, skills and modern engineering tools necessary for project work.
CO6. contribute to multidisciplinary scientific workin the field of Electrical power Systems.
CO7. execute the project effectively and efficiently considering economical and financial factors.
CO8. plan, prepare and present effective written and oral technical report on the topic.
CO9. engage in lifelong learning for development of technical competence in the field of Electrical power systems and allied fields.
CO10. understand ethical responsibility towards environment and society in the field of Electrical Engineering.
CO11. adapt to independent and reflective learning for sustainable professional growth.

Program: M.Tech. COMPUTER SCIENCE

M. Tech. (CS) – I Semester
(16MT10501) ADVANCED COMPUTER NETWORKS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	*60*	*100*	*4*	*--*	*--*	*4*

PRE-REQUISITES: A Course on "Computer Networks"
COURSE DESCRIPTION:
Computer Networks and Protocols, Data Link Layer, LAN and Network Routing; Transport Layer and Internet Protocols; Wireless and Optical Networks; MANETs and Wireless Sensor Networks
COURSE OUTCOMES:
After successful completion of this course, students will be able to:
CO1. Gain knowledge on principles of computers, network topologies, routing mechanisms.
CO2. Analyze the computer network with suitable network protocols and routing algorithms.
CO3. Formulate solutions for engineering problems pertaining to the advanced networking technologies.
CO4. Develop techniques for subnet masks and addresses to fulfill networking requirements.
CO5. Conduct Research to solve the problems related to Routing Algorithms in Networks.

M. Tech. I Semester
(16MT10502) ADVANCED DATABASE MANAGEMENT SYSTEMS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	*60*	*100*	*4*	*--*	*--*	*4*

PRE-REQUISITES: A Course on "Database Management System".
COURSE DESCRIPTION:
Concepts of Database System and Architectures, Data modeling using ER-Model; SQL, Objects Relational Database and XML; Database Design and File Organizations; Query Processing, Concurrency and Recovery; Distributed DBMS Architecture and Design.
COURSE OUTCOMES:
After successful completion of this course the students will be able to:
CO1: Gain Advanced knowledge in
- Database System Concepts , Languages , Interfaces and Architectures
- Query Languages , Relational Databases and XML
- Database Design and File Organization.
- Query Processing and Recovery
- Distributed Database Architecture and Design

CO2: Analyze database management architecture and categorize languages and database objects.
CO3: Design a wide range of potential solutions for the database problems using ER-diagrams SQL, Normalization and XML.
CO4: Initiate Research to develop new Architectural models and Query processing using SQL in database Systems.
CO5: Apply appropriate modern techniques, resources and tools for the real world problems in databases.

M. Tech (CS) – I Semester
(16MT10503) ADVANCED OPERATING SYSTEMS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	*60*	*100*	*4*	*--*	*--*	*4*

PRE-REQUISITES:
A Course on ***"Operating Systems"***
COURSE DESCRIPTION
Process management and process scheduling; Concurrency, synchronization and deadlocks; Memory management, file system and secondary storage; I/O systems, protection and security; Introduction to Distributed Systems, Synchronization in Distributed Systems
COURSE OUTCOMES:
After Successful completion of the course, students will be able to:

CO-1: Gain advanced knowledge in

- Process management concepts.
- Synchronization and Deadlocks
- Inter Process Communication.
- Group Communication.
- Remote Procedure Call.

CO-2: Analyze how operating system manages resources among the users**.**
CO-3: Formulate solutions for engineering problems pertaining to the advanced Operating Systems
CO-4: Design real time solutions for the problems related to CPU Scheduling, concurrency and Synchronization
CO-5: Apply the concepts of semaphores, monitors, message-passing and other forms of synchronization to maintain Concurrency.

M. Tech (CS) I Semester
(16MT10504) DATA WAREHOUSING AND DATA MINING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	***60***	***100***	***4***	***0***	***--***	***4***

PRE-REQUISITES: A Course on "Database Management System".
COURSE DESCRIPTION: Concepts of Data Warehousing and Data mining; Pre-processing techniques in Data Warehouses; Data cube computation and OLAP query processing; Data Mining process and System architecture; relationship with data warehouse and OLAP Systems; Data mining Techniques and Applications.
COURSE OUTCOMES:
After successful completion of this course, the student will be able to:
CO1: Gain knowledge in -

- Multidimensional data model and Data warehouse Architecture.
- Data mining algorithms.
- Association Rules, Classification and Prediction and Cluster Analysis.

CO2: Analyse data mining algorithms for complex industrial problems.
CO3: Solve engineering problems to get wide variety of solutions by applying data mining algorithms.
CO4: Ability to carry out research in Spatial Mining, Spatio Temporal Mining, Text Mining Multimedia Mining and web Mining
CO5: Create and apply appropriate techniques & tools of data mining to solve real world problems.

M.Tech (CS) I-Semester
(16MT12502) DATA STRUCTURES AND ALGORITHMS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	**60**	**100**	**4**	**-**	**-**	**4**

PREREQUISITES: A course on "Computer Programming".
COURSE DESCRIPTION:
Introduction to Data Structures and Algorithms; Searching and Sorting; Trees and Graphs; Divide and Conquer; Greedy method; Dynamic Programming, Back Tracking; Branch and Bound.
COURSE OUTCOMES:
After successful completion of this course, students will be able to:
CO1. Gain knowledge on:

- Linear data structures including Stack, Queue and Linked Lists and Non-linear data structures like Trees and Graphs.
- Divide and Conquer Method, Greedy Method, Dynamic Programming, Backtracking and Branch & Bound algorithms.

CO2. Analyze the efficiency of algorithms using space and time complexities.
CO3. Solve real world problems using algorithm design techniques.
CO4. Apply Dynamic programming techniques to provide software solutions.

M. Tech (CS) – I Semester
(16MT10505) COMPUTER VISION

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	*60*	*100*	*4*	*-*	*-*	*4*

PRE-REQUISITES:
A Course on "Computer Graphics"
COURSE DESCRIPTION:
Concepts of Cameras, Measuring Light , Sources, Shadows and Shading; Linear filters, Edge detection; Segmentation by clustering, Segmentation by fitting a model; Finding templates using classifiers , Recognition by relations between Templates; Geometric camera models, Camera calibration.
COURSE OUTCOMES:
After successful completion of this course the students will be able to:
CO -1: Gain knowledge in image processing techniques.
CO -2: Analyze the applicability of various techniques such as Fourier Transforms, Normalized Correlation, Estimating Derivatives in filtering and edge detection to generate quality images.
CO -3: Solve complex image segmentation problems using clustering and fitting models.
CO -4: Conduct Research on geometric methods and tools for camera calibration.
CO -5: Apply building classifiers, voting and search techniques and Image Processing tools for finding templates for real world images.

M. Tech (CS) – I Semester
(16MT10506) INFORMATION RETRIEVAL SYSTEMS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITE:
A Course on **"**Database Management Systems"
COURSE DESCRIPTION:
Concepts of Information retrieval Systems; Indexing and data structures; indexing, Document and term clustering; user search techniques; Text search algorithms, information system Evaluation;
COURSE OUTCOMES:
After successful completion of this course, students will be able to:
CO-1 : Acquire knowledge in fundamental concepts of
- Information Retrieval System capabilities
- Data Structures
- Indexing and Search Algorithms

CO -2: Analyze concepts of Database, Data Warehouses of real time applications related to Document Store, Document data warehouses like space research , judicial, biomedical, scientific documents.
CO -3 : Solve complex search problems like ranking , weighted ,software text searches by implementing A* Search, Zipf and Information retrieval frame work
CO -4: Initiate research to identify and develop algorithms for indexing , clustering and searching.
CO -5: Create and apply online Information Retrieval Systems like search engines.

M. Tech (CS) – I Semester
(16MT10507)INTERNET OF THINGS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	*60*	*100*	*4*	*-*	*--*	*4*

PRE-REQUISITES:
C*ourses on "Computer Networks" and "Java"*
COURSE DESCRIPTION:
Domain Specific IoT's; M2M& System Management with Netconf-Yang; Developing Internet of Things Using Python; IoT Physical Devices & Case Studies Illustrating IoT Design
COURSE OUTCOMES:
After successful completion of this course, students will be able to:

CO1: Gain knowledge on
- Building blocks of Internet of Things and characteristics.
- Application areas of IoT
- Concept of M2M (machine to machine) with necessary protocols

CO2: Analyze Domain specific IoT's, revolution of Internet in Mobile Devices.
CO3: Design and Develop Techniques for solutions to solve the problems in IoT using Python Scripting Language.
CO4: Conduct research on domain specific IoT's and IoT enabling Technologies.
CO5: Acquire knowledge to recognize the opportunities and contribute to collaborative-multidisciplinary Scientific Research.

M.Tech (CS) – I Semester
(16MT22504) SOFTWARE TESTING TECHNIQUES

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: A course on "Software Development Methodologies".
COURSE DESCRIPTION: Basic concepts of Software Testing; Testing Techniques – Levels of Testing; Testing Process – Test Planning; Test Metrics and Reports; Software Test Automation.
COURSE OUTCOMES:
On successful completion of this course, the students will be able to:
1. Gain knowledge on the Software Testing types and Process for different programming environments.
2. Analyze and apply the appropriate testing techniques suitable for testing the software.
3. Perform testing by applying appropriate strategies for selecting test cases to meet requirements of the product.
4. Apply efficient modern software testing tools for automation.
5. Write test cases and perform defect reporting.

M. Tech (CS) I Semester
(16MT10531) DATABASE MANAGEMENT SYSTEMS & DATA WAREHOUSING AND DATA MINING LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	*50*	*100*	-	-	*4*	*2*

PRE-REQUISITES:
Courses on "Database Management Systems" and "Data Warehousing and Data Mining"
Course Description:
Hands on practice and implementation of data mining algorithms - Apriori, Fp-tree; Bayesian classification; Back propagation; k-means clustering; Bisecting k-means clustering in C++.
Designing and implement basic SQL Queries, PL/SQL and advanced concepts in PL/SQL such as Object creation structures; Triggers; Embedded SQL using Oracle Database Management System Package.
COURSE OUTCOMES:
After successful completion of this course, the student will be able to:
CO-1: Acquire Practical Knowledge on
- SQL Queries
- Triggers
- Data Mining Algorithms
- Classification , Prediction and Cluster Analysis

CO-2: Analyze Integrity Constraints on databases for validation and Data Mining algorithms for solving real time applications
CO-3:Develop and Design solutions to complex problems related to frequent item sets, classification and clustering.
CO-4: Apply advanced knowledge to identify research challenges, and issues related to databases and data mining.
***CO-5*: Use modern software tools and technologies for designing simple to complex applications in databases and Data warehousing and data mining.
CO-6: Attitude for independent and continuous learning for improved knowledge with newer versions of DBMS packages and data mining.

M. Tech. (CS) – I Semester
(16MT10532) DATA STRUCTURES AND COMPUTER NETWORKS LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	***50***	***100***	***--***	***--***	***4***	***2***

PRE-REQUISITES:
Courses on "Advanced Computer Networks" and "Data Structures"
COURSE DESCRIPTION:
Hands on practical experience on implementing data link layer farming methods and routing algorithms; Practical implementation of linked lists, stacks, queues, binary tree, binary search tree, AVL tree, B -tree, graphs, N-Queen's problem using C++.
COURSE OUTCOMES:
After successful completion of this course the students will be able to:
CO-1. Gain basic programming skills to implement
a. Framing mechanisms for data link layer,
b. Shortest path using Dijkstra's routing mechanism
c. Distance vector routing mechanism
d. Linear and non-linear data structures, backtracking problems.
CO-2. Analyze data structures for various problem solving techniques and typical performance measures of network models.
CO-3 Design, conceptualize and solve real world problems by providing the best solutions for data structures and networking models.
CO-4:. Use modern software tools and technologies for designing simple to complex applications in real world.
CO-5: Apply advanced knowledge to identify research challenges, and contribute individually or in teams to the development of network projects for real world problems.
CO-6: Develop effective professional and business communication in data structures and networks.
CO-7: Attitude for independent and continuous learning for improved knowledge with newer versions of object oriented software and new simulation models of protocols.

M. Tech. I Semester
(16MT13808) RESEARCH METHODOLOGY

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	**-**	**-**	**-**	**2**	**-**	**-**

PREREQUISITES: --
COURSE DESCRIPTION:
Overview of Research, research problem and design, various research designs, data collection methods, statistical methods for research, importance of research reports and its types.
COURSE OUTCOMES: After completion of the course, students should be able to:
1. Acquire in-depth knowledge on
   a. Research design and conducting research
   b. Various data collection methods
   c. Statistical methods in research
   d. Report writing techniques.
2. Analyze various research design issues for conducting research in core or allied areas
3. Formulate solutions for engineering problems by conducting research effectively in the core or allied areas
4. Carryout literature survey and apply research methodologies for the development of scientific/technological knowledge in one or more domains of engineering.
5. Select and Apply appropriate techniques and tools to complex engineering activities in their respective fields
6. Write effective research reports.
7. Develop attitude for lifelong learning to do research.
8. Develop professional code of conduct and ethics of research.

M.Tech (CS) II-Semester
(16MT20501) ADVANCED COMPUTER ARCHITECTURE

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PREREQUISITES: *A course on* "Computer Organization".

COURSE DESCRIPTION

Quantitative design and analysis, memory hierarchy design; parallel computer models and network properties; pipelining, superscalar techniques, multiprocessors and multi computers; Multi-Vector, SIMD and Multi-Core computers

COURSE OUTCOMES:

After successful completion of this course, students will be able to:

CO1. Acquire knowledge of:
- Models and Computer Architectures.
- Concepts of parallel computer models.
- Scalable Architectures.
- Pipelining, Superscalar processors, multiprocessors, SIMD and Multi core Computers.

CO2. Analyze architectures of parallel computers, sub systems and their interconnection structures.

CO3. Apply concepts and techniques of advanced computer architectures to solve engineering problems

CO4. Conduct research in the area of parallel computer architecture development and warehouse scale computing.

M. Tech (CS) – II Semester

(16MT20502) BIG DATA ANALYTICS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	*60*	*100*	*4*	*--*	*--*	*4*

PRE-REQUISITES:

Courses on “Data Base Management Systems” & “Data Warehousing and Data Mining”.

COURSE DESCRIPTION:

Concepts of Big Data, Types of Data Elements; Introduction to Hadoop, Hadoop Ecosystem; Map Reduce; Building Blocks of Hadoop; Big data analytics applications; Predictive and Descriptive Analytics.

COURSE OUTCOMES:

After successful completion of this course, the student will be able to:

CO-1: Gain knowledge in:
- Big data Characteristics
- Hadoop Framework
- Map Reduce.
- Hadoop Release

CO-2: Analyze and develop solutions for database systems for storing and analyzing the large data.

CO-3: Apply Big Data Analytics for estimating the data sets to solve the real world problems.

CO-4: Design and model for an effective database by using big data tools.

CO-5: Carry out research on Predictive Analysis and Sentiment Analysis

CO-6: Learning advance analytics techniques for effective Database monitoring.

M. Tech (CS) II-Semester

(16MT20503) OBJECT ORIENTED ANALYSIS AND DESIGN

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	*60*	*100*	*4*	*--*	*--*	*4*

PRE-REQUISITES:

A Course on “Object Oriented Programming”

COURSE DESCRIPTION:

Concepts of Unified Modeling language; Sequence and collaboration diagrams; Behavioral Modeling; Unified Process and phases of unified process

COURSE OUTCOMES:

After successful completion of the course, the students will be able to:

CO-1: Gain advanced knowledge in
- Object Oriented Methodologies
- UML Diagrams
- Unified Process

CO-2: Analyze Various UML Models which are required for solving Real World problems.

CO-3: Formulate solutions for engineering problems pertaining to the Object Oriented Analysis and Design

CO-4: Design UML Diagrams Using Visual Modelling Tools

CO-5: Apply unified process models for building of Applications, which is required for effective project management.

M.Tech (CS) II Semester
(16MT12501) CLOUD COMPUTING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: *Courses on* "Operating Systems" and "Computer Networks"
COURSE DESCRIPTION:
Virtualization, Case studies – XEN, VMware, Microsoft Hyper-V; Cloud architecture; Services and Applications; Cloud Programming; Industry practices and Case studies –Amazon Web Services, Google App Engine, and Microsoft Azure.
COURSE OUTCOMES:
After successful completion of this course, students will be able to:
CO1: Demonstrate knowledge on Virtualization models, Cloud Architecture, Services and Programming concepts.
CO2: Analyze the problems in existing cloud architectures.
CO3: Apply concurrent programming, throughput computing and Data intensive computing in Cloud programming.
CO4: Conduct research on emerging technologies in cloud and energy management in cloud
CO5: Apply virtualization techniques to optimize resource sharing.

M.Tech (CS) II Semester
(16MT22505) WEB TECHNOLOGIES

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: A course on "Object Oriented Programming".
COURSE DESCRIPTION: Web Technologies: HTML5, CSS, JavaScript, JQuery; Open source server-side scripting language- PHP; MySQL database concepts; and AJAX.
COURSE OUTCOMES:
On successful completion of this course, the students will be able to:
CO1: Gain knowledge on web technologies.
CO2: Analyze the functionality of client as well as server side web technologies for validating web pages.
CO3: Gain programming skills to design and develop novel web applications
CO4: Apply web technologies to make web pages more interactive, scalable and user friendly web applications.

M.Tech (CS) II-Semester
(16MT20504) EMBEDDED SYSTEMS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	*60*	*100*	*4*	*--*	*--*	*4*

PRE-REQUISITES:
Courses on Computer Organization & Operating Systems
COURSE DESCRIPTION:
Concepts of Embedded System components, Micro controller program-ming; Programming in Embedded Systems, design using hardware and software components; Real-Time Operating systems, Embedded Product Development Life Cycle .
COURSE OUTCOMES:
After successful completion of this course the students will be able to:
CO-1: Gain advanced knowledge in
- Embedded system components.
- Micro controller programming.

CO-2: Analyze critical problems related to programming for hardware and software components by conducting detailed research.
CO-3: Apply and solve issues in computer based systems using a range of solutions provided by Embedded Systems.
CO-5: Use appropriate techniques, tools, resources and usage of modern Embedded Product Development Life Cycle (EDLC) tools for the design and development of Embedded Systems.

M. Tech (CS) II-Semester
(16MT20505)INFORMATION SECURITY

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	*60*	*100*	*4*	*--*	*--*	*4*

PRE-REQUISITES:
A Course on "Computer Networks"
COURSE DESCRIPTION
Concepts of cryptographic algorithms, public key and private key encryption; security models, Hash Algorithms; Intrusion Detection, IP Security; analysis of security principles in internet and system security
COURSE OUTCOMES:
After successful completion of this course, students will be able to:
*CO1.*Gain advanced knowledge in
- Symmetric and Asymmetric Encryption Algorithms
- Key distribution and message Authentication
- Hash algorithms and digital signature techniques
- IP security and Wireless network security
- Intrusion Detection and Firewall configurations

CO2. Analyze the symmetric algorithms, Public-Key Encryption and Hash Algorithms.
CO3. Develop solutions to solve the problems related to Public-Key Encryption, Digital signatures, Secure Hash Functions
*CO4.*Conduct research to identify efficient ciphers and cryptographic algorithms to provide novel solutions for Real-Time applications
*CO5.*Apply the appropriate Cryptographic Techniques and security Algorithms in the area of Information Security

M.Tech (CS) – II Semester
(16MT20506) MOBILE COMPUTING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	*60*	*100*	*4*	*--*	*--*	*4*

PRE-REQUISITES:
A Course on "Computer Networks"
COURSE DESCRIPTION:
GSM architecture, Wireless MAC and CDMA Systems; Mobile IP network layer, Mobile Transport Layer; Databases, Data Dissemination and Broadcasting Systems; Synchronization in Mobile Devices and Mobile Computing Systems; Mobile Application Languages and Mobile Operating Systems.
COURSE OUTCOMES:
After successful completion of this course, students will be able to:
CO1. Gain advanced knowledge in
- GSM and CDMA Systems.
- Mobile IP, and Mobile TCP
- Databases and Data Dissemination
- Mobile Data Synchronization

CO2. Analyze various methods in data dissemination and broadcasting models
CO3. Evaluate and implement novel applications to realize power computing and context-aware computing. .
CO4. Contribute positively to multidisciplinary scientific research on mobile application languages and mobile operating systems.
CO5. Apply Database Hoarding Techniques, Selective Indexing and Tuning Techniques to solve problems in Mobile Computing

M. Tech (CS) – II Semester
(16MT20507) SOFTWARE PROJECT MANAGEMENT

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	*60*	*100*	*4*			*4*

PRE-REQUISITES:
A course on "Software Engineering"

COURSE DESCRIPTION:
Concepts of Software Project Management; Software efforts estimation techniques; Software economics; life cycle phases; model based software architectures; project organizations & responsibilities.
COURSE OUTCOMES:
After successful completion of this course the students will be able to:

CO-1: Gain knowledge on project planning and management, client management and project Scheduling and monitoring.
CO-2: Analyze the major and minor milestones, artifacts and metrics from management and technical perspective.
CO-3: Design software products using conventional and modern principles of software project management.
CO-4: Apply Software Metrics for a given Project to calculate Cost estimation models.
CO-5: Adopt team effectiveness through Work Breakdown Structures by optimal cost and schedule estimates
CO-6: Demonstrate skills of project management and process measurement in software projects.

M. Tech. II-Semester
(16MT20531) CLOUD COMPUTING & BIG DATA ANALYTICS LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	--	--	4	2

PRE-REQUISITES:
Course on "Cloud Computing" and "Operating Systems"
COURSE DESCRIPTION:
Hands-on experience on creating Virtual machines on Windows and Linux platforms, Development of Service based web applications & their deployment and Mobile app development, Designing and implementing Hadoop cluster.
COURSE OUTCOMES:
After successful completion of this course , students will be able to:

CO-1**:** Demonstrate hands-on experience on Virtualization models, Cloud Environment and Hadoop cluster setup.
CO-2**:** Analyze the given experiment and measure the performance of services and datasets.
CO-3**:** Apply API development skills in web applications for Cloud deployment and develop solutions for real time applications using Hadoop.
CO-4**:** Devise virtual environments based on virtualization techniques and processing huge amount of data using Big data tools
CO-5**:** Develop written and oral communications in preparing and presenting reports.

M. Tech – II Semester
(16MT20532) OBJECT ORIENTED ANALYSIS & DESIGN LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	--	--	4	2

PRE-REQUISITES:
A Course on "Object Oriented Programming"
COURSE DESCRIPTION:
Concepts of Unified Modeling language; Sequence and collaboration diagrams; Behavioral Modeling; Unified Process and phases of unified process.
COURSE OUTCOMES:
After successful completion of this course the students will be able to:

CO-1: Demonstrate knowledge on Object Oriented concepts, project planning and modeling concepts.
CO-2: Analyze and understand requirements of given real life problems.
CO-3: Design Structural and Behavioral Diagrams to solve real world problems.
CO-5: Apply UML to develop blueprints of a given problem.
CO-6: Develop written and oral communications in preparing and presenting reports.
CO-7: Update knowledge in object oriented analysis and design continuously

M. Tech. (CS)-II Semester
(16MT20533) SEMINAR

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
--	100	100	--	--	--	2

PRE-REQUISITES:--
COURSE DESCRIPTION:
Identification of seminar topic; literature survey; preparation of technical report and presentation
COURSE OUTCOMES:
On successful completion of this course, the students will be able to:
- CO1. Demonstrate capacity to identify an advanced topic for seminar in core and allied areas.
- CO2. Extract information pertinent to the topic through literature survey.
- CO3. Comprehend extracted information through analysis and synthesis critically on the topic.
- CO4. Plan, organize, prepare and present effective written and oral technical report on the topic.
- CO5. Adapt to independent and reflective learning for sustainable professional growth in Computer Science and software systems
- CO6. Contribute to multidisciplinary scientific working the field of Computer Science and software systems
- CO7. Understand ethical responsibility towards environment and society in the field of Computer Science and software systems
- CO8. Engage in lifelong learning for development of technical competence in the field of Computer Science and software systems

M. Tech. – II Semester
(16MT23810) INTELLECTUAL PROPERTY RIGHTS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	-	2	-	-

PRE-REQUISITES: --
COURSE DESCRIPTION:
Introduction to Intellectual Property; Trade Marks; Law of Copy Rights; Law of Patents; Trade Secrets; Unfair Competition; New Development of Intellectual Property.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
1. Demonstrate in-depth knowledge on
    - Intellectual Property
    - Trade Marks & Secrets
    - Law of Copy Rights, Patents
    - New development of Intellectual Property
2. Analyze the different forms of infringement of intellectual property rights.
3. Solve problems pertaining to Intellectual Property Rights.
4. Stimulate research zeal for patenting of an idea or product.
5. Write effective reports required for filing patents.
6. Develop life-long learning capabilities.
7. Develop awareness of the relevance and impact of IP Law on their academic and professional lives.
8. Develop attitude for reflective learning.

M. Tech. (CS) III & IV Semesters
(16MT30531 & 16MT40531) PROJECT WORK

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
200	200	400	--	--	--	28

PRE-REQUISITES: --
COURSE DESCRIPTION:
Identification of topic for the project work; Literature survey; Collection of preliminary data; Identification of implementation tools and methodologies; Performing critical study and analysis of the topic identified; Time and cost analysis; Implementation of the project work; Writing of thesis and presentation.
COURSE OUTCOMES:
On successful completion of this course, the students will be able to
CO1. Demonstrate capacity to identify an advanced topic for project work in core and allied areas.
CO2. Extract information pertinent to the topic through literature survey.

CO3. Comprehend extracted information through analysis and synthesis critically on the topic.
CO4. Solve engineering problems in the chosen topic with higher order skill to obtain solutions.
CO5. Use the techniques, skills and modern engineering tools necessary for project work.
CO6. Perform time and cost analysis on the project.
CO7. Plan, prepare and present effective written and oral technical report on the topic.
CO8. Adapt to independent and reflective learning for sustainable professional growth. CO9**.** Contribute to multidisciplinary scientific working the field of Computer Science and Software Systems
CO10. Understand ethical responsibility towards environment and society in the field of Computer Science and Software Systems
CO11. Engage lifelong learning for development of technical competence in the field of Computer Science and Software Systems.

Program: M.Tech. COMPUTER NETWORKS AND INFORMATION SECURITY

I M. Tech. (CN&IS) I-Semester
(16MT10501) ADVANCED COMPUTER NETWORKS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES:
A Course on "Computer Networks"
COURSE DESCRIPTION:
Computer Networks and Protocols; Data Link Layer, LAN and Network routing; Transport Layer and Internet Protocols; Wireless and Optical Networks; MANETs and Wireless Sensor Networks
COURSE OUTCOMES:
After successful completion of this course, students will be able to:
CO1. Gain knowledge on principles of computers, network topologies, routing mechanisms.
CO2. Analyze the computer network with suitable network protocols and routing algorithms.
CO3. Formulate solutions for engineering problems pertaining to the advanced networking technologies.
CO4. Develop new techniques for subnet masks and addresses to fulfill networking requirements.
CO5. Conduct research to solve the problems related to routing algorithms in Network applications.

I M. Tech (CN&IS)I-Semester
(16MT10504) DATA WAREHOUSING AND DATA MINING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	--	4

PRE-REQUISITES:
A course on "Database Management Systems"
COURSE DESCRIPTION
Concepts of Data Warehousing and Data Mining; Pre-processing Techniques in Data Warehouses; Data cube computation and OLAP query processing; Data Mining process and System architecture; relationship with data warehouse and OLAP Systems; Data mining Techniques and Applications
COURSE OUTCOMES:
After successful completion of this course, students will be able to:
CO1. Gain knowledge in:
- Multidimensional data model and Data Warehouse architectures. .
- Data mining algorithms.
- Association Rules, Classification and Prediction and Cluster Analysis.

CO2. Analyse data mining algorithms for complex industrial problems.
CO3. Solve engineering problems to get wide variety of solutions by applying data mining algorithms.
CO4. Ability to carry out research in spatial mining, spatio temporal mining, text mining, multimedia and web mining
CO5. Create and apply appropriate techniques & tools of data mining to solve real world problems

I M. Tech (CN&IS) I-Semester
(16MT20505) INFORMATION SECURITY

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	*60*	*100*	*4*	*--*	*--*	*4*

PRE-REQUISITES:
A Course on "Computer Networks"

COURSE DESCRIPTION
Concepts of cryptographic algorithms, public key and private key encryption, security models, Hash Algorithms, Intrusion Detection, IP Security, analysis of security principles in internet and system security

COURSE OUTCOMES:
After successful completion of this course, students will be able to:

CO1. Gain advanced knowledge in
- Symmetric and Asymmetric Encryption Algorithms
- Key distribution and message Authentication
- Hash algorithms and digital signature techniques
- IP security and Wireless network security
- Intrusion Detection and Firewall configurations

CO2. Analyze the symmetric algorithms, Public-Key Encryption and Hash Algorithms.
CO3. Develop solutions to solve the problems related to Public-Key Encryption, Digital signatures, Secure Hash Functions
CO4. Conduct research to identify efficient ciphers and cryptographic algorithms to provide novel solutions for real time applications
CO5. Apply the appropriate Cryptographic Techniques and security Algorithms in the area of Information Security

I M.Tech (CN&IS) I-Semester
(16MT20506) MOBILE COMPUTING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	*60*	*100*	*4*	*--*	*--*	*4*

PRE-REQUISITES:
A Course on "Computer Networks"

COURSE DESCRIPTION:
GSM architecture, Wireless MAC, and CDMA Systems; Mobile IP network layer; Mobile Transport Layer; Databases, Data dissemination and Broadcasting systems; Synchronization in mobile devices and Mobile Computing Systems; Mobile Application Languages and Mobile Operating Systems.

COURSE OUTCOMES:
After successful completion of this course, the students will be able to:

CO1. Gain advanced knowledge in
- GSM and CDMA Systems.
- Mobile IP, and Mobile TCP
- Databases and Data Dissemination
- Mobile Data Synchronization

CO2. Analyze various methods in data dissemination and broadcasting models
CO3. Evaluate and implement novel applications to realize power computing and context-aware computing.
CO4. Contribute positively to multidisciplinary scientific research in design and development of mobile application languages and mobile operating systems for mobile.
CO5. Apply Database hording Techniques, Selective indexing and Tuning techniques to solve mobile computing problems.

I M. Tech (CN&IS) I-Semester
(16MT22505) WEB TECHNOLOGIES

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES:
A course on "Object Oriented Programming"

COURSE DESCRIPTION:
Web Technologies: HTML5, CSS, JavaScript, JQuery; Open source server-side scripting language- PHP; MySQL database concepts; and AJAX

COURSE OUTCOMES:

On successful completion of this course, the students will be able to:

CO1. Gain knowledge on web technologies.
CO2. Analyze the functionality of client as well as server side web technologies for validating web pages.
CO3. Gain programming skills to design and develop novel web applications
CO4. Apply web technologies to make web pages more interactive, scalable and user friendly web applications.

M. Tech (CNIS) I-Semester
(16MT16301) DESIGN OF SECURE PROTOCOLS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	*60*	*100*	*4*	*-*	*-*	*4*

PRE-REQUISITES:
A Course on "Cryptography and Network Security, "

COURSE DESCRIPTION:
Pseudo-random-Bit generation and algorithm modes; Symmetric and asymmetric cryptography; Authentication protocols and Hash functions; Modern cryptography and its applications, Security implementations over resource constrained networks.

COURSE OUTCOMES:
After successful completion of this course, the students will be able to:

CO1. Gain advanced knowledge on Basic Cryptography Techniques Pseudo-random-Bit generators used in Cryptography.
CO2. Analyze various Authentication Protocols and security threats of systems against various attacks possible over the Internet services to provide secure access to the system.
CO3.Solve the security issues by adopting mathematical and logical operators such as hash functions.
CO4.Carryout research on advanced and modern Cryptographic protocol solutions to resolve security problems in the real world.
CO5. Evaluate the use of Cryptographic algorithms and tools in providing security to resource constraint networks and e-commerce systems.

I M. Tech (CN&IS) I-Semester
(16MT16302) ETHICAL HACKING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	*60*	*100*	*4*	*-*	*--*	*4*

PRE-REQUISITES:

Courses on "Computer networks, Cryptography & Network security"

COURSE DESCRIPTION:

Introduction to hacking concepts; Password hacking Techniques; Denial of service attacks; Web application vulnerabilities; Wireless hacking & physical security; overview of cryptography and penetration testing methodologies.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO1: Gain Knowledge on

- Hacking and its societal issues
- Hacking methods
- Types of hacking
- Tools of hacking

CO2: Analyze system, network vulnerabilities which give a scope to perform hacking.

CO3: Develop skills to solve the different security risks that arise from hacking.
CO4: Design new techniques and tools to solve real world security problems.
CO5: Apply appropriate ethical hacking techniques to provide solution for a given security problem
CO6. Undertake research to solve security problems at host, data and Network level.

I M. Tech (CN&IS) I-Semester
(16MT10507) INTERNET OF THINGS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	*60*	*100*	*4*	*-*	*--*	*4*

PRE-REQUISITES:
C*ourses on "Computer Networks" and "Java"*
COURSE DESCRIPTION:
Domain Specific IoT's; M2M& System Management with Netconf-Yang; Developing Internet of Things Using Python; IoT Physical Devices & Case Studies Illustrating IoT Design
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1: Gain knowledge on
- Building blocks of Internet of Things and characteristics.
- Application areas of IoT
- Concept of M2M (machine to machine) with necessary protocols

CO2: Analyze Domain specific IoT's, revolution of Internet in Mobile Devices.
CO3: Design and Develop Techniques for solutions to solve the problems in IoT using Python Scripting Language.
CO4: Conduct research on domain specific IoT's and IoT enabling Technologies.
CO5: Acquire knowledge to recognize the opportunities and contribute to collaborative-multidisciplinary Scientific Research.

I M.Tech. (CN&IS) I Semester
(16MT22508) SOFTWARE SECURITY

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	**60**	**100**	**4**	**-**	**-**	**4**

PREREQUISITES:
Courses on "Software Engineering," and "Network Security"
COURSE DESCRIPTION:
Importance of Security in Software - Security a Software Issue, Secure Software; Requirements Engineering for Secure Software; Security Principles in SDLC - Secure Software Architecture and Design, Secure Coding and Testing; Security and Complexity - System Assembly Challenges; Governance and Managing for more Secure Software.
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1: Gain knowledge on security issues in:
- Requirement Engineering
- Architecture and Design
- Coding and Testing

CO2: Analyze complex software projects to describe security risks and mitigation techniques.
CO3: Applying methods to detect software security defects, SQUARE process model for requirement gathering and coding practices & security testing for identifying security failures.
CO4: Initiate research issues in code analysis techniques to improve software security.

I M. Tech. (CN&IS) I-Semester
(16MT16331) COMPUTER NETWORKS & INFORMATION SECURITY LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	*50*	*100*	--	--	*4*	*2*

PRE-REQUISITES:
Courses on "Computer Networks" and "Information Security"

COURSE DESCRIPTION:
Hands experience on Data Link Layer Farming Methods; Routing Algorithms; Implementation of DES, RSA; AES Algorithms, Secure Hash Algorithms and Digital Signature Standards.

COURSE OUTCOMES:
After successful completion of this course, the students will be able to:

CO1. Gain knowledge to implement
- Framing mechanisms for data link layer
- Shortest path routing algorithms
- Symmetric encryption algorithms- DES,AES and Asymmetric algorithm-RSA
- Secure Hash algorithms and digital signatures

CO2. Analyze the routing algorithms, Symmetric-key encryption and public-key encryption algorithms.
CO3. Develop the solutions to solve the problems in networks and information security systems.
CO4. Implement routing and encryption techniques using C or JAVA to provide solutions to the real world problems.

M. Tech (CN&IS) I-Semester
(16MT16332) WEB TECHNOLOGIES LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	*50*	*100*	-	-	*4*	*2*

PRE-REQUISITES:
Course on "Programming in C, and Java"

COURSE DESCRIPTION:
This course is hands-on and project-based; students will construct a substantial dynamic web application based on the concepts, technologies, and techniques presented during lecture.

COURSE OUTCOMES:
After completion of this course the students will be able to:
CO1. Gain knowledge in designing web pages using HTML, CSS, JS, PHP.
CO 2. Analyze the design problems in HTML Web pages with CSS
CO3. Design a dynamic webpage with HTML, CSS, Java Script, PHP concepts
CO4. Assess the HTML Website using XML Parsers
CO 5. Engage in lifelong learning by incorporating the best design practices.

I M. Tech.(CN&IS) I-Semester
(16MT13808) RESEARCH METHODOLOGY

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	-	2	-	-

PREREQUISITES: --

COURSE DESCRIPTION:
Overview of Research, research problem and design, various research designs, data collection methods, statistical methods for research, importance of research reports and its types.

COURSE OUTCOMES: After completion of the course, students should be able to:

CO1. Acquire in-depth knowledge on
Research design and conducting research
Various data collection methods
Statistical methods in research
Report writing techniques.

CO2. Analyze various research design issues for conducting research in core or allied areas
CO3. Formulate solutions for engineering problems by conducting research effectively in the core or allied areas
CO4. Carryout literature survey and apply research methodologies for the development of scientific/technological knowledge in one or more domains of engineering.
CO5. Select and Apply appropriate techniques and tools to complex engineering activities in their respective fields
CO6. Write effective research reports.
CO7. Develop attitude for lifelong learning to do research.
CO8. Develop professional code of conduct and ethics of research.

I M. Tech (CN&IS) II-Semester
(16MT20502) BIG DATA ANALYTICS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	*60*	*100*	*4*	*--*	*--*	*4*

PRE-REQUISITES:
Courses on "Data Base Management Systems" & "Data Warehousing and Data Mining"
COURSE DESCRIPTION:
Concepts of Big Data**;** Types of Data Elements; Introduction to Hadoop; Hadoop Ecosystems; MapReduce; Building Blocks of Hadoop; big data analytics applications; Predictive and Descriptive Analytics**.**
COURSE OUTCOMES:
After successful completion of this course, the student will be able to:
CO1. Demonstrate in depth knowledge in
- Big data Characteristics
- Hadoop Framework
- MapReduce.
- Hadoop Release

CO2.Analyze and develop solutions for database systems for storing and analyzing the large data.
CO3.Apply Big Data Analytics for estimating the data sets to solve the real world problems
CO4. Design and model for an effective database by using big data tools.
CO5.Carry out research on predictive analysis and sentiment analysis.
CO5.Learning advance analytics techniques for effective Database monitoring.

I M.Tech. (CNIS) II Semester
(16MT12501) CLOUD COMPUTING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	**60**	**100**	**4**	**-**	**-**	**4**

PREREQUISITES:
Courses on "Operating Systems" and "Computer Networks"
COURSE DESCRIPTION:
Virtualization, Case studies – XEN, VMware, Microsoft Hyper-V; Cloud architecture; Services and Applications; Cloud Programming; Industry practices and Case studies –Amazon Web Services, Google App Engine, and Microsoft Azure.
COURSE OUTCOMES:
After successful completion of this course, students will be able to:
CO1: Demonstrate knowledge on Virtualization models, Cloud Architecture, Services and Programming concepts.
CO2: Analyze the problems in existing cloud architectures.
CO3: Apply concurrent programming, throughput computing and Data intensive computing in Cloud programming.
CO4: Conduct research on emerging technologies in cloud and energy management in cloud
CO5: Apply virtualization techniques to optimize resource sharing.

I M. Tech (CN&IS) II-Semester
(16MT26301) INTRUSION DETECTION SYSTEMS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	*60*	*100*	*4*	*--*	*--*	*4*

PRE-REQUISITES:
Courses on "Computer Networks" and "Network security"
COURSE DESCRIPTION:
Introduction to threats , attacks and intrusions; Network security monitoring and Sinkhole design; Traffic threat assessment and network incident response; Malicious bots and botnet construction; introduction to network forensics and Intrusion prevention systems(IPS) in host and network level.
COURSE OUTCOMES:
After successful completion of this course, students will be able to:
CO1: Gain Knowledge on Intrusions, security monitoring, Network Forensic principles and Intrusion Prevention system (IPS).
CO2: Analyze the threats and vulnerabilities in the network traffic for designing the solutions.
CO3: Detect, identify and mitigate the security attacks from the network traffic to provide the solutions to the real word problems.
CO4: Conduct research to identify novel solutions for detecting and mitigation of Intrusions in public and private networks.
CO5: Gain exposure on IDS and IPs tools of Intrusion and Extrusion detection for NSM data collections.

I M.Tech (CN&IS). II-Semester
(16MT26302) NETWORK PROGRAMMING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	*60*	*100*	*4*	*-*	*-*	*4*

PRE-REQUISITES:
Courses on "Computer Networks" and "Unix Programming"
COURSE DESCRIPTION:
Concepts of Unix Standards; Protocol Usage by common internet application; Elementary TCP Sockets; Handling server process termination; crashing and rebooting; IPV6socket options; Interface with UDP; Function and IPV6 support; I/O multiplexing IPC creating and opening channels, permissions; Terminal Modes, Remote login overview;
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:

CO1: Gain knowledge in
- Basic concepts of UNIX standards, networks and socket functions.
- TCP and UDP socket API and related functions.
- DNS and address conversions.
- I/O Multiplexing, IPC and RPC.

CO2: Analyze the key protocols that support the Internet and several common programming interfaces for network communication.
CO3: Solve I/O Multiplexing issues using TCP socket programming.
CO4: Design client server architecture by developing new TCP and UDP socket functions.
CO5: Apply appropriate techniques and tools to implement algorithms for modern network architectures.

I M. Tech (CN&IS)– II Semester
(16MT26303) WIRELESS NETWORKS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	*60*	*100*	*4*	*-*	*-*	*4*

PRE-REQUISITES:
A Course on "Computer Networks"

COURSE DESCRIPTION:
Queuing theory; Mobile Radio Propagation; Channel Coding and Error Control; Multiple Radio Access, Multiple Division Techniques For Traffic Channels; Ad Hoc Networks and Sensor Networks; Wireless LANs; PANs, BANs and MANs.

COURSE OUTCOMES:
After successful completion of this course, students will be able to:

CO1. Acquire knowledge in physical layer, data link layer, network layer and transport layer of wireless networking models.

CO2. Analyse the traffic theories, mobile radio propagation, channel coding, cellular concepts to measure the performance.

CO3. Conduct research to develop routing protocols for MANETs to solve real world problems.

CO4. Develop solution for complex problems using networking tools

I M.Tech (CN&IS). II-Semester
(16MT10506) INFORMATION RETRIEVAL SYSTEMS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITE:
A Course on "Database Management Systems"

COURSE DESCRIPTION:
Concepts of Information retrieval Systems; Indexing and data structures; indexing, Document and term clustering; user search techniques; Text search algorithms, information system Evaluation;

COURSE OUTCOMES:
After successful completion of this course, students will be able to:

CO1 : Acquire knowledge in fundamental concepts of
- Information Retrieval System capabilities
- Data Structures
- Indexing and Search Algorithms

CO2: Analyze concepts of Database, Data Warehouses of real time applications related to Document Store, Document data warehouses, judicial, biomedical, scientific documents.

CO3: Solve complex search problems like ranking , weighted ,software text searches by implementing A* Search, Zipf and Information retrieval frame work

CO4: Initiate research to identify and develop algorithms for indexing, clustering and searching

CO5: Create and apply online Information Retrieval Systems like search engines.

I M. Tech. (CN&IS) II-Semester
(16MT26304) COMPUTER FORENSICS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	--	--	4

PRE-REQUISITES:
A Course on "Information Security"

COURSE DESCRIPTION:
Concepts of computer forensic technologies and cybercrime; Evidence collection and data seizure; Initial Response and Forensic Duplication; Forensic Data Analysis and Validation; Processing crimes and incident scenes; Mobile Device Forensics, Network forensics and E-Mail Investigations

COURSE OUTCOMES:
After successful completion of this course, students will be able to:

CO1: Acquire knowledge in
- Computer Forensic Fundamentals and Technologies
- Evidence and Data Capture and Computer Forensic Analysis
- Law Enforcement crime and incident scenes

CO2: Analyze and validate forensic data related to mobile devices, E-Mails.

CO3: Provide solutions for a wide range of forensic problems like attack on routers, E-Mail crimes.

CO4: Conduct research and contribute in groups for the development of new forensics tools.

CO5: Create and apply appropriate forensic tools, techniques to capture the evidence and investigate crimes

I M Tech (CN&IS) II-Semester
(16MT26305)DATABASE SECURITY

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	*60*	*100*	*4*	*--*	*--*	*4*

PRE-REQUISITES:
A course on "Database Management Systems"
COURSE DESCRIPTION:
Explore database access controls; data obscurity and physical database security; Password Policies, Privileges; fraud detection through the use of audit tables & triggers and obscurity through the use of encryption; views & virtual private databases.
COURSE OUTCOMES:
After successful completion of this course, students will be able to:
CO1: Acquire knowledge in
- Information System Security
- Design of Secure Databases.
- Database System Models and Applications.
- Need for database security architecture.

CO2: Analyze fundamental database security threats, vulnerabilities and associated risks.
CO3: Implement specific database security solutions that include: access controls, audit/control and obscurity (encryption, views, and VPDs) mechanisms*.*
CO4: Create database security architecture, database user roles using SQL Server
CO5: Conduct research on establishment of strong passwords and manage th resources through database audit/access controls.
CO6: Recognize database security issues, implementation methods to database security mechanisms and strategies in life- long learning.

I M. Tech (CN&IS). II-Semester
(16MT26306)SOCIAL NETWORKS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	*60*	*100*	*4*	*--*	*--*	*4*

PRE-REQUISITES:

A Course on **"**Computer Networks**"**

COURSEDESCRIPTION:

Concepts of Tweet rank model; Rich Media Communications patterns; Data Pre-Processing; Challenges of DOSN; Web accessibility analysis; Collaborative tagging; Visualization and Applications of Social Networks

COURSE OUTCOMES:

CO1: Gain knowledge on
- Social Media Analysis
- Mining and Privacy.
- Visualization and Applications of Social Networks.

CO2: Analyze the mining techniques, social network Infrastructures and Communities.

CO3: Apply the Baye's Conditional Probabilities technique in the real world applications of social networks.

CO4: Initiate research to identify solutions for security and privacy in social networks.

CO4: Develop effective communication among peers in the area of Social Networks.

CO5: Acquire professional code of conduct and social responsibility to contribute for development of society.

I M. Tech (CN&IS) – II Semester
(16MT20531) CLOUD COMPUTING & BIG DATA ANALYTICS LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	--	--	4	2

PRE-REQUISITES:

Course on "Cloud Computing" and "Operating Systems"

COURSE DESCRIPTION:
Hands-on experience on creating Virtual machines on Windows and Linux platforms, Development of Service based web applications & their deployment and Mobile app development, Designing and implementing Hadoop cluster.
COURSE OUTCOMES:
After successful completion of this course , students will be able to:

CO1: Demonstrate hands-on experience on Virtualization models, Cloud Environment and Hadoop cluster setup.
CO2: Analyze the given experiment and measure the performance of services and datasets.
CO3: Apply API development skills in web applications for Cloud deployment and develop solutions for real time applications using Hadoop.
CO4: Devise virtual environments based on virtualization techniques and processing huge amount of data using Big data tools
CO5: Develop written and oral communications in preparing and presenting reports.

I M. Tech. (CN&IS) -II Semester
(16MT26331)WIRELESS NETWORKS LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	*50*	*100*	-	-	*4*	*2*

PRE-REQUISITES:--
COURSE DESCRIPTION:
This course introduces hands-on experience in designing and implementing wireless networking models.
COURSE OUTCOMES:
On successful completion of this course the students will be able to:
CO1. Gain practical knowledge on wireless network simulation.
CO2. Analyze performance measures of multi-hop wireless network models.
CO3.Design wireless networking models and validate networking protocols.
CO4. Compare and Contrast performance measures of new networking models.
CO5. Develop simulation models for wireless networking by using QUALNET.

I M. Tech. (CN&IS)-II Semester
(16MT26332) SEMINAR

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
--	100	100	--	--	--	2

PRE-REQUISITES:--
COURSE DESCRIPTION:
Identification of seminar topic; literature survey; preparation of technical report and presentation:
COURSE OUTCOMES:
On successful completion of this course, the students will be able to
CO1. Demonstrate capacity to identify an advanced topic for seminar in core and allied areas.
CO2. Extract information pertinent to the topic through literature survey.
CO3. Comprehend extracted information through analysis and synthesis critically on the topic.
CO4. Plan, organize, prepare and present effective written and oral technical report on the topic.
CO5. Adapt to independent and reflective learning for sustainable professional growth in Computer networks & information Security.
CO6. Contribute to multidisciplinary scientific work in the field of Computer networks & information Security
CO7. Understand ethical responsibility towards environment and society in the field of Computer networks & information Security.
CO8. Engage in lifelong learning for development of technical competence in the field of Computer Networks & information Security

M. Tech. – II Semester (CN&IS)
(16MT23810) INTELLECTUAL PROPERTY RIGHTS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-		-	2	-	-

PRE-REQUISITES: --
COURSE DESCRIPTION:
Introduction to Intellectual Property; Trade Marks; Law of Copy Rights; Law of Patents; Trade Secrets; Unfair Competition; New Development of Intellectual Property.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:

CO1. Demonstrate in-depth knowledge on
- Intellectual Property
- Trade Marks & Secrets
- Law of Copy Rights, Patents
- New development of Intellectual Property

CO2. Analyze the different forms of infringement of intellectual property rights.
CO3. Solve problems pertaining to Intellectual Property Rights.
CO4. Stimulate research zeal for patenting of an idea or product.
CO5. Write effective reports required for filing patents.
CO6. Develop life-long learning capabilities.
CO7. Develop awareness of the relevance and impact of IP Law on their academic and professional lives.
CO8. Develop attitude for reflective learning.

M. Tech. (CNIS)-III & IV Semesters
(16MT36331 &16MT46331) PROJECT WORK

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
200	200	400	--	--	--	28

PRE-REQUISITES: --
COURSE DESCRIPTION:
Identification of topic for the project work; Literature survey; Collection of preliminary data; Identification of implementation tools and methodologies; Performing critical study and analysis of the topic identified; Time and cost analysis; Implementation of the project work; Writing of thesis and presentation.
COURSE OUTCOMES:
On successful completion of this course, the students will be able to:
CO1. Demonstrate capacity to identify an advanced topic for project work in core and allied areas.
CO2. Extract information pertinent to the topic through literature survey.
CO3. Comprehend extracted information through analysis and synthesis critically on the topic.
CO4. Solve engineering problems pertinent to the chosen topic for feasible solutions.
CO5. Use the techniques, skills and modern engineering tools necessary for project work.
CO6. Do time and cost analysis on the project.
CO7. Plan, prepare and present effective written and oral technical report on the topic.
CO8. Adapt to independent and reflective learning for sustainable professional growth.
CO9**.** Contribute to multidisciplinary scientific working the field of Computer Networks & Information Security
CO10. Understand ethical responsibility towards environment and society in the field of Computer Networks & Information Security.
CO11. Engage lifelong learning for development of technical competence in the field of Computer Networks & Information Security.

Program: M.Tech. SOFTWARE ENGINEERING

M.Tech. I Semester
(16MT12501) CLOUD COMPUTING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: Courses on "Operating Systems" and "Computer Networks"

COURSE DESCRIPTION: Virtualization, Case studies – XEN, VMware, Microsoft Hyper-V; Cloud architecture; Services and Applications; Cloud Programming; Industry practices and Case studies –Amazon Web Services, Google App Engine, and Microsoft Azure.

COURSE OUTCOMES:

On successful completion of this course, the students will be able to:

1. Demonstrate knowledge on Virtualization models, Cloud Architecture, Services and Programming concepts.
2. Analyze the problems in existing cloud architectures.
3. Apply concurrent programming, throughput computing and Data intensive computing in Cloud programming.
4. Develop research insights into emerging technologies and energy management.
5. Apply virtualization techniques to optimize resource sharing.

M.Tech. I Semester
(16MT12502) DATA STRUCTURES AND ALGORITHMS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: A course on "Computer Programming".

COURSE DESCRIPTION:

Introduction to Data Structures and Algorithms; Searching and Sorting; Trees and Graphs; Divide and Conquer; Greedy method; Dynamic Programming, Back Tracking; Branch and Bound.

COURSE OUTCOMES:

On successful completion of this course, the students will be able to:

CO1. Gain knowledge on:
- Linear data structures including Stack, Queue and Linked Lists and Non-linear data structures like Trees and Graphs.
- Divide and Conquer Method, Greedy Method, Dynamic Programming, Backtracking and Branch & Bound algorithms.

CO2. Analyze the efficiency of algorithms using space and time complexities.

CO3. Apply algorithm design techniques in providing solutions to real world problems.

CO4. Apply Dynamic programming techniques to provide software solutions.

M.Tech. (SE) I Semester
(16MT12503) SOFTWARE DEVELOPMENT METHODOLOGIES

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: A course on "Software Engineering".

COURSE DESCRIPTION: Introduction-Software Process; Software Requirements and Analysis; Software Design; Software Implementation- Implementation Issues, Modern Programming Language Features; Software Testing and Maintenance.

COURSE OUTCOMES:

On successful completion of this course, the students will be able to:

1. Demonstrate in depth knowledge on:
   - Software Paradigms, Agile Development, Software Reuse, and Testing
2. Perform requirements analysis and build requirements model.
3. Apply advanced software engineering methods in software development life cycle.

M.Tech. (SE) I Semester

(16MT12504) SOFTWARE MEASUREMENT AND METRICS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES: A course on "Software Engineering".

COURSE DESCRIPTION: Software measurement theory; Models of software engineering measurement; Software products metrics, software process metrics; Measuring & management and Software quality metrics.

COURSE OUTCOMES:

On successful completion of this course, the students will be able to:

1. Gain knowledge in:
   - Data collection and measures.
   - Product attributes
   - Software quality and Object oriented metrics.
2. Gain skills in analyzing what to measure and complexity assessment in software development.
3. Initiate research to improve Software Estimation and Quality in software development.
4. Apply OO metric tools for software measurement.
5. Apply project cost calculation procedures in software development.

M.Tech. (SE) I Semester

(16MT12505) SOFTWARE REQUIREMENTS AND ESTIMATION

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: Courses on "Software Engineering," and "Object Oriented Analysis & Design".

COURSE DESCRIPTION:

Introduction- Software requirements and risk management, Software Requirements Engineering; Requirements management, Software Requirements Modeling; Software Estimation, Size Estimation; Effort, Schedule and Cost Estimation; Requirements Management Tools, Software Estimation Tools.

COURSE OUTCOMES:

On successful completion of this course, the students will be able to:

1. Gain knowledge on:
   - Requirements Engineering and Management
   - Estimation of software - size, effort, schedule and cost.
2. Analyze the problems in estimation & factors influencing estimation and build traceability matrix, links in requirement chain.
3. Solve size and cost estimation for software development using COCOMO II, Putnam Estimation and Algorithmic models.
4. Apply requirement management and estimation tools for software development.

5. Gain the understanding of the requirements engineering and management principles for effective software implementation.

M.Tech. (SE) I Semester
(16MT12506) DISTRIBUTED DATABASES

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: Courses on "Database Management Systems" and "Computer Networks"

COURSE DESCRIPTION: Distributed Databases Overview & Distributed Database Design; Translation of Global Queries to Fragment Queries, Optimization of Access Strategies; Management of Distributed Transactions, Distributed Database administration; Concurrency, Reliability; Case studies.

COURSE OUTCOMES:

On successful completion of this course, the students will be able to:

1. Gain knowledge on query processing and optimization.
2. Gain analytical skills to implement distributed and parallel databases.
3. Initiate research in advanced Query Optimization, authorization and protection in database.
4. Apply transaction management techniques in distributed environment.

M.Tech. (SE) I Semester
(16MT12507) MACHINE LEARNING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: --Nil--

COURSE DESCRIPTION: Machine learning fundamentals, applications; Multivariate methods, Bayesian networks, Decision tree learning; Support Vector Machines, Statistical learning methods, Unsupervised learning; Kernel Machines; Combining Multiple Learners and Reinforcement learning.

COURSE OUTCOMES:

On successful completion of this course, the students will be able to:

1. Gain knowledge on supervised, unsupervised, and reinforcement machine learning techniques.
2. Solve real-life problems using Multivariate Methods, Decision Trees, Kernel Machines and Combining Multiple Learners.
3. Initiate research in pattern recognition, classification and clustering techniques.

M.Tech. (SE) I Semester
(16MT12508) SOFTWARE RELIABILITY AND REUSE

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: Courses on "Software Engineering" and "Probability and Statistics".

COURSE DESCRIPTION: Software reliability engineering process, Software reliability strategies, availability; Software reliability modeling; Software metrics for reliability assessment; Best practice of software reliability engineering, and neural networks for software reliability, software system failures, free software intensive system and reusable components.

COURSE OUTCOMES:

On successful completion of this course, the student will be able to:

1. Gain knowledge on:
   - Software Reliability Modeling.
   - Software metrics for Reliability Assessment.
   - Software Reliability Estimation.
   - Best practices of Software Reliability Engineering.
2. Analyze software system failures and operational profile.
3. Solve Software system reliability issues using optimum reliability models.
4. Initiate research in producing failure free software intensive system.
5. Apply advanced methods to analyze complex legacy software systems and identify reusable components.

M.Tech. (SE) I Semester

(16MT12509) USER INTERFACE DESIGN

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: A course on "Software Development Methodologies"

COURSE DESCRIPTION: Characteristics & principles of User Interface Design; Requirement analysis-direct & indirect methods; Design- using Formatting menus & windows; Design-using Text boxes, multimedia and Windows layout.

COURSE OUTCOMES:

On successful completion of this course, the students will be able to:

1. Gain the knowledge on concepts of user interfaces and related business functions.
2. Analyze user requirements necessary for UI development.
3. Design interfaces using appropriate menus, windows, interfaces.
4. Solve real world problems by applying theoretical user interface concepts.
5. Usage and customize of advanced tools for various window layouts in project management and development of UI computing systems.

M.Tech. (SE) I Semester

(16MT12531) ADVANCED SOFTWARE ENGINEERING LAB-1

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	4	2

PREREQUISITES: Courses on "Software Development Methodologies", "Software Requirements and Estimation", Data Structures and Algorithms" and "Object Oriented Analysis & Design"

COURSE DESCRIPTION: Software development life cycle activities- requirements specification using open source Requirement documentation tool, modeling using AgroUML tool; Implementation of various linear and non-linear data structures using C++; Refactoring using InsRefactor and SafeRefactor Eclipse Plugins.

COURSE OUTCOMES:

On successful completion of this course, the students will be able to:

1. Demonstrate hands-on experience on:
   - Requirements Engineering and Management
   - Estimation of software-size, effort, schedule and cost.
2. Identify key entities and relationships in the problem domain and write succinct textual descriptions of problems, modeling and Implement linear and non-linear data structures using C++.
3. Identify and apply designing, estimating tools and methodologies for complex engineering problems.
4. Apply algorithm design approaches and C++ programming skills to solve real world applications.
5. Work individually and in teams collaboratively in implementing mini projects.
6. Demonstrate communication skills both oral and written for preparing and presenting reports.

7. Engage in life-long learning and enthusiasm to upgrade knowledge and skills in latest technologies and tools.

M.Tech. I Semester
(16MT12532) CLOUD COMPUTING LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	4	2

PREREQUISITES: Courses on "Cloud Computing" and "Operating Systems".

COURSE DESCRIPTION: Hands-on experience on creating Virtual machines on Windows and Linux platforms, Development of Service based web applications & their deployment and Mobile app development.

COURSE OUTCOMES:

On successful completion of this course, the students will be able to:

1. Gain hands-on experience on Virtualization models and Cloud Environment.
2. Analyze the given experiment and relate to existing architectures.
3. Apply API development skills in web applications for Cloud deployment.
4. Initiate research to develop novel Service based web solutions.
5. Gain knowledge on investigative approach and identify suitable Cloud platforms for SOA based problems.
6. Devise virtual environments based on virtualization techniques.
7. Develop written and oral communications in preparing and presenting reports

M.Tech. (SE) I Semester
(16MT13808) RESEARCH METHODOLOGY

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	-	2	-	-

PREREQUISITES: --

COURSE DESCRIPTION: Overview of Research, research problem and design, various research designs, data collection methods, statistical methods for research, importance of research reports and its types.

COURSE OUTCOMES:

On successful completion of this course, the students will be able to:

1. Acquire in-depth knowledge on
   - e. Research design and conducting research
   - f. Various data collection methods
   - g. Statistical methods in research
   - h. Report writing techniques.
2. Analyze various research design issues for conducting research in core or allied areas.
3. Formulate solutions for engineering problems by conducting research effectively in the core or allied areas.
4. Carryout literature survey and apply research methodologies for the development of scientific/technological knowledge in one or more domains of engineering.
5. Select and Apply appropriate techniques and tools to complex engineering activities in their respective fields.
6. Write effective research reports.
7. Develop attitude for lifelong learning to do research.
8. Develop professional code of conduct and ethics of research.

M.Tech. (SE) II Semester
(16MT22501) BIG DATA TECHNOLOGIES

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: Courses on "Database Management Systems, Data Warehousing and Data Mining"

COURSE DESCRIPTION: Fundamentals of Big Data; Data-parallel programming model- Hadoop, Hadoop I/O; MapReduce features, HDFS; Hive, HBase, Zookeeper; Sqoop and Case studies.

COURSE OUTCOMES:

On successful completion of this course, the students will be able to:

1. Gain knowledge on Big Data storage, processing, querying and reporting.
2. Analyze complex analytical problems to provide optimal solutions.
3. Apply Big Data Technologies to solve real-world problems.
4. Initiate research using HDFS and MapReduce programming model for the implementation of parallelism.
5. Apply various Big Data tools: Sqoop, HBase, MapReduce and Mahout for data analytics.

M.Tech. (SE) II Semester
(16MT22502) SERVICE ORIENTED ARCHITECTURE

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: Courses on "Software Engineering" and "Web Technologies"

COURSE DESCRIPTION: Introduction to SOA, Web services & Primitive SOA, Contemporary SOA, Principles of SOA, Service Layers, Delivery strategies, Service Modeling, Service and Business process design- Simple Object Access Protocol (SOAP), Web Services Description Language (WSDL), and Web Services- Business Process Execution Language (WS-BPEL), SOA support in .NET and J2EE.

COURSE OUTCOMES:

On successful completion of this course, the students will be able to:

1. Gain knowledge on:
   - Fundamentals of web services
   - Development strategies, Principles, Services, Layers and characteristics of service orientation.
2. Analyze complex business process critically in identifying appropriate service model logic.
3. Solve real time problems related to design the Web Services using XML Schema, WSDL, SOAP and BPEL.
4. Initiate research using XML Schema, WSDL, SOAP, BPEL and Service Oriented Enterprise model.
5. Apply the modern tools and techniques of .NET and J2EE to modeling the web services.

M.Tech. (SE) II Semester
(16MT22503) SOFTWARE ARCHITECTURE AND DESIGN PATTERNS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: Courses on "Software Development Methodologies," and "Object Oriented Programming".

COURSE DESCRIPTION: Envisioning Architecture - Software Architecture, Pattern System; Creating Architecture – Understanding the Requirements, Designing the Architecture, Documenting Software Architectures, Reconstructing Software Architectures; Analyzing Architectures and moving from one system to many – Evaluating the Architecture; Introduction to Design Patterns and Creational Patterns; Structural and behavioral patterns.

COURSE OUTCOMES:

On successful completion of this course, the students will be able to:

1. Gain knowledge on:
   - Software architecture styles and business life cycle.
   - Various design issues and patterns.
2. Analyze and identify architectural styles and patterns to solve software design problems.
3. Solve Software Architecture design problems using design patterns.
4. Apply appropriate novel software pattern to solve real world problems in object oriented software design process

M.Tech. II Semester

(16MT22504) SOFTWARE TESTING TECHNIQUES

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: A course on "Software Development Methodologies".

COURSE DESCRIPTION: Basic concepts of Software Testing; Testing Techniques – Levels of Testing; Testing Process – Test Planning; Test Metrics and Reports; Software Test Automation.

COURSE OUTCOMES:

On successful completion of this course, the students will be able to:

1. Gain knowledge on the Software Testing types and Process for different programming environments.
2. Analyze and apply the appropriate testing techniques suitable for testing the software.
3. Design and apply appropriate strategies for selecting test cases to meet requirements of the product.
4. Apply efficient modern software testing tools for automation.
5. Write test cases and perform defect reporting.

M.Tech. II Semester

(16MT22505) WEB TECHNOLOGIES

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: A course on "Object Oriented Programming".

COURSE DESCRIPTION: Web Technologies: HTML5, CSS, JavaScript, JQuery; Open source server-side scripting language- PHP; MySQL database concepts; and AJAX.

COURSE OUTCOMES:

On successful completion of this course, the students will be able to:

CO1: Gain knowledge on web technologies.

CO2: Analyze the functionality of client as well as server side web technologies for validating web pages.

CO3: Gain programming skills to design and develop novel web applications

CO4: Apply web technologies to make web pages more interactive, scalable and user friendly web applications.

M.Tech. (SE) II Semester

(16MT10502) ADVANCED DATABASE MANAGEMENT SYSTEMS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: *A Course on "Database Management Systems".*

COURSE DESCRIPTION: Concepts of Database System Concepts and Architectures, Data modeling using ER-Model;SQL, Objects Relational Database and XML, Database Design and File Organizations, Query Processing, Concurrency and Recovery, Distributed DBMS Architecture and Design.

COURSE OUTCOMES:

On successful completion of this course, the students will be able to:

1. Gain Advanced knowledge in:
   - Database System Concepts , Languages , Interfaces and Architectures
   - Query Languages , Relational Databases and XML
   - Database Design and File Organization.
   - Query Processing and Recovery
   - Distributed Database Architecture and Design
2. Analyze database management architecture and categorize languages and database objects.
3. Design a wide range of potential solutions for the database problems using ER-diagrams, SQL, Normalization and XML.
4. Apply higher order skill and contribute for the development of technical knowledge to solve the problems innovatively.
5. Apply appropriate modern techniques, resources and tools for the real world problems in databases.

M.Tech. (SE) II Semester

(16MT22506) SOFTWARE PROCESS AND PROJECT MANAGEMENT

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: A course on "Software Engineering"

COURSE DESCRIPTION: Software Process Maturity Levels-Initial and the repeatable process, The Defined Process, The Managed Process and the Optimizing Process; Software management Renaissance, Software Management Disciplines and Framework, Next Generation Software Economics and Case Studies.

COURSE OUTCOMES:

On successful completion of this course, the students will be able to:

1. Gain knowledge on:
   - Software process maturity levels and activities
   - Software project management strategies
2. Perform analysis of project management techniques for deploying software systems quickly.
3. Apply the skills to solve problems in modern software process and project management.
4. Conduct research to improve software process and project Controlling activities.
5. Apply software process management techniques to measure the quality of the software.
6. Learn how to optimize software project cost and schedule estimation techniques

M.Tech. (SE) II Semester

(16MT22507) SOFTWARE REVERSE ENGINEERING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: Courses on "Software Engineering," and "Object Oriented Concepts".

COURSE DESCRIPTION: Foundations – Software Reverse Engineering, Applications and Tools, Low level software; Reverse Engineering Tools and applied Reversing; Object Flow Graph, Class and Object diagrams; Interaction, State and Package diagrams; Reversing Malware and Anti-reversing Techniques.

COURSE OUTCOMES:

On successful completion of this course, the students will be able to:

1. Gain knowledge on:
   - Finding malicious code.
   - Discovering unexpected flaws and faults.
   - Finding the use of others code.
   - Learning from others products of a different domain or purpose.
2. Analyze Software System and discover new opportunities for improving existing system.
3. Apply Anti-reversing techniques for Code obfuscation.
4. Design and develop Object Flow Graph, UML diagrams necessary for code reversing.
5. Apply Disassemblers, Debuggers and Decompilations tools and algorithms to implementing Reverse Engineering.
6. Exhibit ethical attitude in software reverse engineering.

M.Tech. II Semester

(16MT22508) SOFTWARE SECURITY

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: Courses on "Software Engineering," and "Network Security".

COURSE DESCRIPTION: Importance of Security in Software - Security a Software Issue, Secure Software; Requirements Engineering for Secure Software; Security Principles in SDLC - Secure Software Architecture and Design, Secure Coding and Testing; Security and Complexity - System Assembly Challenges; Governance and Managing for more Secure Software.

COURSE OUTCOMES:

On successful completion of this course, the students will be able to:

CO1: Gain knowledge on security issues in:
- Requirement Engineering
- Architecture and Design
- Coding and Testing

CO2: Analyze complex software projects to describe security risks and mitigation techniques.

CO3: Applying methods to detect software security defects, SQUARE process model for requirement gathering and coding practices & security testing for identifying security failures.

CO4: Initiate research issues in code analysis techniques to improve software security.

M.Tech. (SE) II Semester

(16MT22531) ADVANCED SOFTWARE ENGINEERING LAB-2

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	4	2

PREREQUISITES: Courses on “Software Development Methodology” and “Object Oriented Programming”

COURSE DESCRIPTION: Software development life cycle activities- Implementation of design patterns using enterprise architect; Creation of web service client; Implementation of Orchestration with BPEL; Test plan document; Regression testing, functional testing using QTP, RFT and Selenium; Performance testing using Load Runner, RPT and Web Performance Tool.

COURSE OUTCOMES:

On successful completion of this course, the students will be able to:

1. Gain hands-on experience on:
   - Web services
   - Design issues and patterns
2. Analyze software design problems, complex business process and identify architectural styles, patterns and appropriate service model logic to solve.
3. Gain software testing skills and practical experience by conducting software testing processes.
4. Apply various testing phases and automate testing process for the given application using Software Engineering concepts and practices to:
   i. Identify customer’s needs.
   ii. Evaluate system for feasibility.
   iii. Perform economic and technical analysis.
   iv. Allocate functions to system elements.
   v. Establish schedule, constraints and estimate cost.
   vi. Create system definitions.
5. Apply QTP and RFT tools for automation testing of software process.
6. Work individually and in teams collaboratively in implementing mini projects.
7. Gain communication skills both oral and written for preparing and presenting reports.

M.Tech. (SE) II Semester

(16MT22532) BIG DATA TECHNOLOGIES LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	4	2

PREREQUISITES: Courses on “Database Management Systems”, “Data Mining and Data Warehousing”, and “Big Data Technologies”.

COURSE DESCRIPTION: Hands on Java Programs; Data-parallel programming model- Hadoop, Hadoop I/O; MapReduce features, HDFS; Hive, HBase, Zookeeper; Sqoop and Case studies.

COURSE OUTCOMES:

On successful completion of this course, the students will be able to:

1. Gain hands-on experience on:
   - Map-Reduce, Sqoop, HBase and Mahout
2. Apply Big Data Technologies to solve contemporary problems
3. Gain skills on HDFS and MapReduce programming model concepts.
4. Initiate research insights into latest technologies of Big Data Analytics.
5. Apply various Big Data tools: Sqoop, HBase, MapReduce and Mahout.
6. Work individually and in teams collaboratively in implementing mini projects.
7. Demonstrate communication skills both oral and written for preparing and presenting reports.

M. Tech. (SE) – II Semester
(16MT22533) SEMINAR

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
--	100	100	--	--	--	2

PRE-REQUISITES: -Nil**-**

COURSE DESCRIPTION: Identification of seminar topic; literature survey; preparation of technical report and presentation.

COURSE OUTCOMES:

On successful completion of this course, the students will be able to:

1. Demonstrate capacity to identify an advanced topic for seminar in core and allied areas.
2. Extract information pertinent to the topic through literature survey.
3. Comprehend extracted information through analysis and synthesis critically on the topic.
4. Plan, organize, prepare and present effective written and oral technical report on the topic.
5. Adapt to independent and reflective learning for sustainable professional growth in Software Engineering.
6. Contribute to multidisciplinary scientific work in the field of Software Engineering.
7. Understand ethical responsibility towards environment and society in the field of Software Engineering.
8. Engage in lifelong learning for development of technical competence in the field of Software Engineering.

M.Tech. (SE) II Semester
(16MT23810) INTELLECTUAL PROPERTY RIGHTS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	-	2	-	-

PREREQUISITES: --

COURSE DESCRIPTION: Introduction to Intellectual Property; Trade Marks; Law of Copy Rights; Law of Patents; Trade Secrets; Unfair Competition; New Development of Intellectual Property.

COURSE OUTCOMES:

On successful completion of this course, the students will be able to:

1. Demonstrate in-depth knowledge on
    - Intellectual Property
    - Trade Marks & Secrets
    - Law of Copy Rights, Patents
    - New development of Intellectual Property
2. Analyze the different forms of infringement of intellectual property rights.
3. Solve problems pertaining to Intellectual Property Rights.
4. Stimulate research zeal for patenting of an idea or product.
5. Write effective reports required for filing patents.
6. Develop life-long learning capabilities.
7. Develop awareness of the relevance and impact of IP Law on their academic and professional lives.
8. Develop attitude for reflective learning.

M. Tech. (SE) – III & IV Semesters
(16MT32531 & 16MT42531) PROJECT WORK

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
200	200	400	--	--	--	28

PRE-REQUISITES: -Nil-

COURSE DESCRIPTION: Identification of topic for the project work; Literature survey; Collection of preliminary data; Identification of implementation tools and methodologies; Performing critical study and analysis of the topic identified; Time and cost analysis; Implementation of the project work; Writing of thesis and presentation.

COURSE OUTCOMES:

On successful completion of this course, the students will be able to:

1. Demonstrate capacity to identify an advanced topic for project work in core and allied areas.
2. Extract information pertinent to the topic through literature survey.
3. Comprehend extracted information through analysis and synthesis critically on the topic.
4. Solve engineering problems pertinent to the chosen topic for feasible solutions.
5. Use the techniques, skills and modern engineering tools necessary for project work.
6. Do time and cost analysis on the project.
7. Plan, prepare and present effective written and oral technical report on the topic.
8. Adapt to independent and reflective learning for sustainable professional growth.
9. Contribute to multidisciplinary scientific work in the field of Software Engineering.
10. Understand ethical responsibility towards environment and society in the field of Software Engineering.
11. Engage lifelong learning for development of technical competence in the field of Software Engineering.

Program: MASTER OF COMPUTER APPLICATIONS

MCA I - SEMESTER

(16MC1HS01) ACCOUNTING AND FINANCIAL MANAGEMENT

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITE: —

COURSE DESCRIPTION:

General accounting principles; Computerized Accounting; Financial Management; Break Even Analysis and Capital Budgeting; Financial Statements.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate Knowledge in:

- Basic Principles and concepts of Financial Accountancy.
- Basic concepts of Financial Management.

CO2. Develop skills in:

- Managerial decision making of an organization.
- Practice of Financial Accounting and Financial Management.

CO3. Ascertain the profitability and soundness of the organization.

CO4. Analyze and synthesize financial information to provide valid conclusions.

MCA I - SEMESTER

(16MC1BS01) MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: —

COURSE DESCRIPTION:

Mathematical logic and predicates, functions and relations; algebraic structures; mathematical reasoning; recurrence relations; graphs and trees.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Gain knowledge in

- Mathematical concepts
- Mathematical logic
- Programming languages
- Discrete mathematical structures
- Recurrence relations and
- Graph theory

CO2. Formulate Complex Computing problems with substantial conclusions using:

- Mathematical reasoning
- Recurrence relations and
- Graph theory

CO3. Design and develop mathematical models in Computer Science for real time problems/ business applications.

CO4. Express statements with the precision of formal logic and synthesize arguments to test their validity and prove a given statement using mathematical induction or using direct and indirect methods.

CO5. Apply the principles of discrete mathematical Structures to solve complex Application Software.

MCA I - SEMESTER

(16MC10101) **COMPUTER ORGANIZATION**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES:—

COURSE DESCRIPTION: Representation of data types used in digital computers; implementation of types of codes; construction of logical circuits by using logic gates; representation of types of instructions, instruction formats; description of the complete computer; representation of memory organization and input-output organization.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Understand the basic components of a system that optimizes resources:
- Processor
- Memories
- Input/output and Organization

CO2. Solve arithmetic operations on different types of number systems.

CO3. Design the system that must be cost effective with respect to the business needs.

CO4. Synthesize the system that can face new technical challenges.

CO5. Select an innovative system that works with diverse environments.

MCA I - SEMESTER

(16MC10102) **OPERATING SYSTEMS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES:—

COURSE DESCRIPTION: Design and implementation of operating system structure; Evaluation of Multithreading and CPU scheduling algorithms; Solving deadlocks and synchronization problems ; Implementation of memory management techniques; security threats ;

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Explore knowledge in-
- Operating system structure
- Process scheduling
- Process and thread synchronization

CO2. Analyze the performance of-
- CPU scheduling algorithms
- Page replacement Algorithms and
- Deadlocks

CO3. Design and implement software solutions for process and memory management.

CO4. Compare and contrast paging techniques using virtual memory.

CO5. Evaluate the key trade-offs between multiple approaches of operating system design.

CO6. Communicate effectively with operating system through application programs.

MCA I-SEMESTER

(16MC10103) **PROGRAMMING in C**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: —

COURSE DESCRIPTION:

Computer systems and Environments; Analysis and Efficiency of algorithms done with problem solving approaches; basic elements of C and data types; working with conditional and unconditional statements along with iterations; Handling strings and derived data types using modular programming; Handling files and dealing with preprocess directives; Command line argument and its usage; develop programs to solve real world problems.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Exhibit knowledge in

- C Tokens
- Input/output Formatting styles
- Control statements
- Data types
- Dynamic allocation functions
- Preprocess Directives

CO2. Analyze the efficiency of algorithms to solve computational problems using top down approach.

CO3. Design and develop the solutions using the techniques-parameter passing mechanism, command line arguments and recursion for real world problems.

CO4. Implement the concepts of modular programming language which includes functions, pointers and structures to solve complex problems.

CO5. Adapt preprocess directives, sequential and random access to text/binary files for persistent data storage for real world applications using Turbo C.

CO6. Engage lifelong learning and develop programming competency.

MCA I - SEMESTER

(16MC1HS31) ENGLISH LANGUAGE LABORATORY

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: English at Under Graduation level.

COURSE DESCRIPTION: Phonetics; Vocabulary Building; Functional Grammar; Just a Minute; Elocution/Impromptu; Giving Directions/Conversation Starters; Role Play; Public Speaking; Describing People, Places, Objects and Events; Reading Comprehension; Listening Comprehension; Information Transfer.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge in

- Phonetics
- Information Transfer

CO2. Analyse the functional knowledge in

- Vocabulary
- Grammar

CO3. Design and develop functional skills for professional practice.

CO4. Apply the techniques of Listening and Reading skills to comprehend listening and Reading comprehension.

CO5. Function effectively as an individual and as a member in diverse teams to demonstrate

- Just A Minute
- Role Play

CO6. Communicate effectively in public speaking in formal and informal situations.

CO7. Recognize the need to engage in lifelong learning to upgrade competence of knowledge and communication.

MCA I - SEMESTER

(16MC10131) IT LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: —

COURSE DESCRIPTION: Peripherals of a computer and disassembling & assembling the PC; Linux file system and File handling utilities & Text processing utilities; Productivity tools including Word, Excel, Power Point, Access, publisher.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Acquire skills in:

- Identification of Functional parts of PC
- Operating Systems

CO2. Identify the appropriate features to design documents, excel spread sheets and power point presentations.

CO3. Design documents, excel spread sheets, power point presentations, Access database and personal websites effectively.

CO4. Update knowledge and skills in PC maintenance and usage of latest Operating Systems and MS-Office.

CO5. Practice of ethical code of conduct in the usage of computer hardware and software.

CO6. Engage in life-long learning and attitude to work in teams.

CO7. Work together to customize the existing tools.

MCA I - SEMESTER

(16MC10132) PROGRAMMING IN C LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: A Course on "Programming in C".

COURSE DESCRIPTION: Program design and problem solving using the C programming language; Programming topics include control structures, functions, arrays, Strings, pointers, and file I/O and the usage of the preprocessor.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Solve problems using knowledge in

- C Tokens
- Input/output Formatting styles
- Control statements
- Data types

CO2. Design and develop the solutions using the techniques-parameter passing mechanism, command line arguments and handling files for real world problems making use of analysis of algorithms and verification.

CO3. Demonstrate the concepts of C as modular programming language which includes functions, pointers and structures to solve real world complex problems.

CO4. Engage lifelong learning and develop programming competency.

MCA II - SEMESTER

(16MC2BS01) **PROBABILITY AND STATISTICS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES:—

COURSE DESCRIPTION: Fundamental concepts of Probability; probability distributions; random variables; sampling, correlation and regression analysis; statistical quality control; testing of hypothesis.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Acquire knowledge of probability and probability distributions, random variables, sampling, testing of hypothesis, correlation and regression analysis and statistical quality control.

CO2. Identify the association between variables using Correlation and Regression Analysis.

CO3. Construct the probability distribution of a random variable, based on a real-world situation, and use it to compute expectation and variance.

CO4. Use testing of hypothesis for drawing valid inferences in research problems and making decisions in industry.

CO5. Adapt and apply theorems and probability distributions to compute solutions based on practical situations.

CO6. Asses the quality of the products produced in an industry using control charts.

MCA II-Semester

(16MC20101) **DATABASE MANAGEMENT SYSTEMS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: —

COURSE DESCRIPTION: Concepts of relational database and its design; Representation of ER diagram to Relational model; SQL queries; Normal forms; Recovery and concurrency control mechanism, Storage and indexing mechanism.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Gain in-depth knowledge in

- Database models and database architecture
- Transaction processing and recovery management
- Storage and Indexing mechanism

CO2. Analyze the complex problems of real world applications.

CO3. Design Relational Database Schema for a given Entity Relationship model.

CO4. Interpret the data by applying normalization techniques for the development of database application projects.

CO5. Use Structured Query Language DDL/DML/DCL commands to solve real time applications.

MCA II-SEMESTER

(16MC20102) **DATA STRUCTURES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: A course on "Programming in C".

COURSE DESCRIPTION: Writing Pseudo code using algorithms for implementing Abstract Data Type; Implementation of Stack, Queue, LIST, Graph, Tree ADT's and its applications; Implementation of Sorting and Searching techniques; Implementation of Binary Search Tree ADT, AVL- height balanced trees and its applications.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Gain knowledge in linear and non-linear data structures to solve computing problems.

CO2. Identify and analyze the usage of various data structures, operations and associated algorithms.

CO3. Design and develop variety of algorithms and programs in order to solve computing problems.

CO4. Choose the appropriate data structure and algorithm design method to get an optimal solution for complex real world problem.

CO5. Apply searching, sorting, tree traversal and graph traversal techniques to optimize the complexities of an application.

CO6. Communicate effectively about complex computing activities by writing documentation.

MCA II-SEMESTER

(16MC20103) OBJECT ORIENTED PROGRAMMING THROUGH JAVA

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: A course on "Programming in C".

COURSE DESCRIPTION: Basic Principles of Object Oriented Programming, Representation of Java Classes and methods; Inheritance and Polymorphism using Java, Creation of Packages and Interfaces; Implementation of Utility Classes and Input/output; Exception handling mechanism and multithreading; Event handling techniques and GUI applications by using AWT and Swings.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Understand the usage of Object-Oriented Principles.

CO2. Analyze to solve real world problems by using Java Programming language.

CO3. Develop and execute various GUI Applications using AWT and Swings.

CO4. Adapt and design applications using Java IDE tools.

CO5. Recognize the need to engage independent learning for continual development as an application professional.

CO6. Communicate effectively about complex computing activities by writing documentation.

MCA II-SEMESTER

(16MC20104) SOFTWARE ENGINEERING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES:- -

COURSE DESCRIPTION: Software engineering core principles process models and agile process; design concepts and design issues; quality management principles; software configuration and product metrics; project estimation and risk management maintenance.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Understand concepts-process, models, methodologies and principles of software engineering.

CO2. Identify and classify user requirements and software requirement specification.

CO3. Analyze the architecture and Design application software using design engineering principles.

CO4. Estimate and maintain software configuration management by synthesis of development process
to provide valid conclusions.

CO5. Apply risk and metrics management principles forquality assurance.

CO6. Test and communicate quality of an application and as per needs of the stakeholder.

MCA - II Semester

(16MC20131) DATABASE MANAGEMENT SYSTEMS LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES:A Course on "Database Management Systems".

COURSE DESCRIPTION: Analyze problems and design of ER diagrams; Creation of Data Definition commands; Normalization techniques; Implementation of functions; Creation of Views, Indexes and Sequences; Implementation of simple and complex queries using Oracle SQL; Creation of packages and triggers.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Impart knowledge in applying normalization techniques for development of application software to realistic problems.

CO2. Formulate queries using SQL DDL/DML/DCL commands.

CO3. Design a database using ER diagrams, convert ER diagrams into relation schemas.

CO4. Improve the database performance by optimizing the queries using Indexing and Hashing techniques.

CO5. Exploit their knowledge in developing database applications using SQL language.

MCA - II SEMESTER

(16MC20132) DATA STRUCTURES THROUGH C LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: Courses on "Programming in C Lab" and "Data Structures".

COURSE DESCRIPTION

Implementing logical and physical representation of data, complexity and their efficiency. Implementing linked lists and their different variations, queues, stacks and their applications; tree structures and their different variations; Solving problems using graphs, sorting and searching techniques.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Apply abstract data type and their basic usability in different applications through C programming language.

CO2. Identify and analyze suitable data structures to solve computing problems.

CO3. Design and develop variety of c programs using data structures in order to solve computing problems.

CO4. Choose the appropriate data structure and algorithm design method to get an optimal solution for complex real world problem.

CO5. Apply searching, sorting, tree traversal and graph traversal techniques to optimize the complexities of an application.

CO6. Work together or as an individual to customize the applications.

MCA II-SEMESTER

(16MC20133) **OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: Courses on "Programming in C Lab" and "Object oriented Programming through JAVA".

COURSE DESCRIPTION: Implementation of recursive and non recursive functions; Usage of StringTokenizer class; Implementation of method overloading; Basic String Operations; Creation of package and Interfaces; Handling predefined and user defined exceptions; Creation of File and its Operations; Implementation of multithreading; Creating and testing Applets; Usage of Event handling techniques and GUI applications by using AWT and Swings.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Understand the basic concepts and structure of a Java Program.

CO2. Analyze to solve real world problems by using Java Programming language.

CO3. Develop and execute various GUI Applications using AWT and Swings.

CO4. Adopt and design applications using Java IDEs tools.

CO5. Recognize the need to engage independent learning for continual development as an application professional.

CO6. Work together to customize the existing applications.

MCA -III Semester

(16MC3HS01) **ORGANIZATIONAL BEHAVIOR AND HUMAN RESOURCE MANAGEMENT**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE REQUISITE: —

COURSE DESCRIPTION : Managements; Functions of Management; Elements of Corporate Planning Process; Environmental Analysis; Management of Change; Organizational Behavior; Individual Behavior; Concepts of Personality; Perception; Learning; HRM; Human Resource Planning; Job Design and Job Design; Recruitment; Selection; Training; BPO.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on managing behavior in an organization.

CO2. Develop requisite skills for:

CO3. Effective Human Resource Management.

CO4. Optimum utilization of Human Resource.

CO5. Develops effective communication among the work group of an organization.

CO6. Provide life-long learning for effective operation of an organization.

MCA III-Semester

(16MC3BS01) **OPERATIONS RESEARCH**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: —

COURSE DESCRIPTION: Operations research techniques; Linear Programming Problems; Transportation problem; Assignment problem; sequencing problem; Replacement problem; Inventory models; simulation models and PERT/CPM in project management.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on:

- Linear Programming Problem
- Utilization of Resources
- Transportation Problem, Assignment Problem, sequencing problem and replacement problem
- Inventory models PERT/CPM and
- Simulation

CO2. Analyze literature and solve complex computational problems using Linear Programming Problem (LPP) techniques.

CO3. Design and solve problems using LPP models, Transportation Problem, Assignment Problem, Sequencing Problem that meet optimized utilization of resources.

CO4. Synthesize data transformation by using complex operational models in Inventory, simulation models and Game Theory.

CO5. Apply operational modeling techniques-PERT and CPM in Project Management system.

MCA – III Semester

(16MC30101) **COMPUTER NETWORKS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: —

COURSE DESCRIPTION:

Computer network Applications; The physical layer; The data link layer; The medium access control sub-layer; The network layer; The transport layer; The application layer; Network security.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on:

- Concepts of computer networks
- Functionality of reference models and layers
- Interfaces between layers

CO2. Analyze issues related to data link layer and transport layers using channel allocation and connection management schemes.

CO3. Design techniques for error detection and correction mechanisms suitable to ensure data integrity, access control techniques.

CO4. Investigate diverse techniques used in service user and provider layers in terms of reliability, data integrity, collision resistance and access control mechanisms.

CO5. Apply algorithms and use simulators to calculate least-cost paths for a given network.

CO6. Use the skills by using diverse communication standards and networks with the technology advancements in data communication.

MCA III – Semester
(16MC30102) DATA WAREHOUSING AND DATA MINING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: A Course on "Data Base Management Systems".

COURSE DESCRIPTION: Data Warehouse Components and Architecture; Data mining Functionalities; Data Preprocessing; Association Rule Mining; Classification and Clustering; Multimedia, Text, Web Data Mining and Applications.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on:
- Schemas of Data warehouse
- Data preprocessing methods
- Classification and Clustering techniques

CO2. Analyze frequent itemsets using Apriori and FP growth algorithms.

CO3. Design and develop solutions for different classification and prediction models.

CO4. Solve complex problems by adapting appropriate analysis and interpretation of different types of text, multimedia and web data.

CO5. Use WEKA tool for creation of weather, hospital, banking dataset and perform preprocessing on these datasets.

MCA III – Semester
(16MC30103) OBJECT ORIENTED ANALYSIS AND DESIGN

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: Courses on "Object Oriented Programming Through JAVA" and "Software Engineering"

COURSE DESCRIPTION:

Things and Classes; Relationships; Class Diagrams; Object Diagrams; Usecase Diagrams; Interaction Diagrams; Activity Diagrams; State Chart Diagrams; Component Diagrams; Deployment Diagrams.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on Things, principles of Object Oriented Development.

CO2. Analyze the specifications of Class, Use case, Activity, Sequence and State diagrams and develop models using pre conditions and post conditions.

CO3. Design application artifacts to construct the Logical, Behavioral and Architectural model of an Application.

CO4. Solve complex behavior using common modeling techniques of things.

CO5. Make use of UML Tool such as Rational Rose or Visual Paradigm to design Class, Use Case, Sequence, Collaboration, Activity, State Chart, Component and Deployment Diagrams for the an Application.

MCA – III Semester
(16MC30131) COMPUTER NETWORKS LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C

50	50	100	-	-	3	2

PREREQUISITES: A Course on "Computer Networks".

COURSE DESCRIPTION: Implementing error detection and correction techniques; sliding window protocol; simulation of dynamic routing algorithms; congestion controlling mechanism; simulation of various Transport layer protocols.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on the concepts of networks, topologies, network devices and network simulators.

CO2. Analyze Error detection and correction mechanisms to verify and correct the data.

CO3. Develop networking protocols like TCP/IP, UDP, RPC, ARP and RARP.

CO4. Investigate congestion control mechanisms such as Leaky Bucket algorithm to achieve flow control.

CO5. Simulate dynamic routing protocols such as Distance Vector and Link state routing algorithms using NS2 simulator.

CO6. Adapt policies and mechanisms to avoid unauthorized access over the network through access control mechanisms and authentication.

CO7. Effectively communicate the routing paths through network simulators through visualization.

CO8. Advanced communication techniques can be applied by an individual to interact with remote machine through client server programming.

MCA III – Semester

(16MC30132) **DATA WAREHOUSING AND DATA MINING LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: A course on "Data Warehousing and Data Mining".

COURSE DESCRIPTION:

Develop Transformations using Data Warehouse ETL tool; Creation of Datasets; Data Preprocessing; Association Rule Mining; Classification and Clustering; Multimedia, Text, Web Data Mining and Applications.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on:

- Data acquisition process
- Data preprocessing methods
- Data Mining algorithms

CO2. Analyze frequent itemsets using Apriori and FP-growth algorithms.

CO3. Design and construct data acquisition process from one data source to other target data source using data warehouse ETL tool.

CO4. Develop solutions for complex computing problems by applying appropriate data mining algorithms to evaluate the accuracy and error measures using WEKA components.

CO5. Use WEKA tool to preprocess weather, hospital, and banking datasets to discover knowledge for making future predictions effectively.

CO6. Communicate effectively in implementing data mining problems with respect to documentation and visualization of hidden patterns.

CO7. Apply the knowledge of data mining to assess and provide computing solutions for societal issues.

CO8. Function effectively as an individual and as a member in a team to manage and implement data mining application in multidisciplinary environment.

MCA – III Semester

(16MC30133) **OBJECT ORIENTED ANALYSIS AND DESIGN LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: A Course on "Object Oriented Analysis and Design".

COURSE DESCRIPTION:

Analyze specifications; Design Class Diagrams; Object Diagrams; Usecase Diagrams; Interaction Diagrams; Activity Diagrams; State Chart Diagrams; Component Diagrams; Deployment Diagrams

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on:
- Library Management System
- ATM Application
- Online Bookshop
- Railway Reservation System

CO2. Analyze applications and specifications to develop static and behavioral models.

CO3. Design and construct the Logical, Behavioral and Architectural model of an Application.

CO4. Construct a project from beginning to end using UML Tool, Rational Rose for an Application Software.

CO5. Communicate effectively with all the team members about various logical and behavioral objects of an Application Software.

CO6. Asses the common modeling techniques to be applied for a system for the societal applications.

MCA IV-SEMESTER

(16MC40101) **BIG DATA ANALYTICS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: Courses on "Data warehousing and Data Mining" and "Object Oriented Programming through JAVA".

COURSE DESCRIPTION:

Big data Analytics usage and Outcomes; Types of big data; Challenges of analyzing big data; Analytics tools for big data; Requirements of Hadoop; Adapting Hadoop File systems and I/O; MapReduce Application; Administration of Hadoop; Big data analytics; R Programming on Hadoop.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Acquire knowledge on
- Basic concepts of Big Data Analytics and current trends in Big Data
- MapReduce and R Tool
- HDFS and MapReduce in Big Data Hadoop.

CO2. Analyze the big data types as Structured, unstructured and semi-structured.

CO3. Design and develop methods using Map Reduce technique to solve:
- Varieties of data formats in Hadoop Framework for an application.
- Methods, Dimensions, and practices for Big Data applications.

CO4. Solve complex problems in Big Data by adopting appropriate techniques to provide insights for small and medium business.

CO5. Apply modern tools like HIVE and R to perform analytics in an user friendly environment on Hadoop platform.

CO6. Demonstrate knowledge as an individual to manage Weather sensors application.

MCA IV-Semester

(16MC40102) **LINUX PROGRAMMING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: A Course on "Computer Networks".

COURSE DESCRIPTION: LINUX operating system features; Architecture of LINUX operating system; LINUX environment; Shell Script; Signals and Sockets.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate Knowledge on LINUX operating system and utilities.

CO2. Analyze the Bourne shell, LINUX files, processes and signals to solve problems in Linux operating system.

CO3. Design and develop the programs by using LINUX system tools like vi editor, File, Text, Network and Backup utilities.

CO4. Solve Advanced C and Shell Script Programming problems in Linux Environment. Select and apply appropriate techniques like semaphores, Messages and Shared Memory to develop inter Process communication in Linux.

CO5. Communicate effectively with Linux operating system through different application programs.

MCA IV-Semester

(16MC40103) **WEB PROGRAMMING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: A Course on "Object Oriented Programming through JAVA".

COURSE DESCRIPTION:

Concepts of HTML; Java Script and XML; Developing Web Applications using Servlets, JSP and PHP; Adopting Tomcat Server and XAMP Server for deploying Web Applications.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate Knowledge on

- Client side scripting
- AJAX programming and Application Servers
- HTML, DHTML**,** Java Script and XML

CO2. Analyze 2-tier, 3-tier and MVC architectures for web application development.

CO3. Design and develop web Applications using Dynamic HTML with Java Script, XML technology.

CO4. Investigate and solve complex problems using Server-side technologies like servlets, JDBC technologies and adapt Tomcat Server and XAMPP Server for deployment.

CO5. Use JSP and PHP to implement E-Commerce applications that has potential insights.

MCA–IV Semester

(16MC40104) **SERVICE ORIENTED ARCHITECTURE**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: A course on "Software Engineering".

COURSE DESCRIPTION: Web Services; Principles of SOA; Service Layers; Simple Object Access Protocol (SOAP); Web Services Description Language (WSDL).

COURSE OUTCOMES: On successful completion of this course, the student will be able to:

CO1. Demonstrate knowledge on:

- Principles, services and policies of service orientation.
- Fundamentals of web services.
- XML, WSDL related to SOA

CO2. Analyze complex business process critically in identifying appropriate service model logic.

CO3. Design service oriented architecture suitable for different environments.

CO4. Use XML, SOAP and service interface design tools for building service oriented architecture.

MCA IV - Semester

(16MC40105) **INTERNET OF THINGS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITE: A Course on **"**Computer Networks".

COURSE DESCRIPTION: Internet of Things(IoT) Components; Communication models; Prototyping; Hardware; Design models; Development platforms; Analytics for IoT.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on Protocols, Functional blocks and communication models of Internet of things.

CO2. Identify appropriate sensors and communication modes used in IoT based systems.

CO3. Design appropriate solutions for IoT applications using Raspberry Pi and Arduino kits.

CO4. Appropriately synthesize the models and applications for usage in Home automation and cities.

CO5. Apply evolutionary techniques to perform analytics on the data integrated from IoT based systems.

CO6. Use Professional engineering principles to design and develop applications using IoT.

MCA – IV Semester

(16MC40106) **COMPUTER FORENSICS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: A Course on "Computer Networks".

COURSE DESCRIPTION: Computer forensics technologies and cybercrime; Evidence collection and data seizure; Initial Response and Forensic Duplication; Open source tools for Forensic Process;

Forensic Data Analysis and Validation; Processing crimes and incident scenes; Mobile Device Forensics; Network Forensics; E-mail Investigation; Report writing.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on:

- Process Fundamentals and Technologies
- Evidence Capture and Computer Forensic Analysis
- Law Enforcement crime and incident scenes

CO2. Analyze and validate digital evidence found in digital storage device.

CO3. Design and develop solutions for a forensic process based on type of communication standards, electronic device capabilities and specifications.

CO4. Investigate and contribute in groups for the development of new forensics tools- Forensic Card Reader, Cell Seizure and MOBILedit.

CO5. Apply forensic tools- Forensic SIM, WinHex and techniques to acquire and verify the evidence.

CO6. Commit to ethics and follow Law of Enforcement standards for digital Forensics and crime investigations.

MCA – IV Semester

(16MC40107) E-COMMERCE

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: Courses on "Database Management Systems", "Computer Networks" and "Web Programming".

COURSE DESCRIPTION:

Electronic Commerce; E-Commerce applications and web; Process models; Electronic payment systems; EDI; Interorganizational E-Commerce; Digital document types; Online marketing process; M-Commerce; Commerce catalogues; Multimedia.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on

- E-Commerce applications.
- Mercantile Process Models
- Electronic Payment Systems
- Electronic Data Interchange (EDI)

CO2. Analyze the impact of E-commerce on business models and strategies in the new economy.

CO3. Design and develop an electronic payment system.

CO4. Solve complex security problems in the development of Electronic commerce application using SSL and S-HTTP.

CO5. Apply corporate digital library technique to make the information useful to diverse people at different stages in the work process.

CO6. Follow ethics to adapt security standards - digital signature standards in resolving the issues of E-Commerce.

MCA IV-Semester

(16MC40108) SOFTWARE PROJECT MANAGEMENT

Int. Marks	Ext. Marks	Total Marks	L	T	P	C

40	60	100	4	-	-	4

PREREQUISITES: A course on "Software Engineering".

COURSE DESCRIPTION: Software Models and process improvement ; Principles of software management system and life cycle phases; Workflows and checkpoints of the process; scheduling and work break down structure ; Process automation ; Software metrics ; Future generation software economics.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on
- Software Economics
- Engineering and Production stages
- Artifacts of the process
- Check points of the process
- Process Automation and Tailoring of the process

CO2. Analyze the resources required for a project and to produce a work plan and resource schedule.

CO3. Design and develop project plans to address real-world management Challenges.

CO4. Synthesize the development of project by assessing quality of project using metrics.

CO5. Apply process methods to manage the software projects at each stage of software development life cycle.

CO6. Commit to ethics to adapt conventional and modern software project management principles for developing the software projects.

IV-Semester

(16MC40109) **INFORMATION RETRIEVAL SYSTEMS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: A course on "Data Warehousing and Data Mining".

COURSE DESCRIPTION: Functional overview; Information Retrieval System capabilities; automatic Indexing; stemming algorithms; automatic term clustering; user search techniques; Information visualization technologies; software text search algorithms; Information system evaluation.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on
- Theoretical and practical aspects of information retrieval Systems.
- Automatic indexing
- Hardware/ Software text search algorithms and Information visualization

CO2. Analyze the functionality of several searches and browse algorithms.

CO3. Design and develop the probabilistic retrieval methods, algorithms and ranking principles.

CO4. Apply porter stemming and successor stemming algorithms to extract meaningful and relevant patterns.

CO5. Use various search engines effectively by applying optimum searching techniques.

MCA IV-Semester

(16MC40110) **WIRELESS NETWORKS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C

40	60	100	4	-	-	4

PREREQUISITES: A Course on "Computer Networks".

COURSE DESCRIPTION: Concepts of Medium access alternatives; Generations of Wireless WANS; Adhoc and Wireless Sensor Networks; Wireless MANS and PANS.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate Knowledge on
- Wireless WANS
- Wireless LANS
- Adhoc and Sensor Networks and
- Wireless MANS and PANS

CO2. Analyze the sensor and Adhoc network models and its classifications.

CO3. Design and develop Network applications for Wireless devices like smart phones and tablets.

CO4. Solve complex connectivity problems - Security, Quality of service and routing optimization at in wireless Networks.

CO5. Select and apply the latest wireless network protocols - LTE, Wi-Fi and Bluetooth in developing and operating wireless networks.

CO6. Provide innovative privacy and security measures for accessing of Wireless Network devices adapting standards-IEEE 802.11, IEEE 802.11b and IEEE 802.11.

MCA – IV Semester
(16MC40111) BUSINESS INTELLIGENCE

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: A course on "Data Warehousing and Data Mining".

COURSE DESCRIPTION: Decision support and business intelligence**;** Framework of computerized decision support and business intelligence; DSS classifications; DSS components; Mathematical models for decision support; BPM methodologies; BPM technologies; BPM applications; Artificial intelligence; Fuzzy logic; Fuzzy inference systems; Natural Language Processing and Artificial Intelligence.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on:
- Big data technologies, Data Mining (DM), Knowledge Management, Expert Systems, Natural Language Processing and Artificial Intelligence, banking, finance and insurance.
- Data mining techniques.
- Frameworks of computerized decision support system and Business Intelligence.

CO2. Analyze the scenarios like customer choices and preferences for an organization using predictive analytics.

CO3. Design and develop a DSS with the dimensions like Communications-driven and group, Data-driven, Document-driven, Knowledge-driven, Model-driven.

CO4. Develop solutions for the problems in data warehouse by analyzing a BI maturity model to identify critical attributes and mapping operational data to data warehouse.

CO5. Apply modern techniques like variable identification, predictive analytics of Mathematical models for identification and environmental analysis of the problem.

MCA – IV Semester
(16MC4HS31) SOFT SKILLS LABORATORY

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: A Course on "English Language Lab".

COURSE DESCRIPTION: Body Language; Assertiveness; Goal Setting; Creative Thinking; Interpersonal Skills; Team Work; Conflict Management; Etiquette; Report Writing; Group Discussions; Interviewing Skills.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Acquire knowledge on:

- Goal Setting
- Creative Thinking
- Leadership Skills and
- Team Work

CO2. Analyse the functional knowledge on

- Body Language
- Interpersonal Skills and
- Stress Management

CO3. Apply the techniques of soft skills in a problem situation enhanced through multimedia software.

CO4. Function effectively as an individual and as a member in diverse teams.

CO5. Communicate effectively in public speaking in formal and informal situations.

MCA IV-SEMESTER

(16MC40131) **BIG DATA ANALYTICS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PRE-REQUISITES: A Course on "Big Data Analytics".

COURSE DESCRIPTION: Installation of Hadoop; Perform analytics on Weather sensors application; Analysis of reports in R and HIVE Tool.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on:

- Map Reduce Framework
- R programming

CO2. Analyze Structured, unstructured and semi-structured types of data to perform data analytics.

CO3. Design and develop Map Reduce programs on Hadoop platform for weather sensor data.

CO4. Solve complex problems in Big Data by adopting appropriate techniques to provide insights to facebook datasets.

CO5. Apply modern tools such as HIVE and R to perform analytics in a user friendly environment.

CO6. Communicate effectively in implementing social network data sets for analysis using R tool with respect to visualization of hidden patterns.

CO7. Asses the Weather sensors applications with respect to local or global climatic conditions.

CO8. Demonstrate knowledge as an individual to manage OLA dataset on R and HIVE to handle diverse data.

MCA IV-Semester

(16MC40132) **LINUX AND WEB PROGRAMMING LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: Courses on "Linux Programming" and "Web Programming".

COURSE DESCRIPTION: HTML, Java Script**,** XML and Shell Script; Web Application Development using Servlets, Java Server Pages, PHP and JDBC; Tomcat Server and XAMP Server for Deploying Web Applications.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate Knowledge on:
- Client side scripting
- AJAX programming and Application Servers
- HTML, DHTML**,** Java Script and XML

CO2. Analyze 2-tier, 3-tier and MVC architectures for web application development.

CO3. Design and develop web Applications using Dynamic HTML with Java Script, XML technology.

CO4. Investigate and solve complex problems using Server-side technologies like servlets, JDBC technologies and adapt Tomcat Server and XAMPP Server for deployment.

CO5. Use JSP and PHP to implement E-Commerce applications that has potential insights.

CO6. Communicate effectively in implementing web application programs using HTML, JAVA script and AJAX.

CO7. Develop societal, environmental and health related applications using Servlets, JSP and PHP.

CO8. Work with diverse teams using web technology frame-works towards developing quality software applications.

MCA – V Semester

(16MC50101) **CLOUD COMPUTING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES: Courses on "Computer Networks" and "Operating Systems".

COURSE DESCRIPTION: Virtualization, Cloud Computing Fundamentals, Deployment Models; Cloud Computing Architecture; Cloud Computing Mechanisms; Cloud Security; Cloud Disaster Recovery; Working with Clouds; and Case Studies.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on services, architecture, types of infrastructural models, disaster recovery and Virtualization.

CO2. Analyze the issues in cloud computing Data, Network and Host security.

CO3. Apply API development skills in web applications for Cloud deployment.

CO4. Use research based knowledge to build cloud applications.

CO5. Use advanced programming languages to access cloud services.

CO6. Build cloud environment suitable for societal requirements.

MCA V-Semester

(16MC50102) **MOBILE APPLICATION DEVELOPMENT**

Int. Marks	**Ext. Marks**	**Total Marks**	**L**	**T**	**P**	**C**
40	60	100	4	-	-	4

PREREQUISITES: Courses on "Computer Networks", "Web Programming" and "Database Management systems"

COURSE DESCRIPTION:

J2ME concepts; J2ME Architecture and Development Environment; Commands, Items and Event Processing; Low level and High Level Displays; e Applications by using Wireless Tool Kit and Connecting with SQL Data Bases.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on J2ME and Wireless Technology.

CO2. Analyze the commands, items and event processing in MIDlet Programming.

CO3. Design and develop the applications for Mobile Devices.

CO4. Solve the High level and Low level Display problems in Mobiles Screens and Canvas.

CO5. Select appropriate tool like wireless tool kit-MIDlet programming to develop Mobile Applications.

CO6. Create security alerts in mobiles for betterment of individual and society.

MCA V-SEMESTER

(16MC50103) **SOFTWARE TESTING**

Int. Marks	**Ext. Marks**	**Total Marks**	**L**	**T**	**P**	**C**
40	60	100	4	-	-	4

PREREQUISITES: A course on "Software Engineering".

COURSE DESCRIPTION:

Software Testing Basics: Goals, Defects, Terminology, Methodology, STLC in SDLC, Verification and Validation; Software Testing Techniques: White box testing, Black Box Testing, Regression testing; Test Management: Test Planning, Design and Specifications; Test Automation: Tool selection and Guidelines.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on:
- Software Testing Life Cycle.
- Testing Techniques.
- Test Management and Metrics.
- Regression Testing
- Test Automation

CO2. Analyze testing circumstances and their resultants in software development.

CO3. Design and develop the appropriate test cases in accordance to the software development model.

CO4. Use problem solving skills to control and monitor the testing process.

CO5. Apply testing tools for testing the software quality.

CO6. Apply contextual knowledge to perform testing on software related to societal applications.

MCA V – Semester

(16MC50104) **SOFTWARE QUALITY ASSURANCE**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: A Course on "Software Engineering".

COURSE DESCRIPTION: Software Quality; Software Quality Assurance; Project Life Cycle components; Software Quality Infrastructure; Development Methodologies; Procedures and Work Instructions; Standards, Certificates and assessments.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on quality, architecture, metrics of software development.

CO2. Analyze software quality plan for a software project to include sections on change management, configuration management, defect elimination, validation and verification and measurement.

CO3. Design software quality plans for a software project and asses their capability to adopt quality standards.

CO4. Assess the quality of software product using software quality metrics.

CO5. Adapt Procedures and work instructions, Templates, Checklists and 3S development for software quality infrastructure.

CO6. Commit to ethics to apply ISO and IEEE standards in preparing the quality plan and documents.

MCA – V Semester

(16MC50105) **SEMANTIC WEB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: Courses on "Web Programming" and "Computer Networks".

COURSE DESCRIPTION: Semantic web fundamentals; Semantic web technology; Ontology web language; Swoogle; Semantic web services.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on:

- Semantic web search
- RDF and SWOOGLE
- Semantic web services
- RDFS and OWL

CO2. Analyze layers of web architecture for describing web content.

CO3. Design semantic web search engine for capturing information on the current web

MCA – V Semester

(16MC50106) **INFORMATION SECURITY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: A course on "Computer Networks".

COURSE DESCRIPTION: cryptographic algorithms; Classical Encryption Techniques; Public key and Private key encryption; security models; Hash Algorithms; E-mail and IP Security; analysis of security principles in internet and system security; Intrusion Detection.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on

- Symmetric and Asymmetric Encryption Algorithms
- Key distribution and message Authentication
- Hash algorithms and digital signature techniques
- IP security and Web Security
- Intrusion Detection and Firewall configurations

CO2. Analyze appropriate Symmetric, Asymmetric Encryption algorithms and Hash Algorithms to provide Confidentiality and Authentication.

CO3. Design solutions to problems related to Public-Key Encryption, Digital signatures, Secure Hash Functions.

CO4. Identify efficient ciphers such as Gauss Cipher, Vigenere cipher, Rail Fence Cipher and cryptographic algorithms such as RSA, Diffie-Hellman cryptographic algorithms, Digital Signature standard for Hashing techniques to provide novel solutions for real-time application protocols like PGP, S/MIME, SSL, TLS and SET.

CO5. Use the Cryptographic Techniques - Vigenere cipher, Rail Fence Cipher to provide confidentiality, security Algorithms and hashing techniques to enhance level of protection in area of digital communication.

CO6. Commit to ethics in authentication and access control methods to implement policies and mechanisms on business operations using Digital Signature Standards.

MCA V-SEMESTER

(16MC50107) ENTERPRISE RESOURCE PLANNING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: Courses on "Database Management Systems and Management Information Systems."

COURSE DESCRIPTION: Concepts of ERP; Strategies of ERP Technology; Business models; ERP market.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on systematically planning mechanisms in an enterprise and identify all components in an ERP system and the relationships among the component.

CO2. Analyze ERP Technology Implementations and Modules to develop custom ERP Applications.

CO3. Design and develop an ERP system along with customization using appropriate modeling methods-Entity Relationship Modeling (ERM) and Event-Driven Process Chains (EPC).

CO4. Solve Complex ERP Risks and SAP Business Applications problems.

CO5. Select appropriate tool like SAP AG's ERP used in implementation of ERP system.

MCA – V Semester

(16MC50108) MANAGEMENT INFORMATION SYSTEMS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: Courses on "Database Management System" and "Organizational Behavior and Human Resource Management".

COURSE DESCRIPTION: Methodologies of systems approach to organization; types of information systems; Management issues; Strategic and project planning for MIS; Designing an information system; Implementation of a system; Evaluation and maintenance; Weaknesses in system development; Soft spots in planning.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on:

- Meaning and role of MIS
- Types of information systems
- System design processes
- Decision making processes
- Techniques used in developing an information system.

CO2. Analyze the techniques of operations research, management science, mathematical tools, scientific approaches for decision rules.

CO3. Design and develop programmed decision system for Manufacturing Subsystem Inventory System Distribution Logistics System.

CO4. Solve complex problems in strategic and project planning, conceptual and detailed system design by using the techniques like breakdown structure, the network approach to defining task relationships and the integration of performance/cost/time for planning and control.

CO5. Apply tools like spreadsheets, system flowcharts to evaluate solutions for real-world business problems.

CO6. Aware of the ethical, social, and security issues of an information system.

MCA – V Semester

(16MC50109) **BIOINFORMATICS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: –

COURSE DESCRIPTION: Bioinformatics; Biology and Information; DNA and RNA; biological databases; Sequence alignment and dynamic programming; database mining tools; usages of Bioinformatics.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on

- Biological database.
- Bioinformatics.
- DNA and RNA.
- Modern molecular biology

CO2. Analyze DNA and RNA Structure, Public Databases-NCBI and global and local sequence alignments on biological DBMS.

CO3. Design and implement

- Data retrieval.
- Data annotation.
- Database Connectivity

CO4. Investigate on sequence alignment function and retrieve structure and Evolutionary information using dynamic programming.

CO5. Select and apply techniques and data mining tools on biological data to perform Sequence similarity search using tools like BLAST and FASTA.

MCA – V Semester

(16MC50110) ETHICAL HACKING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: A Course on "Computer networks".

COURSE DESCRIPTION: Network and Computer Attacks; Foot Printing and Social Engineering; Port Scanning; Enumeration; Desktop and Server Operating System vulnerabilities; Hacking Web Servers; Cryptography; Network Protection System; Hacking Wireless Network.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate Knowledge on:
- Network and Computer attacks
- OS Vulnerabilities
- Hacking web servers, Hacking wireless network

CO2. Analyze system and network vulnerabilities.

CO3. Design security solutions for risks that arise from hacking.

CO4. Use appropriate ethical hacking technique to solve security problems.

CO5. Apply Contextual Knowledge to assess safety and legal issues in ethical hacking.

CO6. Inculcate use of ethical hacking practices while maintaining professional ethics.

MCA V-Semester

(16MC50111) MULTIMEDIA AND RICH INTERNET APPLICATION DEVELOPMENT

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: A course on "Web Programming".

COURSE DESCRIPTION: Concepts of Multimedia; Multimedia authoring tools; Data representations; Fundamental concepts in Video and digital audio; Basic video compression techniques; Multimedia communication and retrieval; Development of rich internet applications with adobe flash.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate Knowledge on multimedia, video compression techniques and adobe flash.

CO2. Analyze a variety of creative techniques like sequential, hierarchical search and MPEG in the visual design of online media.

CO3. Design and development of Multimedia Animations using Adobe Flash and Flex3

CO4. Create highly interactive, rich internet applications using multimedia technologies and authoring tools.

CO5. Evaluate the role and importance of critical experimentation and innovation in the multimedia development process as a professional practice.

MCA – V Semester

(16MC50131) **CLOUD COMPUTING LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	2

PREREQUISITES: A Course on "Cloud Computing".

COURSE DESCRIPTION: Hands-on experience on creating virtual machines on Windows and Linux platforms; Development of service based web applications and their deployment and Mobile app development.

COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate hands-on experience on Virtualization models and Cloud Environment.

CO2. Analyze the given experiment and relate to existing architectures.

CO3. Apply API development skills in web applications for cloud deployment.

CO4. Demonstrate independent problem solving skills in developing dynamic web applications.

CO5. Use advanced programming languages to access cloud services.

CO6. Demonstrate communication skills, both oral and written for preparing and presenting reports.

CO7. Build suitable cloud environment for societal requirements.

CO8. Work effectively as an individual and as a member in team for mini-project implementation

MCA – V Semester

(16MC50132) **MINI PROJECT**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	-	2

PREREQUISITES: All the courses of the program from I to IV semesters.

COURSE DESCRIPTION: Identification of topic for the project work; Literature survey; Collection of preliminary data; Identification of implementation tools and methodologies; Performing critical study and analysis of the topic identified; Implementation of the project work; Preparation of mini project reports and presentation.

COURSE OUTCOMES: Completion of the project work enables a successful student to demonstrate:

CO1. Knowledge on the project topic.

CO2. Analytical ability exercised in the project work.

CO3. Design skills applied on the project topic.

CO4. Ability to investigate and solve complex computing problems faced during the project work.

CO5. Ability to apply tools and techniques to complex computing activities with an understanding of limitations in the project work.

CO6. Ability to provide solutions as per societal needs with consideration to health, safety, legal and cultural issues considered in the project work.

CO7. Understanding of the impact of the professional computing practices to provide solutions in environmental context and need for sustainable development experienced during the project work.

CO8. Ability to apply ethics and norms of the professional computing practice applied in the project work.

CO9. Ability to function effectively in a team is experienced during the mini project.

CO10. Ability to present views cogently and precisely on the project work.

CO11. Project management skills as applied in the project work.

CO12. Ability to engage in life-long leaning as experience during the project work.

MCA – V Semester

(16MC50133) COMPREHENSIVE ASSESSMENT

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	100	100	-	-	-	2

PREREQUISITES: All the courses of the program.

COURSE DESCRIPTION: Assessment of student learning outcomes in the courses of the program.

COURSE OUTCOMES: Comprehensive Assessment enables a successful student to demonstrate:

CO1. Knowledge in the courses of the program.

CO2. Analytical ability in the courses of the program.

CO3. Design skills in the courses of the program.

CO4. Ability to investigate and solve complex computing problems in the courses of the program.

CO5. Ability to apply tools and techniques to complex computing activities with an understanding of limitations in the courses of the program.

CO6. Ability to provide solutions as per societal needs with consideration to health, safety, legal and cultural issues in the courses of the program.

CO7. Understanding of the impact of the professional computing solutions in environmental context and need for sustainable development in the courses of the program.

CO8. Ability to apply ethics and norms of the professional computing practices in the courses of the program.

CO9. Ability to function effectively as an individual in the courses of the program.

CO10. Ability to present views cogently and precisely in the courses of the program.

CO11. Ability to engage in life-long leaning in the courses of the program.

MCA – VI Semester

(16MC60131) SEMINAR

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	100	100	-	-	-	2

PREREQUISITES: All the courses of the program.

COURSE DESCRIPTION: Identification of topic for the seminar; Literature survey; Performing critical study and analysis of the topic identified; Preparation of report and presentation.

COURSE OUTCOMES: Completion of the seminar work enables a successful student to demonstrate:

CO1. Knowledge on the seminar topic.

CO2. Analytical ability exercised during the seminar work.

CO3. Ability to investigate and solve complex computing problems faced during the seminar work.

CO4. Ability to apply techniques to complex computing activities with an understanding of limitations as applied in the seminar work.

CO5. Ability to function effectively as an individual as experienced during the seminar work.

CO6. Ability to present views cogently and precisely on the seminar topic.

CO7. Ability to engage in life-long leaning as experience during the seminar work.

MCA – VI Semester

(16MC60132) PROJECT WORK

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
100	100	200	-	-	-	12

PREREQUISITES: All the courses of the program.

COURSE DESCRIPTION: Identification of topic for the project work; Literature survey; Collection of preliminary data; Identification of implementation tools and methodologies; Performing critical study and analysis of the topic identified; Time and cost analysis; Implementation of the project work; Preparation of thesis and presentation.

COURSE OUTCOMES: Completion of the project work enables a successful student to demonstrate:

CO1. Knowledge on the project topic.

CO2. Analytical ability exercised in the project work.

CO3. Design skills applied on the project topic.

CO4. Ability to investigate and solve complex computing problems faced during the project work.

CO5. Ability to apply tools and techniques to complex computing activities with an understanding of limitations in the project work.

CO6. Ability to provide solutions as per societal needs with consideration to health, safety, legal and cultural issues considered in the project work.

CO7. Understanding of the impact of the professional computing practices to provide solutions in environmental context and need for sustainable development experienced during the project work.

CO8. Ability to apply ethics and norms of the professional computing practice applied in the project work.

CO9. Ability to function effectively as an individual as experienced during the project work.

CO10. Ability to present views cogently and precisely on the project work.

CO11. Project management skills as applied in the project work.

CO12. Ability to engage in life-long leaning as experience during the project work.

Course Outcomes

(UG Programmes)

SREE VIDYANIKETHAN ENGINEERING COLLEGE
(AUTONOMOUS)
Sree Sainath Nagar, A.Rangampet – 517 102 (A.P.)

(AFFILIATED TO JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR, ANANTHAPURAMU)

Program: B.Tech. ELECTRONICS AND COMMUNICATION ENGINEERING

I B. Tech. - I Semester
(19BT1BS01) **DIFFERENTIAL EQUATIONS AND MULTIVARIABLE CALCULUS**
(Common to CE, ME, EEE, ECE, EIE, CSE, CSSE, IT, CSE(AI) and CSE(DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES: -
COURSE DESCRIPTION: Ordinary Differential Equations; Partial Differential Equations; Multivariable Calculus (Differentiation); Multivariable Calculus (Integration); Multivariable Calculus (Vector Calculus).
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1: Formulate and solve differential equations by applying knowledge of calculus for engineering problems.
CO2: Demonstrate knowledge in multivariable calculus for evaluating multiple integrals through techniques of integration.
CO3: Identify scalar and vector valued functions and evaluate vector integrals through knowledge of vector integral theorems and techniques.

I B. Tech - I Semester
(19BT1BS02) **BIOLOGY FOR ENGINEERS**
(Common to EEE, ECE, EIE, CSE(AI) and CSE(DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	2	-	-	2

PRE-REQUISITES: --
COURSE DESCRIPTION: Living Organisms; Proteins, Nucleic acids and Enzymes; Genetics and Molecular Biology; Recombinant DNA technology; Human Physiology and Applied Biology.
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1. Apply the basic knowledge of biology to understand the significance of various biological techniques.
CO2. Identify the role of DNA in the molecular basis of information transfer and understand single gene disorders related to the health perspective.
CO3. Apply the basic knowledge of bio-analytical devices and methods to assess health issues.

I B. Tech. - I Semester
(19BT1BS03) **ENGINEERING PHYSICS**
(Common to EEE, ECE, EIE, CSE(AI), CSE(DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Wave Optics; Electromagnetic Waves; Fiber Optics; Semiconductors; Dielectrics; Magnetism; Superconductors and Nanomaterials
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1. Apply the knowledge of light waves to interpret the concepts of Interference, Diffraction and Polarization
CO2. Demonstrate the concepts of electromagnetic wave propagation in an Optical fibers.
CO3. Apply the basic knowledge of semiconductors to understand the functioning of various optoelectronic devices.
CO4. Demonstrate the basic knowledge of dielectric and magnetic properties to understand the various dielectric polarizations and magnetic materials.
CO5. Understand the concepts of superconductors and nanomaterials to familiarize their applications in relevant fields.

I B.Tech. – I Semester

(19BT10341) **BASIC CIVIL AND MECHANICAL ENGINEERING**

(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES:--

COURSE DESCRIPTION: Overview of Civil Engineering; Surveying, Civil Engineering Materials, Mechanics of Materials, Building Components, Civil Engineering Infrastructure; Overview of Basic Mechanical Engineering; Internal Combustion Engines and Turbines, Mechanical Power Transmission Systems, Manufacturing Processes, Machining Processes, Non-Conventional Machining.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO1. Apply the basic principles of civil engineering, Techniques and tools for analyzing civil structures and solve related problems.

CO2. Describe the working of principles of basic mechanical engineering and solve problems related to it.

I B. Tech. – I Semester

(19BT10201) **BASIC ELECTRICAL AND ELECTRONICS ENGINEERING**

(Common to EEE, ECE, EIE, CSE(AI), CSE(DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --

COURSE DESCRIPTION: Principles of Electrical Systems; AC Machines; Semiconductor Devices and Op-Amps.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO1. Analyze electrical circuits by applying the conceptual knowledge of circuit elements.

CO2. Demonstrate knowledge on various generation technologies, protection devices, safety procedures and BEE standards.

CO3. Demonstrate knowledge on characteristics and applications of transformers and AC machines.

CO4. Demonstrate knowledge on characteristics and applications of diode, BJT and Op-amps.

I B. Tech. - I Semester

(19BT1BS31) **ENGINEERING PHYSICS LAB**

(Common to EEE, ECE, EIE, CSE(AI), CSE(DS) and CSBS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: --

COURSE DESCRIPTION: Determination of wavelength of light and thickness of a thin film; numerical aperture and acceptance angle of optical fiber; Characteristics of various semiconductor diodes; Resistivity of semiconductor; magnetic field along axial line of a current carrying coil

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO1. Apply the basic knowledge of light waves and semiconductors to demonstrate the functioning of optoelectronic devices.

CO2. Understand the experimental procedures to calculate the thickness of a thin film, Hall coefficient, Hysteresis losses, and acceptance angle of an optical fiber.

CO3. Determine the experimental values of magnetic field induction, wave length of a light source, energy gap of a semiconductor.

CO4: Apply skills to plot characteristic curves to determine the various parameters of semiconductor diodes.

CO5. Work independently and in teams to solve problems with effective communication.

I B. Tech. – I Semester

(19BT10231) **BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB**

(Common to EEE, ECE, EIE, CSE(AI), CSE(DS) and CSBS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: Physics at intermediate level.

COURSE DESCRIPTION: Practical investigations on Electrical circuits, AC Machines, Semiconductor Devices and Op-Amps.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO1. Analyze, measure, interpret and validate the practical observations by applying the fundamental knowledge of electrical circuits, machines and electronic devices.

CO2. Design Op-amp based amplifier, voltage summer and integrator circuits for desired specifications.

CO3. Work independently and in teams to solve problems with effective communication.

I B. Tech. – I Semester

(19BT20331) **ENGINEERING WORKSHOP**

(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: --

COURSE DESCRIPTION: Knowledge on various workshop hand and power tools; hands on experience in different manufacturing trades such as fitting, carpentry, sheet metal forming and foundry; Demonstration on dismantling and assembling of various two wheeler parts, power tools in machining and metal joining, basics of plumbing and working of 3D printer.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO1. Design and model various basic prototypes in the trade of fitting such as square/half round mating, V- mating and dovetail mating from the given MS work pieces using fitting tools.

CO2. Develop different prototypes in the carpentry trade such as cross lap joint, dovetail / bridle joints and Mortise and Tenon joint using carpentry tools.

CO3. Design and model different prototypes in the sheet metal forming trade such as rectangular tray, square vessel/cylinder, Funnel as per the dimensions using sheet metal forming tools.

CO4. Develop sand mold using single piece pattern and split piece pattern in the foundry trade using foundry tools.

CO5. Demonstrate the knowledge on automobile parts, power tools, plumbing operation, 3D printing technology involved in different engineering applications.

CO6. Work independently / in groups & communicate effectively in oral and written forms.

I B. Tech. – I Semester

(19BT1AC01) **SPOKEN ENGLISH**

(Audit Course)

(Common to EEE, ECE, EIE, CSE(AI) and CSE(DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	2	-	-	-

PRE-REQUISITES: -

COURSE DESCRIPTON: Functional English; Vocabulary Building; Functional Grammar-I; Functional Grammar – II; Communication Skills.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO1. Demonstrate knowledge of grammar and vocabulary in writing effective formal letters and e-mails.

CO2. Communicate effectively by applying appropriate speaking and writing techniques by examining and applying functional English.

I B. Tech. - II semester
(19BT2BS01) **TRANSFORMATION TECHNIQUES AND LINEAR ALGEBRA**
(Common to CE, ME, EEE, ECE, EIE, CSE, CSSE, IT, CSE(AI) and CSE(DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES: -
COURSE DESCRIPTION: Fourier Series and Fourier Transforms; Laplace Transforms; Inverse Laplace Transforms; Linear Algebra-I (Matrices); Linear Algebra-II (Vector Spaces).
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1. Apply the knowledge of Fourier and Laplace transform techniques to solve differential equations.
CO2. Analyze linear transformations and associated matrices to solve engineering problems by applying the knowledge of linear algebra.

I B. Tech. - II Semester
(19BT1BS04) **ENGINEERING CHEMISTRY**
(Common to EEE, ECE, EIE, CSE(AI) and CSE(DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Atomic Structure and Bonding Theories; Water Treatment; Electrochemistry and Applications; Corrosion; Instrumental Methods and Applications; Fuel chemistry and Lubricants.
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1. Apply the basic knowledge of quantum mechanical approach to atomic structure and bonding theories to identify shapes of different orbitals and molecules.
CO2. Analyze and solve problems associated with hardness of water, boiler troubles and address the societal, health and safety issues related to quality of water.
CO3. Apply the basic knowledge of corrosion phenomenon to identify solutions for control of corrosion and demonstrate competency in the basic concepts of electrochemical cells.
CO4. Demonstrate the basic knowledge of instrumental methods and their applications in the structural analysis of materials.
CO5. Apply the basic knowledge of fuel chemistry and lubricants to identify the quality of fuels and lubricants.

I B. Tech – II Semester
(19BT1HS01) **COMMUNICATIVE ENGLISH**
(Common to EEE, ECE, EIE, CSE(AI) and CSE(DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Introduction to communication; Active listening; Effective speaking; Reading; Technical writing.
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1. Demonstrate knowledge of English language, examining and applying the aspects of Process of communication, Paralinguistic features, Skimming, Scanning, and Elements of style in writing.
CO2. Analyze the modes and techniques of listening, speaking, reading, writing and apply appropriately to communicate effectively with the engineering community and society.
CO3. Apply reading and writing techniques in preparing documents by examining SQ3R Technique, Writer’s Block, and Précis Writing.
CO4. Communicate effectively applying appropriate speaking techniques by examining and applying the communication styles in Conferences, Symposia, Seminars and Persuasive Speaking.

I B. Tech. – II Semester
(19BT10501) **PROGRAMMING FOR PROBLEM SOLVING**
(Common to EEE, ECE, EIE and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES: A course on Basic Mathematics
COURSE DESCRIPTION: Introduction to problem solving approach, Introduction to Python programming, control structures, sequences, sets, Dictionaries, Implementation of Data structures using Python, Modular programming, file handling, Data representation and Visualization.
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1. Demonstrate knowledge on Python constructs to solve basic problems.
CO2. Demonstrate knowledge on Python constructs to solve basic problems.

I B. Tech. – II Semester
(19BT20241) **NETWORK ANALYSIS**
(Common for ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES: Physics at Intermediate Level.
COURSE DESCRIPTION: Fundamentals of electrical circuits; Analysis of single phase AC circuits; Network theorems; Transient analysis and Two port networks.
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1. Analyze and solve various DC and single phase AC circuits by applying conceptual knowledge of network reduction, analyzing techniques and theorems
CO2. Design the Components for resonant, transient circuits and Two-port networks meeting the specified needs using circuit concepts.

I B. Tech. - II Semester
(19BT1BS32) **ENGINEERING CHEMISTRY LAB**
(Common to EEE, ECE, EIE, CSE(AI) and CSE(DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: -
COURSE DESCRIPTION: Estimation of hardness, alkalinity, dissolved oxygen of water samples, Iron, Strength of an acid in Pb-acid battery and residual chlorine in drinking water by volumetric methods; Measurement of viscosity of lubricants; Instrumental methods like conductivity meter, potentiometer, P^H meter and colorimeter; Characterization of simple organic compounds by UV-Vis and IR spectroscopy.
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1. Apply analytical skills for the quantitative estimation of materials through volumetric methods of analysis and address the societal, health issues related to quality of water.
CO2. Develop analytical skills for the quantitative estimation of materials through instrumental methods of analysis.
CO3. Work independently and in teams to solve problems with effective communication.

I B. Tech. - II Semester
(19BT1HS31) **COMMUNICATIVE ENGLISH LAB**
(Common to EEE, ECE, EIE, CSE(AI) and CSE(DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: -
COURSE DESCRIPTION: Phonetics; Vocabulary Building; Grammar; Just a Minute; Elocution/Impromptu; Giving Directions; Role Plays; Public Speaking; Describing Objects; Reading Comprehension; Listening Comprehension; Information Transfer; Letter Writing
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1. Demonstrate knowledge of Phonetics by examining and applying sounds of English in Phonetic Transcription.
CO2**.** Analyze sentence structures by applying and demonstrating the skills of Vocabulary and Grammar.
CO3**.** Apply appropriate listening and reading skills by analyzing the context and demonstrate in Listening Comprehension and Reading Comprehension.
CO4**.** Function effectively as an individual and as a member in diverse teams examining and applying speaking skills in Just A Minute and Role Play.
CO5**.** Communicate effectively applying appropriate writing and speaking techniques by examining and demonstrating knowledge through Describing Objects, Information Transfer and Letter Writing.

I B. Tech. – II Semester
(19BT10331) **COMPUTER AIDED ENGINEERING DRAWING**
(Common to EEE, ECE, EIE, CSE(AI) and CSE(DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	1	2	2

PRE-REQUISITES: --
COURSE DESCRIPTION: Engineering drawing conventions; Importance of engineering drawing; fundamental concepts of sketching; computer aided drafting and different types of projections of geometric entities (both 2D and 3D) through computer aided drafting packages.
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1. Apply the principles of engineering drawing, Methods and CAD tools to draw the Geometries, Curves and Orthographic projections used to communicate in engineering applications.
CO2. Develop lateral surfaces of solids and draw Isometric views of given objects for engineering communication using principles of engineering drawing and CAD tools.
CO3. Work independently / in groups & communicate effectively in oral and written forms.

I B. Tech. – II Semester
(19BT10531) **PROGRAMMING FOR PROBLEM SOLVING LAB**
(Common to EEE, ECE, EIE and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: A course on Basic Mathematics
COURSE DESCRIPTION: The course is designed to provide hands on practice on Scratch programming and python programming for problem solving.
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1. Develop scripts using Scratch tool to simulate simple problems.
CO2. Apply Python Constructs and Modules to develop solutions for real-life problems.
CO3. Function effectively as an individual and in team to foster knowledge and creativity.
CO4. Write and present a substantial technical report/ document effectively.

I B. Tech. – II Semester
(19BT20251) **NETWORK ANALYSIS LAB**
(Common to ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: Physics at Intermediate Level.
COURSE DESCRIPTION: Practical investigations on DC, single phase AC circuits, circuit theorems, transient circuits and Two-Port networks.
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1. Analyze, measure, interpret and validate the practical observations by applying the conceptual knowledge of electrical networks.
CO2. Design resonant, transient and Two-port circuits/networks meeting the specified needs using electrical circuits/networks concepts.
CO3. Work independently and in teams to solve problems with effective communication.

II B. Tech. - I Semester
(19BT3BS02) **SPECIAL FUNCTIONS AND COMPLEX ANALYSIS**
(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES: A course on Differential equations and Multivariable calculus
COURSE DESCRIPTION: Special Functions (Beta and Gamma functions); Special Functions (Bessel's and Legendre's equations); Analytic Functions; Conformal Mapping; Complex Integration; Residue Theorem.
COURSE OUTCOMES:
After successful completion of the course, the students will be able to:
CO1. Apply the knowledge of special functions to evaluate improper integrals.
CO2. Analyze the behavior of functions through the knowledge of complex analysis and evaluate integrals on complex planes.

II B. Tech. I Semester
(19BT30401) **ELECTROMAGNETIC FIELDS AND TRANSMISSION LINES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES: Courses on Transformation Techniques and Linear Algebra &Engineering Physics
COURSE DESCRIPTION:
Static Fields; Maxwell's Equations; Electromagnetic Wave Propagation; Transmission Lines.
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1. Analyze time invariant electromagnetic field equations in different media.
CO2. Solve problems on time variant electromagnetic fields using Maxwell's Equations
CO3. Understand the Reflection and refraction of Uniform Plane Waves for Electromagnetic Wave Propagation in various media.
CO4. Design impedance transformers by applying impedance matching techniques for maximum power transfer in transmission Lines.

II B. Tech. – I Semester

(19BT30402) **ELECTRONIC DEVICES AND CIRCUITS**

(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Courses on Basic Electrical and Electronics Engineering, Differential Equations and Multivariable Calculus & Engineering Physics.

COURSE DESCRIPTION:

Linear and Non-Linear Wave shaping, Biasing and small signal analysis of BJT & FET, Operation and characteristics of Special Purpose electronic devices.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO1. Analyze the response of High pass circuits, Low pass RC circuits for various signals and performance of clippers and clampers.

CO2. Design transistor biasing circuits and stabilize the operating point using appropriate techniques.

CO3. Develop mathematical model of BJT for CE, CB and CC configurations using h-parameters.

CO4. Analyze various configurations and biasing techniques for FET.

CO5. Demonstrate the operation and characteristics of special purpose semiconductor devices for real time applications.

II B. Tech. – I Semester

(19BT30403) **SIGNALS AND SYSTEMS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES:

A course on Differential Equations and Multivariable Calculus.

COURSE DESCRIPTION:

Analysis of signals and systems; Representation of signals using Fourier series and Fourier transforms; Time-Domain and Frequency-Domain aspects of signals and systems; concept of convolution and correlation; Sampling and types of sampling; Laplace transform of signals.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO1. Understand the basic operations on signals & sequences and determine the response of LTI systems using convolution.

CO2. Apply fourier series and transform to analyse spectral characteristics of continuous-time periodic and aperiodic signals.

CO3. Analyse the properties of correlation and convolution to extract signals from noisy signal in various applications.

CO4. Apply Laplace transformation technique to analyse the characteristics of LTI systems.

CO5. Analyse sampling &it's effects and reconstruct signals using interpolation.

II B. Tech – I Semester

(19BT30404) **SWITCHING THEORY AND LOGIC DESIGN**

(Common to ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: A course on Transformation Techniques and Linear algebra.

COURSE DESCRIPTION:

Number system and Boolean algebra; Minimization; Analysis and synthesis of digital circuits; Asynchronous Sequential Logic & Programmable Memories.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO1. Demonstrate the knowledge of Boolean Algebra, various number systems and Logic gates to implement Digital Circuits.

CO2. Design subsystem by Analyzing combinational & sequential logic circuits for providing optimal solutions

CO3. Develop Asynchronous sequential logic and programmable memories for societal needs.

CO4. Design various programmable logic arrays using logic gates

II B. Tech. – I Semester

(19BT3HS31) **SOFT SKILLS LAB**

(Common to CE, ME, EEE, ECE and EIE))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: -

COURSE DESCRIPTION: Body Language; Assertiveness; Goal Setting; Thinking Skills; Team Building; Conflict Management; Technical Report Writing; Résumé Writing; Group Discussions; Interview Skills; Interpersonal Skills; Etiquette.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO1. Demonstrate knowledge of career skills by examining and applying the styles and strategies of Goal Setting, Thinking Skills, and Etiquettes.

CO2. Analyze the limitations and possibilities of favourable situations by applying the skills of Body Language and demonstrate through Assertiveness, and Interpersonal Skills.

CO3. Apply appropriate soft skills by analyzing the problem situations that arise in professional career through demonstrating remedies in Conflict Management.

CO4. Demonstrate ability to function effectively as an individual and as a member in diverse teams examining and applying soft skills in Interviews, Group Discussion and Team Building.

CO5. Apply appropriate speaking and writing techniques in preparing documents and to communicate effectively by examining and demonstrating knowledge in Technical Report Writing and Résumé Writing.

II B.Tech. - I Semester

(19BT30431) **ELECTROMAGNETIC FIELDS AND TRANSMISSION LINES LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PREREQUISITES: Courses on Transformation Techniques and Linear Algebra & Engineering Physics

COURSE DESCRIPTION:

Design and Simulation of electric and magnetic fields (Time variant an Time-in variant) due to Charged particles, finite lines. Simulation of Maxwell’s equation and wave equation, primary and secondary constants of Transmission lines.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO1. Analyze the vector field, vector product, Coulomb law,Electric flux lines, Electric Potential and Bio-Savart’s Law.

CO2. Solve Uniform Plane Wave equation for Electromagnetic Wave Propagation.

CO3. Design and verify the conditions for loss less and distortion less transmission Lines

CO4. Analyze the time-variant and time-invariant electromagnetic fields in different media.

CO5. Work independently and in teams to solve problems with effective Communication.

II B.Tech. – I Semester
(19BT30432) **ELECTRONIC DEVICES AND CIRCUITS LAB**
(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: A Course on Basic Electrical and Electronics Engineering.
COURSE DESCRIPTION: Integrator and Differentiator, Clippers and Clampers, Transistor switch, h-parameter calculation, Drain and Transfer characteristics of FET, Frequency response of CE and CS amplifiers, UJT Relaxation oscillator, Characteristics of DIAC and SCR
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1. Analyze the response of RC circuits for square input.
CO2. Analyze the characteristics of BJT, FET, DIAC and SCR.
CO3. Design BJT and FET Amplifiers and evaluate the performance parameters from the frequency response.
CO4. Develop the basic applications of diode, transistor and UJT for desired specifications.
CO5. Work independently and in teams to solve problems with effective Communication.

II B. Tech. – I Semester
(19BT30433) **SIGNALS AND SYSTEMS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: -
COURSE DESCRIPTION:
Generation of various signals and sequences; convolution and correlation; verification of linearity and time invariance properties; sampling theorem verification; Transform Techniques and Transfer function of system.
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1. Analyse the properties of systems by performing basic operations on various signals and sequences generated using MATLAB tool.
CO2. Apply Fourier and Laplace transformation techniques on signals and systems to analyze spectrum and pole zero plots.
CO3. Develop systems to separate and remove the noise components from the noisy signals.
CO4. Work independently and in teams to solve problems with effective Communication.

II B. Tech. – I Semester
(19BT3MC01) **ENVIRONMENTAL SCIENCE**
(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	-	40	2	-	-	-

PRE-REQUISITES:-
COURSE DESCRIPTION: Natural resources; Ecosystems; Biodiversity; Environment pollution and control; Social issues and environment; Human population and environment.
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1 Analyze natural resources to solve complex environmental problems and natural resource management considering society, environment and sustainability.
CO2 Analyze ecosystems and biodiversity to solve complex environmental problems by following environmental ethics considering society, environment and sustainability besides communicating effectively in graphical form.

CO3 Analyze various types of pollution and their control measures to solve environmental problems through appropriate tools and techniques following latest developments considering society, ethics, environment and sustainability.

CO4 Analyze social issues and its impact on environment, environmental acts to solve complex environmental problems considering society, environment and sustainability besides communicating effectively in graphical form.

CO5 Analyze human population and its impact on environment to solve complex environmental problems through team work and using appropriate tools and techniques considering ethics, society, environment and sustainability.

II B. Tech. – II Semester
(19BT50201) **CONTROL SYSTEMS**
(Common to ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES:A course on Signals and Systems.
COURSE DESCRIPTION:
Concepts of control system; Transfer function of various physical systems; Time response analysis; Frequency response analysis; Controller design and state space analysis.
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1. Develop the mathematical model for various physical systems to determine the transfer function by applying the fundamental principles.
CO2. Analyze the time response of first and second order system to evaluate steady state errors.
CO3. Analyze stability of a system in time and frequency domains.
CO4. Design compensator for a system using bode plot and root locus technique to meet the desired specification for sustainable operation.
CO5. Apply state space method to model the system, to investigate controllability and observability.

II B. Tech. –II Semester
(19BT40401) **ANALOG COMMUNICATIONS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Courses on Electronic Devices and circuits & Signals and Systems.
COURSE DESCRIPTION:
Continuous wave modulations; Modulators and De-Modulators; Transmitters; Receivers; Noise performance; Pulse modulations; Multiplexing.
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1. Evaluate total power, Bandwidth, and efficiency of Various Continuous Wave Modulations.
CO2. Analyze the performance of different modulation systems by evaluating Signal to Noise Ratio.
C03. Analyze various Transmitter & Receivers circuits and receiver parameters.
CO4. Analyze various pulse modulations and demodolations in transmission.

II B. Tech. – II Semester
(19BT40402) **ELECTRONIC CIRCUIT ANALYSIS AND DESIGN**
(Common to ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES: Courses on Basic Electrical and Electronic Engineering & Electronic Devices and circuits.
COURSE DESCRIPTION:
Demonstrate Single Stage Amplifiers; Multi Stage amplifiers; Frequency Response; Negative Feedback Amplifiers; Oscillators; Large Signal Amplifiers; Tuned Amplifiers.
COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO1. Design multistage amplifiers using voltage divider bias to determine the Gain, Bandwidth, Input and Output Impedances.

CO2. Analyze transistors at high frequencies using Hybrid-π Model to determine the gain and bandwidth.

CO3. Design negative Feedback Amplifiers with high stability and positive feedback amplifiers to generate sustained oscillations.

CO4. Analyze different classes of Power Amplifiers to improve power efficiency and understand frequency response of single stage tuned amplifiers.

II B. Tech. – II Semester
(19BT40403) **LINEAR AND DIGITAL IC APPLICATIONS**

(Common to ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Courses on Network Analysis, Switching Theory and Logic Design & Electronic Devices and Circuits

COURSE DESCRIPTION:

Linear & Non-Linear Applications of Op-Amp; IC 555 timer and phase locked loops; Application of PLL; filters; A-D & D-A Converters; CMOS and Bipolar Logic Interfacing; HDL with combinational and sequential logic design.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO1. Design different applications of op-amp, timer circuits and analyze PLL for specified applications.

CO2. Design active filters using op-amp for audio processing applications.

CO3. Analyze different analog to digital and digital to analog converters for data acquisition system.

CO4. Analyze Verilog HDL capabilities to model digital circuits.

CO5. Model combinational and sequential ICs using Verilog HDL to synthesize digital Circuits.

II B. Tech. – II Semester
(19BT40404) **PROBABILITY AND STOCHASTIC PROCESSES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES:A course on Differential Equations and Multivariable Calculus.

COURSE DESCRIPTION:

Probability theory; The Random Variable; Operations on Singleand Multiple Random Variables; Temporal and spectral Characteristics ofStochastic Processes; Noise analysis.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO1. Analyze the probability of occurrence of events in an experiment through axiomatic definitions, conditional, total probability and Bernoulli's trials.

CO2. Evaluate Momentsby performing various operationson single and multiple random Variables.

CO3. Solve problems on stochastic process by analyzing the temporal and spectral characteristics.

CO4. Estimate various noises in communications to improve signal to noise ratio.

II B. Tech. – II Semester
(19BT4BS01) **MATERIAL SCIENCE**

(Open Elective-1)

(Common EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: -

COURSE DESCRIPTION: Introduction to Material Science and Engineering; Composite Materials; Smart Materials; Nano and Biomimetic Materials; Emerging Materials.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO1. Attain the basic knowledge on composites, smart materials, biomimetic materials and nano materials.

CO2. Demonstrate essential information about structure and properties of various composites used in various engineering applications.

CO3. Understand the basic properties of electro-rheostatic, magneto-rheostatic and shape memory alloys used in device applications.

CO4. Accomplish the basic knowledge in nano materials to familiarize various nano structured device applications.

CO5. Outline the processing and properties of functionally graded materials and identify its applications in various fields.

II B. Tech. - II Semester

(19BT4HS02) **BUSINESS COMMUNICATION AND CAREER SKILLS**

(Open Elective-1)

(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: -

COURSE DESCRIPTION: Nature and Scope of Communication; Corporate Communication; Writing Business Messages & Documents; Careers and Résumés; Interviews.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO1. Demonstrate knowledge of professional communication by examining and applying the styles and strategies of business communication in Communication Networks and Writing Messages.

CO2. Analyze the limitations of business communication by applying and demonstrating corporate communication aspects for effective communication through Interpersonal Communication, Informal Communication, and Crisis Management and Communication.

CO3. Apply appropriate writing techniques for effective professional communication in preparing documents by demonstrating and examining Stages in Writing Business Messages, Strategies for Writing the Body of a Letter, and Structuring Résumés.

CO4. Apply appropriate speaking techniques by examining and demonstrating effective communication in distinguished situations through Corporate Communication and Cross Cultural Communication

II B. Tech. - II Semester

(19BT4HS04) **ENTREPRENEURSHIP FOR MICRO, SMALL AND MEDIUM ENTERPRISES**

(Open Elective-1)

(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: -

COURSE DESCRIPTION: Introduction to Entrepreneur Development; Idea generation and formation of Business Plan; Micro and Small Enterprises; Institutional Finance and Support to Entrepreneur; Woman Entrepreneurship.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO1. Demonstrate knowledge in concepts, functions, Micro and Macro units, NGOs, BharatiyaMahila Bank, Women Entrepreneurship, Schemes and Programmes.

CO2. Analyze the idea generation, business plans, business acumen, institutional finance and rural entrepreneurship.

II B. Tech. - II Semester

(19BT4HS06) **GERMAN LANGUAGE**
(Open Elective-1)
(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Oral communication; Basic grammar; Basic writing; Berufsdeutcsch (Business German)
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1. Communicate everyday using familiar words with expressions and simple sentences.

II B. Tech. - II Semester
(19BT4HS08) **INDIAN HISTORY**
(Open Elective-1)
(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: -
CORSE DESCRIPTION: Introduction; Ancient India; Classical and Medieval era; Modern India; India after independence.
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1. Demonstrate contextual knowledge on evolution of ancient and medieval Indian History and acquire awareness on societal and cultural issues.
CO2. Analyze the situations before and after Independence and assess the societal reforms implemented in India after Independence.

II B. Tech. - II Semester
(19BT4HS10) **PERSONALITY DEVELOPMENT**
(Open Elective-1)
(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: A course onSoft Skills Laboratory
COURSE DESCRIPTION: Personalities and Leadership Qualities; Self Esteem and self Development; Attitude; Communication Relationship; Critical Work Skills and Ethics.
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1. Demonstrate knowledge of leadership qualities by examining and applying personality traits through Positive self esteem, Open Communication and Self-Righteousness.
CO2. Analyze the limitations of Attitudes by applying and demonstrating communication traits through Decision Making, Ethics and Self Actualization.
CO3. Apply appropriate Analyzing techniques for comprehending different personalities by examining Positive and Negative Characteristic Traits and demonstrating through Leadership Styles, Mentoring and Behaviour Modification.
CO4. Apply appropriate techniques in Solving Problems by examining and demonstrating Time Management, Stress Management and Anger Management.

II B. Tech. - II Semester
(19BT4HS12) **WOMEN EMPOWERMENT**
(Open Elective-1)
(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Concept & Framework, Status of Women, Women's Right to work, International Women's Decade, and Women Entrepreneurship.
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1. Demonstrate the characteristics of empowered women, their achievements, and frame work for women empowerment, legal laws, and political status of women.
CO2. Apply the knowledge of women rights to address various societal issues and obstacles in different fields including science and technology.
CO3. Understand the significance of participation in policy debates, National conferences and common forums for women's' equality and development.
CO4. Analyze the concept of women entrepreneurship, government schemes and entrepreneurial challenges and opportunities.

II B. Tech. - II Semester
(19BT4HS14) **CONSTITUTION OF INDIA**
(Open Elective-1)
(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Preamble and its Philosophy; Union Legislature; Federalism in India; Judiciary and Public Services; Nation Building
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1. Gain knowledge in Parliamentary proceedings, Election Commission, Public Services and Foreign Policy of India.
CO2. Apply the reasoning informed by the various aspects in the Constitution, its provisions to assess societal issues and the consequent responsibilities relevant to the professional engineering practice.

II B. Tech. - II Semester
(19BT40205) **RELIABILITY AND SAFETY ENGINEERING**
(Open Elective-1)
(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Courses on Differential Equations and Multi-Variable Calculus & Transformation Techniques and Linear Algebra.
COURSE DESCRIPTION:
Fundamentals of reliability engineering; Network modeling and reliability evaluation; Markov chain and Markov processes; basics of safety concepts and safety techniques and applications.
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1. Develop mathematical model of a network to evaluate the parameters for assessing the reliability of a system.
CO2. Analyze the time dependent/independent characteristics of a repairable system and frequency durations techniques to assess reliability.
CO3. Understand various safety management, policy, and planning strategies for personal and industrial safety.
CO4. Understand various safety and hazard identification techniques and follow appropriate safety measures in industry and society.

II B. Tech. - II Semester
(19BT50107) **ENVIRONMENTAL POLLUTION AND CONTROL**

(Open Elective-1)
(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PREREQUISITES: -
COURSE DESCRIPTION: Fundamentals ofair pollution;Dispersion of pollutants; Effects and control of air pollution; Water pollution;Soil pollution and control; Municipal solid waste management.
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1 Analyze air and noise pollution using appropriate tools and techniques to solve complex environmental issues following relevant standards considering society, environment and sustainability besides communicating effectively in graphical form.
CO2 Analyze air and noise pollution control measures using appropriate tools and techniques to solve complex environmental issues following relevant standards and latest developments considering society, environment and sustainability besides communicating effectively in graphical form.
CO3 Analyze water pollution and its control measures using appropriate tools and techniques to solve complex environmental issues following relevant standards and latest developments considering society, environment and sustainability besides communicating effectively in graphical form.
CO4 Analyze soil pollution and its control measures using appropriate tools and techniques to solve complex environmental issues following relevant standards and latest developments considering society, environment and sustainability besides communicating effectively in graphical form.
CO5 Analyze solid waste and its management measures using appropriate tools and techniques to solve solid waste disposal issues following relevant standards and latest developments considering society, environment and sustainability besides communicating effectively in graphical form.

II B. Tech. - II Semester
(19BT50108) **PLANNING FOR SUSTAINABLE DEVELOPMENT**
(Open Elective-1)
(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PREREQUISITES: -
COURSE DESCRIPTION: Sustainable development; Environmental impact; Sustainable Policies; Governance; Theories and strategies; Media and education for sustainability.
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1 Compare sustainable development theories in national and global context to protect the society and environment.
CO2 Analyze the unforeseen environmental impacts on sustainable development to protect the society and environment.
CO3 Analyze policies and governance for sustainable development considering ethics, economics, society and environment.
CO4 Analyze systems and strategies for sustainable development using appropriate tools and techniques considering ethics, economics, society and environment.
CO5 Analyze the role of media and education in sustainable development using appropriate tools and techniques considering ethics, society and environment besides communicating effectively.

II B. Tech. - II Semester
(19BT50109) **RURAL TECHNOLOGY**
(Open Elective-1)
(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PREREQUISITES: -
COURSE DESCRIPTION: Technology for rural development; Nonconventional energy; Technologies for rural development; Community development; IT in rural development.
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1 Compare various technologies for rural development by solving rural problems through different schemes by considering ethics, society, environment and sustainability.
CO2 Analyze non conventional energy sources using appropriate tools and techniques to solve rural energy problems considering society, environment and sustainability besides communicating effectively in graphical form.
CO3 Select appropriate technologies in different areas of rural development to solve rural issues following latest developments considering society, environment and sustainability.
CO4 Relate water conservation, health, safety and rural employment issues for community development to solve rural problems through appropriate technologies considering ethics, society, environment and sustainability.
CO5 Analyze the impact of IT, public and private partnership on rural development to solve complex rural problems using appropriate tools and techniques considering ethics, society, environment and sustainability.

II B. Tech. - II Semester
(19BT50505) **ETHICAL HACKING**
(Open Elective-1)
(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PREREQUISITES: -
COURSE DESCRIPTION:
Ethical hacking, Network and computer attacks, Footprinting, Social engineering, Port scanning, System hacking, Sniffers, Denial of service, Hacking web servers, Wireless hacking, Cryptography, Network Protection System.
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1. Demonstrate knowledge on the computer security, social engineering and the intent of ethical hacking.
CO2. Select and apply foot printing and port scanning tools to discover vulnerabilities of the computer system.
CO3. Investigate hacking techniques and tools to maintain computer security.
CO4. Analyze cryptosystems and network protection systems for information security and intrusion prevention.

II B. Tech. - II Semester
(19BT51207) **AI IN HEALTHCARE**
(Open Elective-1)
(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PREREQUISITES: -
COURSE DESCRIPTION: Concepts of Artificial Intelligence (AI) in Healthcare; The Present State and Future of AI in Healthcare Specialties; The Role of Major Corporations in AI in Health care; Applications of AI in Healthcare.
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1. Understand the fundamental concepts of AI in Healthcare sector.
CO2. Understand the applications of AI in Healthcare specialties.
CO3. Demonstrate AI applications developed by corporate companies.
CO4. Demonstrate knowledge on future applications of Healthcare using AI.
CO5. Understand the principles of AI applications through case studies.

II B. Tech. - II Semester
(19BT51506) **BIOINFORMATICS**
(Open Elective-1)
(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: A course on Biology for Engineers.
COURSE DESCRIPTION:
Biological Data Acquisition, Databases, Data Processing, Methods of Analysis, Applications of Bio-informatics
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1. Understand basic biological data acquisition in bioinformatics.
CO2. Identify the proper databases for the information search by choosing the biological databases and also submission and retrieval of data from databases.
CO3. Analyze the results of bioinformatics data using text and sequence-based searching techniques.
CO4. Analyze the secondary and tertiary structures of proteins by applying different alignment programs
CO5. Design biological databases and novel drugs by using contextual knowledge on bioinformatics.

II B. Tech. – II Semester
(19BT40431) **DIGITAL DESIGN WORKSHOP**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: Courses on Switching Theory and Logic Design & Electronic Devices and Circuits.
COURSE DESCRIPTION: Design and verification of Digital Circuits, PCB Design of Electronic Circuits.
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1. Design and Realize various Digital applications by using ICs for societal needs.
CO2. Implement Electronic Circuits using Passive and Active elements for specified applications.
CO3. Analyze performance parameters for PCB designed circuits using a simulation tool.
CO4. Work independently and in teams to solve problems with effective Communication.

II B.Tech. II Semester
(19BT40432) **ELECTRONIC CIRCUIT ANALYSIS AND DESIGN LAB**
(Common to ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PREREQUISITES: A course on Electronic Devices and Circuits
COURSE DESCRIPTION:
Design, Simulation and verification of BJT and FET Amplifiers; Multistage Amplifiers; Feedback Amplifiers; Oscillators; Power Amplifiers; Tuned Amplifiers.
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1. Design Multistage amplifiers and determine Gain, Bandwidth, Input and Output impedances for specified applications.
CO2. Design negative feedback amplifiers to determine Gain, Bandwidth, Input and Output Impedances
CO3. Design Oscillator circuits to generate sustained oscillations
CO4. Analyze power amplifiers to determine efficiency.
CO5. Work individually and in groups to solve problems with effective communication.

II B. Tech. – II Semester

(19BT40433) **LINEAR AND DIGITAL IC APPLICATIONS LAB**
(Common to ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: A course on Switching Theory and Logic Design
COURSE DESCRIPTION: Design and verification of Op-Amp applications; Timers; ADC and DAC; Simulation and synthesis of combinational and sequential circuits; Simulation tools.
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:

CO1. Design various op-amp applications and timers circuits for societal applications.
CO2. Implement filters, timers, D-A converter using Op-amps and digital circuits for specified applications
CO3. Analyze performance parameters for combinational and sequential circuits using any simulation tool.
CO4. Work independently and in teams to solve problems with effective Communication.

II B. Tech. - II Semester
(19BT315AC) **DESIGN THINKING**
(Audit Course)
(Common to ECE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	2	-	-	-

PRE-REQUISITES: -
COURSE DESCRIPTION:
Design thinking process, Design thinking phases, empathy tools; Idea generation, visualizing and empathizing; Fidelity for prototypes, prototyping; prototyping for physical products.
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:

CO1. Analyze design thinking concepts and principles to perform human centered design process for creative problem solving.
CO2. Create empathy maps to visualize user attitudes and behavior for gaining insights of customers.
CO3. Develop innovative products or services for a customer base using ideation techniques.
CO4. Build prototypes for complex problems using gathered user requirements.
CO5. Apply design thinking tools techniques to produce good design and relevant products or services for a specific target market.
CO6. Improve prototype by testing it with a specific set of users for making it sustainable by following ethics.

Program: B.Tech. ELECTRICAL AND ELECTRONICS ENGINEERING

I B. Tech. - I Semester
(19BT1BS01) DIFFERENTIAL EQUATIONS AND MULTIVARIABLE CALCULUS
(Common to CE, ME, EEE, ECE, EIE, CSE, CSSE, IT, CSE(AI) & CSE(DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES: -
COURSE DESCRIPTION: Ordinary Differential Equations; Partial Differential Equations; Multivariable Calculus (Differentiation); Multivariable Calculus (Integration);Multivariable Calculus (Vector Calculus).
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Formulate and solve differential equations by applying knowledge ofcalculus for engineering problems.
CO2. Demonstrate knowledge in multivariable calculus for evaluating multiple integrals through techniques of integration.
CO3. Identify scalar and vector valued functions and evaluate vector integrals through knowledge of vector integral theorems and techniques.

I B. Tech - I Semester
(19BT1BS02) BIOLOGY FOR ENGINEERS
(Common to EEE, ECE, EIE, CSE(AI) & CSE(DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	2	-	-	2

PRE-REQUISITES: -
COURSE DESCRIPTION: Living Organisms; Proteins, Nucleic acids and Enzymes; Genetics and Molecular Biology; Recombinant DNA technology; Human Physiology and Applied Biology.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Apply the basic knowledge of biology to understand the significance of various biological techniques.
CO2. Identify the role of DNA in the molecular basis of information transfer and understand single gene disorders related to the health perspective.
CO3.Apply the basic knowledge of bio-analytical devices and methods to assess health issues.

I B. Tech. - I Semester
(19BT1BS03) ENGINEERING PHYSICS
(Common to EEE, ECE, EIE, CSE(AI), CSE(DS) & CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Wave Optics; Electromagnetic Waves; Fiber Optics; Semiconductors; Dielectrics; Magnetism; Superconductors and Nanomaterials
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Apply the knowledge of light waves to interpret the concepts of Interference, Diffraction and Polarization.
CO2. Demonstrate the concepts of electromagnetic wave propagation in Optical fibers.
CO3. Apply the basic knowledge of semiconductors to understand the functioning of various optoelectronic devices.
CO4. Demonstrate the basic knowledge of dielectric and magnetic properties to understand the various dielectric polarizations and magnetic materials.
CO5. Understand the concepts of superconductors and nanomaterials to familiarize their applications in relevant fields.

I B.Tech – I Semester
(19BT10341) BASIC CIVIL AND MECHANICAL ENGINEERING
(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --
COURSE DESCRIPTION: Overview of Civil Engineering; Surveying, Civil Engineering Materials, Mechanics of Materials, Building Components, Civil Engineering Infrastructure; Overview of Basic Mechanical Engineering; Internal Combustion Engines and Turbines, Mechanical Power Transmission Systems, Manufacturing Processes, Machining Processes, Non-Conventional Machining.
COURSE OUTCOMES: After successful completion of the course, students will be able to
CO1. Apply the basic principles of civil engineering, Techniques and tools for analyzing civil structures and solve related problems.
CO2. Describe the working of principles of basic mechanical engineering and solve problems related to it.

I B. Tech. – I Semester
(19BT10201) BASIC ELECTRICAL AND ELECTRONICS ENGINEERING
(Common to EEE, ECE, EIE, CSE(AI), CSE(DS) & CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --
COURSE DESCRIPTION: Principles of Electrical Systems; AC Machines; Semiconductor Devices and Op-Amps.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO5. Analyze electrical circuits by applying the conceptual knowledge of circuit elements.
CO6. Demonstrate knowledge on various generation technologies, protection devices, safety procedures and BEE standards.
CO7. Demonstrate knowledge on characteristics and applications of transformers and AC machines.
CO8. Demonstrate knowledge on characteristics and applications of diode, BJT and Op-amps.

I B. Tech. - I Semester
(19BT1BS31) **ENGINEERING PHYSICS LAB**
(Common to EEE, ECE, EIE, CSE(AI), CSE(DS) & CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE - REQUISITES: --
COURSE DESCRIPTION: Determination of wavelength of light and thickness of a thin film; numerical aperture and acceptance angle of optical fiber; Characteristics of various semiconductor diodes; Resistivity of semiconductor; magnetic field along axial line of a current carrying coil
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Apply the basic knowledge of light waves and semiconductors to demonstrate the functioning of optoelectronic devices.
CO2. Understand the experimental procedures to calculate the thickness of a thin film, Hall coefficient, Hysteresis losses, and acceptance angle of an optical fiber.
CO3. Determine the experimental values of magnetic field induction, wave length of a light source, energy gap of a semiconductor.
CO4. Apply skills to plot characteristic curves to determine the various parameters of semiconductor diodes.
CO5. Work independently and in teams to solve problems with effective communication.

I B. Tech. – I Semester
(19BT10231) BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB
(Common to EEE, ECE, EIE, CSE(AI), CSE(DS) & CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: Physics at intermediate level.
COURSE DESCREPTION: Practical investigations on Electrical circuits, AC Machines, Semiconductor Devices and Op-Amps.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO4. Analyze, measure, interpret and validate the practical observations by applying the fundamental knowledge of electrical circuits, machines and electronic devices.
CO5. Design Op-amp based amplifier, voltage summer and integrator circuits for desired specifications.
CO6. Work independently and in teams to solve problems with effective communication.

I B. Tech. – I Semester
(19BT20331) ENGINEERING WORKSHOP
(Common to ECE, EEE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: --
COURSE DESCRIPTION: Knowledge on various workshop hand and power tools; hands on experience in different manufacturing trades such as fitting, carpentry, sheet metal forming and foundry; Demonstration on dismantling and assembling of various two wheeler parts, power tools in machining and metal joining, basics of plumbing and working of 3D printer.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO7. Design and model various basic prototypes in the trade of fitting such as square/half round mating, V-mating and dovetail mating from the given MS work pieces using fitting tools.
CO8. Develop different prototypes in the carpentry trade such as cross lap joint, dovetail / bridle joints and Mortise and Tenon joint using carpentry tools.
CO9. Design and model different prototypes in the sheet metal forming trade such as rectangular tray, square vessel/cylinder, Funnel as per the dimensions using sheet metal forming tools.
CO10. Develop sand mold using single piece pattern and split piece pattern in the foundry trade using foundry tools.
CO11. Demonstrate the knowledge on automobile parts, power tools, plumbing operation, 3D printing technology involved in different engineering applications.
CO12. Work independently / in groups & communicate effectively in oral and written forms.

I B. Tech. – I Semester
(19BT1AC01) SPOKEN ENGLISH
(Audit Course)
(Common to EEE, ECE, EIE, CSE(AI) & CSE(DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	2	-	-	-

PRE-REQUISITES: -
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Demonstrate knowledge of grammar and vocabulary in writing effective formal letters and e-mails.
CO2. Communicate effectively by applying appropriate speaking and writing techniques by examining and applying functional English.

I B. Tech. - II semester
(19BT2BS01) TRANSFORMATION TECHNIQUES AND LINEAR ALGEBRA
(Common to EEE, ECE, EIE, CE, ME, CSE, CSSE & IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES: -
COURSE DESCRIPTION: Fourier Series and Fourier Transforms; Laplace Transforms; Inverse Laplace Transforms; Linear Algebra-I (Matrices); Linear Algebra-II (Vector Spaces).
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Apply the knowledge of Fourier and Laplace transform techniques to solve differential equations.
CO2. Analyze linear transformations and associated matrices to solve engineering problems by applying the knowledge of linear algebra.

I B. Tech. - II Semester
(19BT1BS04) ENGINEERING CHEMISTRY
(Common to EEE, ECE, EIE, CSE(AI) & CSE(DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Atomic Structure and Bonding Theories; Water Treatment; Electrochemistry and Applications; Corrosion; Instrumental Methods and Applications; Fuel chemistry and Lubricants.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Apply the basic knowledge of quantum mechanical approach to atomic structure and bonding theories to identify shapes of different orbitals and molecules.
CO2. Analyze and solve problems associated with hardness of water, boiler troubles and address the societal, health and safety issues related to quality of water.
CO3. Apply the basic knowledge of corrosion phenomenon to identify solutions for control of corrosion and demonstrate competency in the basic concepts of electrochemical cells.
CO4. Demonstrate the basic knowledge of instrumental methods and their applications in the structural analysis of materials.
CO5. Apply the basic knowledge of fuel chemistry and lubricants to identify the quality of fuels and lubricants.

I B. Tech. – II Semester
(19BT1HS01) COMMUNICATIVE ENGLISH
(Common to EEE, ECE, EIE, CSE(AI) & CSE(DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Introduction to communication; Active listening; Effective speaking; Reading; Technical writing.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Demonstrate knowledge of English language by examining and applying the aspects of Process of communication, Paralinguistic features, Skimming, Scanning, and Elements of style in writing.
CO2. Analyze the modes and techniques of listening, speaking, reading, writing and apply appropriately to communicate effectively with the engineering community and society.
CO3. Apply reading and writing techniques in preparing documents by examining SQ3R Technique, Writer’s Block, and Précis Writing.
CO4. Communicate effectively applying appropriate speaking techniques by examining and applying the communication styles in Conferences, Symposia, Seminars and Persuasive Speaking.

I B. Tech. – II Semester
(19BT10501) PROGRAMMING FOR PROBLEM SOLVING
(Common to EEE, ECE, EIE & CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES: A course on Basic Mathematics
COURSE DESCRIPTION: Introduction to problem solving approach, Introduction to Python programming, control structures, sequences, sets, Dictionaries, Implementation of Data structures using Python, Modular programming, file handling, Data representation and Visualization.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Demonstrate knowledge on Python constructs to solve basic problems.
CO2. Develop and use Python modules to provide solutions to problems.

I B. Tech. – II Semester
(19BT20201) ELECTRIC CIRCUITS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES: Physics at Intermediate Level.
COURSE DESCRIPTION: Circuit reduction and analyzing techniques; Analysis of single and poly phase circuits; Circuit theorems; Magnetically coupled circuits and Two-Port networks.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO3. analyze the electrical circuits by applying the principles of network reduction techniques, mesh and nodal analysis.
CO4. analyze the single and poly phase circuits to investigate the response and to determine various electrical quantities.
CO5. analyze various electrical circuits, by applying circuit theorems to determine the response for AC and DC excitations.
CO6. analyze coupled circuits by applying the principles of electromagnetism and determine various parameters.
CO7. design an appropriate filter network for the given specifications.

I B.Tech. - II Semester
(19BT1BS32) ENGINEERING CHEMISTRY LAB
(Common to EEE, ECE, EIE, CSE(AI) & CSE(DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: -
COURSE DESCRIPTION: Estimation of hardness, alkalinity, dissolved oxygen of water samples, Iron, Strength of an acid in Pb-acid battery and residual chlorine in drinking water by volumetric methods; Measurement of viscosity of lubricants; Instrumental methods like conductivity meter, potentiometer, P^H meter and colorimeter; Characterization of simple organic compounds by UV-Vis and IR spectroscopy.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Apply analytical skills for the quantitative estimation of materials through volumetric methods of analysis and address the societal, health issues related to quality of water.
CO2. Develop analytical skills for the quantitative estimation of materials through instrumental methods of analysis.
CO3. Work independently and in teams to solve problems with effective communication.

I B. Tech. - II Semester
(19BT1HS31) COMMUNICATIVE ENGLISH LAB
(Common to EEE, ECE, EIE, CSE(AI) & CSE(DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: -
COURSE DESCRIPTION: Phonetics; Vocabulary Building; Grammar; Just a Minute; Elocution/Impromptu; Giving Directions; Role Plays; Public Speaking; Describing Objects; Reading Comprehension; Listening Comprehension; Information Transfer; Letter Writing
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Demonstrate knowledge of Phonetics by examining and applying sounds of English in Phonetic Transcription.
CO2. Analyze sentence structures by applying and demonstrating the skills of Vocabulary and Grammar.
CO3. Apply appropriate listening and reading skills by analyzing the context and demonstrate in Listening Comprehension and Reading Comprehension.
CO4. Function effectively as an individual and as a member in diverse teams examining and applying speaking skills in Just A Minute and Role Play.

CO5. Communicate effectively applying appropriate writing and speaking techniques by examining and demonstrating knowledge through Describing Objects, Information Transfer and Letter Writing.

I B. Tech. – II Semester
(19BT10331) COMPUTER AIDED ENGINEERING DRAWING
(Common to EEE, ECE, EIE, CSE(AI) & CSE(DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	1	2	2

PRE-REQUISITES:--
COURSE DESCRIPTION: Engineering drawing conventions; Importance of engineering drawing; fundamental concepts of sketching; computer aided drafting and different types of projections of geometric entities (both 2D and 3D) through computer aided drafting packages.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Apply the principles of engineering drawing, Methods and CAD tools to draw the Geometries, Curves and Orthographic projections used to communicate in engineering applications.
CO2. Develop lateral surfaces of solids and draw Isometric views of given objects for engineering communication using principles of engineering drawing and CAD tools.
CO3. Work independently / in groups & communicate effectively in oral and written forms.

I B. Tech. – II Semester
(19BT10531) PROGRAMMING FOR PROBLEM SOLVING LAB
(Common to EEE, ECE, EIE & CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: A course on Basic Mathematics
COURSE DESCRIPTION: The course is designed to provide hands on practice on Scratch programming and python programming for problem solving.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Develop scripts using Scratch tool to simulate simple problems.
CO2. Apply Python Constructs and Modules to develop solutions for real-life problems.
CO3. Function effectively as an individual and in team to foster knowledge and creativity.
CO4. Write and present a substantial technical report/ document effectively.

I B. Tech. – II Semester
(19BT20231) ELECTRIC CIRCUITS LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: Physics at Intermediate Level.
COURSE DESCRIPTION: Practical investigations on DC, single and poly phase circuits, Circuit theorems, magnetically coupled circuits and Two-Port networks.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. analyze various electrical circuits by applying the principles of network reduction techniques, mesh and nodal analysis.
CO2. analyze the single, poly phase and coupled circuits to investigate the response and to determine various electrical quantities.
CO3. analyze various electrical circuits, by applying circuit theorems to determine the response for DC and AC excitations.
CO4. design an appropriate filter network for the given specifications.
CO5. work independently / in groups, and communicate effectively in oral and written forms.

II B. Tech. - I Semester
(19BT3BS02) SPECIAL FUNCTIONS AND COMPLEX ANALYSIS
(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C

40	60	100	3	1	-	4

PRE-REQUISITES: Differential equations and Multivariable calculus
COURSE DESCRIPTION: Special Functions (Beta and Gamma functions); Special Functions (Bessel's and Legendre's equations); Analytic Functions; Conformal Mapping; Complex Integration; Residue Theorem.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
CO1. Apply the knowledge of special functions to evaluate improper integrals.
CO2. Analyze the behavior of functions through the knowledge of complex analysis and evaluate integrals on complex planes.

II B. Tech. – I Semester
(19BT30402) ELECTRONIC DEVICES AND CIRCUITS
(Common to ECE, EEE& EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Courses on Basic Electrical and Electronics Engineering, Differential Equations and Multivariable Calculus & Engineering Physics.
COURSE DESCRIPTION:
Linear and Non-Linear Wave shaping, Biasing and small signal analysis of BJT & FET, Operation and characteristics of Special Purpose electronic devices.
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1. Analyze the response of High pass circuits, Low pass RC circuits for various signals and performance of clippers and clampers.
CO2. Design transistor biasing circuits and stabilize the operating point using appropriate techniques.
CO3. Develop mathematical model of BJT for CE, CB and CC configurations using h-parameters.
CO4. Analyze various configurations and biasing techniques for FET.
CO5. Demonstrate the operation and characteristics of special purpose semiconductor devices for real time applications.

II B. Tech. – I Semester
(19BT30201) ELECTRICAL MACHINES-1

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES:
Basic Electrical and Electronics Engineering and Electric Circuits.
COURSE DESCRIPTION:
Construction, operation, types, performance characteristics and applications of DC machines and transformers.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO6. analyse the DC generator to evaluate various operating parameters and develop constructional features for sustainability.
CO7. analyse the operational characteristics of various DC generators to assess measures for sustainability.
CO8. analyse the performance characteristics of various types of DC motors to develop accessories and assess the suitability for industrial applications.
CO9. analyse the equivalent circuits of transformers with various configurations to determine their performance and assess sustainability for various load conditions.

II B. Tech. – I Semester
(19BT30202) ELECTROMAGNETIC FIELDS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES:
Differential Equations and Multivariable Calculus, Engineering Physics.
COURSE DESCRIPTION:
Static electric fields; Gauss's law and its applications; Potential and Potential Gradient; steady magnetic fields; Ampere's circuital law and its applications; Force in magnetic fields; behaviour of various materials in electric and magnetic fields; Inductance and capacitance calculations; Maxwell's equations for time variant and time invariant fields.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. analyse the static electric field to determine electric field for various charge configurations by applying the laws of electrostatics.
CO2. analyse the static magnetic field to determine magnetic field and force due to various current carrying elements by applying the laws of magneto statics.
CO3. analyse the time varying electric and magnetic fields by applying the laws of electromagnetic.

II B. Tech. – I Semester
(19BT30203) SIGNALS AND NETWORKS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES:
Transformation Techniques and Linear Algebra and Electric circuits.
COURSE DESCRIPTION:
Discrete and continuous time signals; Signal transformation methods — circuit applications; Analysis of Transients and Two-port networks.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. perform various operations on signals and evaluate their characteristics.
CO2. analyze spectral characteristics of signals and circuits using Fourier, Laplace and z-Transforms.
CO3. analyze transient behaviour of DC & AC circuits by using differential equations and Laplace transform methods.
CO4. Analyze network parameters of an isolated and interconnected two-port network.

II B. Tech. – I Semester
(19BT3HS31) SOFT SKILLS LAB
(Common to CE, ME, EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: -
COURSE DESCRIPTION: Body Language; Assertiveness; Goal Setting; Thinking Skills; Team Building; Conflict Management; Technical Report Writing; Résumé Writing; Group Discussions; Interview Skills; Interpersonal Skills; Etiquette.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Demonstrate knowledge of career skills by examining and applying the styles and strategies of Goal Setting, Thinking Skills, and Etiquettes.
CO2. Analyze the limitations and possibilities of favourable situations by applying the skills of Body Language and demonstrate through Assertiveness, and Interpersonal Skills.
CO3. Apply appropriate soft skills by analyzing the problem situations that arise in professional career through demonstrating remedies in Conflict Management.
CO4. Demonstrate ability to function effectively as an individual and as a member in diverse teams examining and applying soft skills in Interviews, Group Discussion and Team Building.
CO5. Apply appropriate speaking and writing techniques in preparing documents and to communicate effectively by examining and demonstrating knowledge in Technical Report Writing and Résumé Writing.

II B.Tech. – I Semester
(19BT30432) ELECTRONIC DEVICES AND CIRCUITS LAB
(Common to ECE, EEE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: A Course on Basic Electrical and Electronics Engineering.
COURSE DESCRIPTION: Integrator and Differentiator, Clippers and Clampers, Transistor switch, h-parameter calculation, Drain and Transfer characteristics of FET, Frequency response of CE and CS amplifiers, UJT Relaxation oscillator, Characteristics of DIAC and SCR.
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1. Analyze the response of RC circuits for square input.
CO2. Analyze the characteristics of BJT, FET, DIAC and SCR.
CO3. Design BJT and FET Amplifiers and evaluate the performance parameters from the frequency response.
CO4. Develop the basic applications of diode, transistor and UJT for desired specifications.
CO5. Work independently and in teams to solve problems with effective Communication.

II B. Tech. – I Semester
(19BT30231) ELECTRICAL MACHINES-1 LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES:
Basics of Electrical and Electronics Engineering Lab and Electric circuits.
COURSE DESCRIPTION:
Speed control and performance characteristics of DC Machines; Determination of losses and performance evaluation of DC machines and transformers.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. evaluate the operating characteristics of DC generators and validate the practical observations with the underlying concepts.
CO2. evaluate the operating characteristics of DC motors and validate the practical observations with the underlying concepts.
CO3. realize the philosophy of testing procedures of various DC machines and transformers by adhering the code of conduct.
CO4. evaluate the operating characteristics of transformers and validate the practical observations with the underlying concepts.
CO5. work independently / in groups, and communicate effectively in oral and written forms.

II B. Tech. – I Semester
(19BT30232) SIGNALS AND NETWORKS LAB
(EEE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES:
Transformation techniques and linear algebra and Electric circuits.
COURSE DESCRIPTION:
Practical investigations through simulation on signals and systems; Spectral analysis of signals, and analysis of transients and two-port networks.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. evaluate, analyze the characteristics/responses of various signals and systems, and interpret the practical observations for validation.
CO2. analyze spectral characteristics of signals/response in frequency domain using Fourier, Laplace and z-Transforms.
CO3. analyze transient behavior of DC & AC circuits using mathematical methods and design timer circuits for desired specifications.
CO4. analyze network parameters of an isolated and interconnected two-port networks and design impedance and gain matching networks.
CO5. work independently / in groups, and communicate effectively in oral and written forms.

II B. Tech. – I Semester
(19BT3MC01) ENVIRONMENTAL SCIENCE
(Mandatory Course)
(Common to ECE, EEE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	-	40	2	-	-	-

PRE-REQUISITES:-

COURSE DESCRIPTION: Natural resources; Ecosystems; Biodiversity; Environment pollution and control; Social issues and environment; Human population and environment.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1. Analyze natural resources to solve complex environmental problems and natural resource management considering society, environment and sustainability.

CO2. Analyze ecosystems and biodiversity to solve complex environmental problems by following environmental ethics considering society, environment and sustainability besides communicating effectively in graphical form.

CO3. Analyze various types of pollution and their control measures to solve environmental problems through appropriate tools and techniques following latest developments considering society, ethics, environment and sustainability.

CO4. Analyze social issues and its impact on environment, environmental acts to solve complex environmental problems considering society, environment and sustainability besides communicating effectively in graphical form.

CO5. Analyze human population and its impact on environment to solve complex environmental problems through team work and using appropriate tools and techniques considering ethics, society, environment and sustainability.

II B. Tech. – II Semester
(19BT40441) ANALOG ELECTRONICS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Courses on Basic Electrical and Electronic Engineering & Electronic Devices and Circuits.

COURSE DESCRIPTION:
Demonstrate Single Stage Amplifiers; Multi Stage amplifiers; Frequency Response; Negative Feedback Amplifiers; Oscillators; Multi vibrators; Large Signal Amplifiers.

COURSE OUTCOMES:
After successful completion of this course, student will be able to:

CO1. Design multistage amplifiers using voltage divider bias to determine the Gain, Bandwidth, Input and Output Impedances.

CO2. Analyze the concept of feedback to improve the stability of amplifiers and generate sustained oscillations.

CO3. Realize different classes of Power Amplifiers to improve efficiency.

CO4. Design filters to find the frequency response and operate IC555 in various modes for different applications

II B. Tech – II Semester
(19BT40201) DIGITAL ELECTRONICS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES:
Electronic Devices and Circuits.

COURSE DESCRIPTION:
Boolean algebra; Minimization techniques; Analysis of digital circuits; Asynchronous Sequential Logic, Programmable Memories and Computer arithmetic.

COURSE OUTCOMES: After successful completion of this course, student will be able to:

CO1. design logical circuits by analyzing various Boolean functions and simplification methods to perform desired logical operations using logical gates.

CO2. design combinational logical circuits for performing various arithmetic operations and data encoding and decoding in various data lines.

CO3. analyze various sequential circuits for realizing counters and registers using flip-flops.

CO4. analyze clocked sequential circuits using various techniques and realize design procedures for optimal circuits.
CO5. design programmable logic devices for required memory and develop various computer algorithms for arithmetic operations.

II B. Tech. – II Semester
(19BT40202) ELECTRICAL MACHINES-2

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES:
Electrical Machines-1 and Electrical Machines-1 Lab.
COURSE DESCRIPTION:
Construction, types, operation and applications of induction machines and synchronous machines; parallel operation of synchronous generators; Performance evaluation of induction machines and synchronous machines.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. analyze the performance of induction machine to evaluate the operating parameters and to asses feasible control strategies.
CO2. analyze the performance of synchronous generator to evaluate the operating parameters and to assess measures for sustainability.
CO3. analyze the synchronized operation of alternators and the effect of influencing factors on synchronization, and to determine feasible operating state for sustainability.
CO4. analyze the performance of synchronous motor to evaluate the operating parameters, and to determine sustainable and feasible operating states for various loadings.

II B. Tech. – II Semester
(19BT40203) ELECTRICAL MEASUREMENTS
(EEE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Electric Circuits.
COURSE DESCRIPTION:
Measurement of electrical quantities; construction, working, design and applications of various electrical measuring instruments; Performance evaluation of various electrical measuring instruments.
COURSE OUTCOMES: On successful completion of the course, students will be able to:
CO1. understand the constructional and operating principles of various measuring instruments and design an appropriate shunt and multiplier for the extension of instrument range.
CO2. analyze various errors, while measuring the electrical quantities due to interconnection of power, energy and power factor measuring instruments and assess the error compensation techniques.
CO3. analyze various errors, while measuring the electrical quantities due to interconnection of instrument transformers and potentiometers, and assess the error compensation techniques.
CO4. analyze the phasor of various electrical bridges used for measuring, to estimate various electrical quantities.
CO5. analyze the patterns of various monitoring instruments to determine the phase and frequency of various electrical signals.

II B. Tech. – II Semester
(**19BT40204**) **TRANSMISSION AND DISTRIBUTION**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES:
Electromagnetic Fields, and Signals and Networks.
COURSE DESCRIPTION:

Parameters of overhead transmission lines and underground cables; Performance of transmission lines, travelling wave phenomenon; Insulators; Sag and corona; Distribution systems classification, analysis and planning.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. analyze the overhead lines and underground cables to evaluate various parameters and their characteristics for different configurations.

CO2. analyze the performance of transmission lines and investigate the behaviour of travelling waves for different configurations of transmission lines.

CO3. analyze the mechanical and electrical aspects of overhead transmission lines and realize measures for sustainability.

CO4. analyze various distribution systems, to determine their performance characteristics under various scenarios.

CO5. realize various aspects of substation, and analyze the primary and secondary feeders systems of substation to configure the feeder layout in a service area.

II B. Tech. – II Semester

(19BT4BS01) **MATERIAL SCIENCE**

(Open Elective-1)

(Common EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: -

COURSE DESCRIPTION: Introduction to Material Science and Engineering; Composite Materials; Smart Materials; Nano and Biomimetic Materials; Emerging Materials.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO1. Attain the basic knowledge on composites, smart materials, biomimetic materials and nano materials.

CO2. Demonstrate essential information about structure and properties of various composites used in various engineering applications.

CO3. Understand the basic properties of electro-rheostatic, magneto-rheostatic and shape memory alloys used in device applications.

CO4. Accomplish the basic knowledge in nano materials to familiarize various nano structured device applications.

CO5. Outline the processing and properties of functionally graded materials and identify its applications in various fields.

II B. Tech. - II Semester

(19BT4HS02) **BUSINESS COMMUNICATION AND CAREER SKILLS**

(Open Elective-1)

(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: -

COURSE DESCRIPTION: Nature and Scope of Communication; Corporate Communication; Writing Business Messages & Documents; Careers and Résumés; Interviews.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO1. Demonstrate knowledge of professional communication by examining and applying the styles and strategies of business communication in Communication Networks and Writing Messages.

CO2. Analyze the limitations of business communication by applying and demonstrating corporate communication aspects for effective communication through Interpersonal Communication, Informal Communication, and Crisis Management and Communication.

CO3. Apply appropriate writing techniques for effective professional communication in preparing documents by demonstrating and examining Stages in Writing Business Messages, Strategies for Writing the Body of a Letter, and Structuring Résumés.

CO4. Apply appropriate speaking techniques by examining and demonstrating effective communication in distinguished situations through Corporate Communication and Cross Cultural Communication

II B. Tech. - II Semester
(19BT4HS04) **ENTREPRENEURSHIP FOR MICRO, SMALL AND MEDIUM ENTERPRISES**
(Open Elective-1)
(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Introduction to Entrepreneur Development; Idea generation and formation of Business Plan; Micro and Small Enterprises; Institutional Finance and Support to Entrepreneur; Woman Entrepreneurship.
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1. Demonstrate knowledge in concepts, functions, Micro and Macro units, NGOs, BharatiyaMahila Bank, Women Entrepreneurship, Schemes and Programmes.
CO2. Analyze the idea generation, business plans, business acumen, institutional finance and rural entrepreneurship.

II B. Tech. - II Semester
(19BT4HS06) **GERMAN LANGUAGE**
(Open Elective-1)
(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Oral communication; Basic grammar; Basic writing; Berufsdeutcsch (Business German)
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1. Communicate everyday using familiar words with expressions and simple sentences.

II B. Tech. - II Semester
(19BT4HS08) **INDIAN HISTORY**
(Open Elective-1)
(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: -
CORSE DESCRIPTION: Introduction; Ancient India; Classical and Medieval era; Modern India; India after independence.
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1. Demonstrate contextual knowledge on evolution of ancient and medieval Indian History and acquire awareness on societal and cultural issues.
CO2. Analyze the situations before and after Independence and assess the societal reforms implemented in India after Independence.

II B. Tech. - II Semester
(19BT4HS10) **PERSONALITY DEVELOPMENT**
(Open Elective-1)
(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: A course on Soft Skills Laboratory
COURSE DESCRIPTION: Personalities and Leadership Qualities; Self Esteem and self

Development; Attitude; Communication Relationship; Critical Work Skills and Ethics.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO1. Demonstrate knowledge of leadership qualities by examining and applying personality traits through Positive self esteem, Open Communication and Self-Righteousness.

CO2. Analyze the limitations of Attitudes by applying and demonstrating communication traits through Decision Making, Ethics and Self Actualization.

CO3. Apply appropriate Analyzing techniques for comprehending different personalities by examining Positive and Negative Characteristic Traits and demonstrating through Leadership Styles, Mentoring and Behaviour Modification.

CO4. Apply appropriate techniques in Solving Problems by examining and demonstrating Time Management, Stress Management and Anger Management.

II B. Tech. - II Semester

(19BT4HS12) **WOMEN EMPOWERMENT**

(Open Elective-1)

(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: -

COURSE DESCRIPTION: Concept & Framework, Status of Women, Women's Right to work, International Women's Decade, and Women Entrepreneurship.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO1. Demonstrate the characteristics of empowered women, their achievements, and frame work for women empowerment, legal laws, and political status of women.

CO2. Apply the knowledge of women rights to address various societal issues and obstacles in different fields including science and technology.

CO3. Understand the significance of participation in policy debates, National conferences and common forums for women's' equality and development.

CO4. Analyze the concept of women entrepreneurship, government schemes and entrepreneurial challenges and opportunities.

II B. Tech. - II Semester

(19BT4HS14) **CONSTITUTION OF INDIA**

(Open Elective-1)

(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: -

COURSE DESCRIPTION: Preamble and its Philosophy; Union Legislature; Federalism in India; Judiciary and Public Services; Nation Building

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO1. Gain knowledge in Parliamentary proceedings, Election Commission, Public Services and Foreign Policy of India.

CO2. Apply the reasoning informed by the various aspects in the Constitution, its provisions to assess societal issues and the consequent responsibilities relevant to the professional engineering practice.

II B. Tech. - II Semester

(19BT40205) **RELIABILITY AND SAFETY ENGINEERING**

(Open Elective-1)

(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Courses on Differential Equations and Multi-Variable Calculus & Transformation Techniques and Linear Algebra.

COURSE DESCRIPTION:

Fundamentals of reliability engineering; Network modeling and reliability evaluation; Markov chain and Markov processes; basics of safety concepts and safety techniques and applications.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO1. Develop mathematical model of a network to evaluate the parameters for assessing the reliability of a system.

CO2. Analyze the time dependent/independent characteristics of a repairable system and frequency durations techniques to assess reliability.

CO3. Understand various safety management, policy, and planning strategies for personal and industrial safety.

CO4. Understand various safety and hazard identification techniques and follow appropriate safety measures in industry and society.

II B. Tech. - II Semester

(19BT50107) **ENVIRONMENTAL POLLUTION AND CONTROL**

(Open Elective-1)

(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PREREQUISITES: -

COURSE DESCRIPTION: Fundamentals of air pollution; Dispersion of pollutants; Effects and control of air pollution; Water pollution; Soil pollution and control; Municipal solid waste management.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO1 Analyze air and noise pollution using appropriate tools and techniques to solve complex environmental issues following relevant standards considering society, environment and sustainability besides communicating effectively in graphical form.

CO2 Analyze air and noise pollution control measures using appropriate tools and techniques to solve complex environmental issues following relevant standards and latest developments considering society, environment and sustainability besides communicating effectively in graphical form.

CO3 Analyze water pollution and its control measures using appropriate tools and techniques to solve complex environmental issues following relevant standards and latest developments considering society, environment and sustainability besides communicating effectively in graphical form.

CO4 Analyze soil pollution and its control measures using appropriate tools and techniques to solve complex environmental issues following relevant standards and latest developments considering society, environment and sustainability besides communicating effectively in graphical form.

CO5 Analyze solid waste and its management measures using appropriate tools and techniques to solve solid waste disposal issues following relevant standards and latest developments considering society, environment and sustainability besides communicating effectively in graphical form.

II B. Tech. - II Semester

(19BT50108) **PLANNING FOR SUSTAINABLE DEVELOPMENT**

(Open Elective-1)

(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PREREQUISITES: -

COURSE DESCRIPTION: Sustainable development; Environmental impact; Sustainable Policies; Governance; Theories and strategies; Media and education for sustainability.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO1 Compare sustainable development theories in national and global context to protect the society and environment.

CO2 Analyze the unforeseen environmental impacts on sustainable development to protect the society and environment.
CO3 Analyze policies and governance for sustainable development considering ethics, economics, society and environment.
CO4 Analyze systems and strategies for sustainable development using appropriate tools and techniques considering ethics, economics, society and environment.
CO5 Analyze the role of media and education in sustainable development using appropriate tools and techniques considering ethics, society and environment besides communicating effectively.

II B. Tech. - II Semester
(19BT50109) **RURAL TECHNOLOGY**
(Open Elective-1)
(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PREREQUISITES: -
COURSE DESCRIPTION: Technology for rural development; Nonconventional energy; Technologies for rural development; Community development; IT in rural development.
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1 Compare various technologies for rural development by solving rural problems through different schemes by considering ethics, society, environment and sustainability.
CO2 Analyze non conventional energy sources using appropriate tools and techniques to solve rural energy problems considering society, environment and sustainability besides communicating effectively in graphical form.
CO3 Select appropriate technologies in different areas of rural development to solve rural issues following latest developments considering society, environment and sustainability.
CO4 Relate water conservation, health, safety and rural employment issues for community development to solve rural problems through appropriate technologies considering ethics, society, environment and sustainability.
CO5 Analyze the impact of IT, public and private partnership on rural development to solve complex rural problems using appropriate tools and techniques considering ethics, society, environment and sustainability.

II B. Tech. - II Semester
(19BT50505) **ETHICAL HACKING**
(Open Elective-1)
(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PREREQUISITES: -
COURSE DESCRIPTION:
Ethical hacking, Network and computer attacks, Foot printing, Social engineering, Port scanning, System hacking, Sniffers, Denial of service, Hacking web servers, Wireless hacking, Cryptography, Network Protection System.
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1. Demonstrate knowledge on the computer security, social engineering and the intent of ethical hacking.
CO2. Select and apply foot printing and port scanning tools to discover vulnerabilities of the computer system.
CO3. Investigate hacking techniques and tools to maintain computer security.
CO4. Analyze cryptosystems and network protection systems for information security and intrusion prevention.

II B. Tech. - II Semester
(19BT51207) **AI IN HEALTHCARE**
(Open Elective-1)
(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PREREQUISITES: -
COURSE DESCRIPTION: Concepts of Artificial Intelligence (AI) in Healthcare; The Present State and Future of AI in Healthcare Specialties; The Role of Major Corporations in AI in Healthcare; Applications of AI in Healthcare.
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO6. Understand the fundamental concepts of AI in Healthcare sector.
CO7. Understand the applications of AI in Healthcare specialties.
CO8. Demonstrate AI applications developed by corporate companies.
CO9. Demonstrate knowledge on future applications of Healthcare using AI.
CO10. Understand the principles of AI applications through case studies.

II B. Tech. - II Semester
(19BT51506) **BIOINFORMATICS**
(Open Elective-1)
(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: A course on Biology for Engineers.
COURSE DESCRIPTION:
Biological Data Acquisition, Databases, Data Processing, Methods of Analysis, Applications of Bio-informatics
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1. Understand basic biological data acquisition in bioinformatics.
CO2. Identify the proper databases for the information search by choosing the biological databases and also submission and retrieval of data from databases.
CO3. Analyze the results of bioinformatics data using text and sequence-based searching techniques.
CO4. Analyze the secondary and tertiary structures of proteins by applying different alignment programs
CO5. Design biological databases and novel drugs by using contextual knowledge on bioinformatics.

II B. Tech. – II Semester
(19BT40231) DIGITAL ELECTRONICS LAB
(EEE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES:
Electronic devices and circuits.
COURSE DESCRIPTION:
Practical investigations through simulation on logic gates; minimization of circuits; design of various combinational and sequential logic circuits.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. perform various arithmetic operations on number systems and analyze simplification methods in logical circuits, to perform desired logical operations optimally using logical gates.
CO2. design combinational logical circuits for performing various arithmetic operations and data encoding and decoding for engineering applications.
CO3. analyze various sequential circuits for realizing counters and registers using flip-flops.
CO4. work independently / in groups, and communicate effectively in oral and written forms.

II B.Tech. – II Semester
(19BT40232) ELECTRICAL ENGINEERING WORKSHOP

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	2

PRE-REQUISITES:
Electric Circuits Lab and Electrical Machines-1 Lab.
COURSE DESCRIPTION: Exercises on assessing of electrical parameters and functionality of electrical apparatus; Design and estimation of electrical systems, and protection system for electrical devices and systems; Troubleshooting of electrical appliances and Calibration of measuring instruments.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. evaluate various electrical quantities using modern utilities, assess the functionality of various devices and analyze the practical observations for calibration.
CO2. design operating equipment for the various electrical appliances for sustainable operation, and estimate typical house wiring system following the code of conduct and realize the technological developments in design of operating equipment.
CO3. analyze various electrical appliances for troubleshooting and maintenance, and protection schemes for safety of personals and apparatus, and realize the technological developments in protection.
CO4. work independently / in groups, and communicate effectively in oral and written forms.

II B. Tech. – II Semester
(19BT40233) ELECTRICAL MACHINES-2 LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	2

PRE-REQUISITES:
Electrical Machines-1 and Electrical Machines-1Lab
COURSE DESCRIPTION:
Practical investigations on asynchronous and synchronous machines; Performance indices analysis, determination of equivalent circuit parameters and speed control methods of induction motor.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. analyze the performance of induction machines to evaluate operating parameters and interpret the practical observations for validation.
CO2. analyze the performance of synchronous machines to evaluate operating parameters and interpret the practical observations for validation.
CO3. analyze the performance of universal motor for various loading conditions.
CO4. realize the philosophy of testing procedure of synchronous and asynchronous machines following the code of conduct.
CO5. work independently / in groups, and communicate effectively in oral and written forms.

II B. Tech. – II Semester
(19BT315AC) DESIGN THINKING
(Audit Course)
(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	2	-	-	-

PRE-REQUISITES: -
COURSE DESCRIPTION:
Design thinking process, Design thinking phases, empathy tools; Idea generation, visualizing and empathizing; Fidelity for prototypes, prototyping; prototyping for physical products.
COURSE OUTCOMES: After successful completion of this course, the students will be able to:
CO1. Analyze design thinking concepts and principles to perform human centered design process for creative problem solving.
CO2. Create empathy maps to visualize user attitudes and behavior for gaining insights of customers.
CO3. Develop innovative products or services for a customer base using ideation techniques.
CO4. Build prototypes for complex problems using gathered user requirements.
CO5. Apply design thinking tools techniques to produce good design and relevant products or services for a specific target market.
CO6. Improve prototype by testing it with a specific set of users for making it sustainable by following ethics.

Program: B.Tech. ELECTRONICS AND INSTRUMENTATION ENGINEERING

I B. Tech. - I Semester
(19BT1BS01) **DIFFERENTIAL EQUATIONS AND MULTIVARIABLE CALCULUS**
(Common to CE, ME, EEE, ECE, EIE, CSE, CSSE, IT, CSE(AI) & CSE(DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES: --
COURSE DESCRIPTION: Ordinary Differential Equations; Partial Differential Equations; Multivariable Calculus (Differentiation); Multivariable Calculus (Integration); Multivariable Calculus (Vector Calculus).
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Formulate and solve differential equations by applying knowledge of calculus for engineering problems.
CO2. Demonstrate knowledge in multivariable calculus for evaluating multiple integrals through techniques of integration.
CO3. Identify scalar and vector valued functions and evaluate vector integrals through knowledge of vector integral theorems and techniques.

I B. Tech - I Semester
(19BT1BS02) **BIOLOGY FOR ENGINEERS**
(Common to EEE, ECE, EIE, CSE(AI) & CSE(DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	2	-	-	2

PRE-REQUISITES: --
COURSE DESCRIPTION: Living Organisms; Proteins, Nucleic acids and Enzymes; Genetics and Molecular Biology; Recombinant DNA technology; Human Physiology and Applied Biology.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Apply the basic knowledge of biology to understand the significance of various biological techniques.
CO2. Identify the role of DNA in the molecular basis of information transfer and understand single gene disorders related to the health perspective.
CO3. Apply the basic knowledge of bio-analytical devices and methods to assess health issues.

I B. Tech. - I Semester
(19BT1BS03) **ENGINEERING PHYSICS**
(Common to EEE, ECE, EIE, CSE(AI), CSE(DS) & CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --
COURSE DESCRIPTION: Wave Optics; Electromagnetic Waves; Fiber Optics; Semiconductors; Dielectrics; Magnetism; Superconductors and Nanomaterials
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Apply the knowledge of light waves to interpret the concepts of Interference, Diffraction and Polarization
CO2. Demonstrate the concepts of electromagnetic wave propagation in an Optical fibers.
CO3. Apply the basic knowledge of semiconductors to understand the functioning of various optoelectronic devices.
CO4. Demonstrate the basic knowledge of dielectric and magnetic properties to understand the various dielectric polarizations and magnetic materials.
CO5. Understand the concepts of superconductors and nanomaterials to familiarize their applications in relevant fields.

I B. Tech. – I Semester
(19BT10341) **BASIC CIVIL AND MECHANICAL ENGINEERING**
(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --
COURSE DESCRIPTION: Overview of Civil Engineering; Surveying, Civil Engineering Materials, Mechanics of Materials, Building Components, Civil Engineering Infrastructure; Overview of Basic Mechanical Engineering; Internal Combustion Engines and Turbines, Mechanical Power Transmission Systems, Manufacturing Processes, Machining Processes, Non-Conventional Machining.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Apply the basic principles of civil engineering, Techniques and tools for analyzing civil structures and solve related problems.
CO2. Describe the working of principles of basic mechanical engineering and solve problems related to it.

I B. Tech. – I Semester
(19BT10201) **BASIC ELECTRICAL AND ELECTRONICS ENGINEERING**
(Common to EEE, ECE, EIE, CSE(AI), CSE(DS) & CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --
COURSE DESCRIPTION: Principles of Electrical Systems; AC Machines; Semiconductor Devices and Op-Amps.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO9. Analyze electrical circuits by applying the conceptual knowledge of circuit elements.
CO10. Demonstrate knowledge on various generation technologies, protection devices, safety procedures and BEE standards.
CO11. Demonstrate knowledge on characteristics and applications of transformers and AC machines.
CO12. Demonstrate knowledge on characteristics and applications of diode, BJT and Op-amps.

I B. Tech. - I Semester
(19BT1BS31) **ENGINEERING PHYSICS LAB**
(Common to EEE, ECE, EIE, CSE(AI), CSE(DS) & CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: --
COURSE DESCRIPTION: Determination of wavelength of light and thickness of a thin film; numerical aperture and acceptance angle of optical fiber; Characteristics of various semiconductor diodes; Resistivity of semiconductor; magnetic field along axial line of a current carrying coil
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Apply the basic knowledge of light waves and semiconductors to demonstrate the functioning of optoelectronic devices.
CO2. Understand the experimental procedures to calculate the thickness of a thin film, Hall coefficient, Hysteresis losses, and acceptance angle of an optical fiber.
CO3. Determine the experimental values of magnetic field induction, wave length of a light source, energy gap of a semiconductor.
CO4: Apply skills to plot characteristic curves to determine the various parameters of semiconductor diodes.
CO5. Work independently and in teams to solve problems with effective communication.

I B. Tech. – I Semester
(19BT10231) **BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB**
(Common to EEE, ECE, EIE, CSE(AI), CSE(DS) & CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: Physics at intermediate level.
COURSE DESCRIPTION: Practical investigations on Electrical circuits, AC Machines, Semiconductor Devices and Op-Amps.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Analyze, measure, interpret and validate the practical observations by applying the fundamental knowledge of electrical circuits, machines and electronic devices.
CO2. Design Op-amp based amplifier, voltage summer and integrator circuits for desired specifications.
CO3. Work independently and in teams to solve problems with effective communication.

I B. Tech. – I Semester
(19BT20331) **ENGINEERING WORKSHOP**
(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: --
COURSE DESCRIPTION: Knowledge on various workshop hand and power tools; hands on experience in different manufacturing trades such as fitting, carpentry, sheet metal forming and foundry; Demonstration on dismantling and assembling of various two wheeler parts, power tools in machining and metal joining, basics of plumbing and working of 3D printer.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Design and model various basic prototypes in the trade of fitting such as square/half round mating, V- mating and dovetail mating from the given MS workpieces using fitting tools.
CO2. Develop different prototypes in the carpentry trade such as cross lap joint, dovetail / bridle joints and Mortise and Tenon joint using carpentry tools.
CO3. Design and model different prototypes in the sheet metal forming trade such as rectangular tray, square vessel/cylinder, Funnel as per the dimensions using sheet metal forming tools.
CO4. Develop sand mold using single piece pattern and split piece pattern in the foundry trade using foundry tools.
CO5. Demonstrate the knowledge on automobile parts, power tools, plumbing operation, 3D printing technology involved in different engineering applications.
CO6. Work independently / in groups & communicate effectively in oral and written forms.

I B. Tech. – I Semester
(19BT1AC01) **SPOKEN ENGLISH**
(Common to EEE, ECE, EIE, CSE(AI) & CSE(DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	2	-	-	-

PRE-REQUISITES: --
COURSE DESCRIPTON: Functional English; Vocabulary Building; Functional Grammar-I; Functional Grammar – II; Communication Skills.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1: Demonstrate knowledge of grammar and vocabulary in writing effective formal letters and e-mails.
CO2: Communicate effectively by applying appropriate speaking and writing techniques by examining and applying functional English.

I B. Tech. - II semester
(19BT2BS01) **TRANSFORMATION TECHNIQUES AND LINEAR ALGEBRA**
(Common to CE, ME, EEE, ECE, EIE, CSE, CSSE, IT, CSE(AI) & CSE(DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES: --
COURSE DESCRIPTION: Fourier Series and Fourier Transforms; Laplace Transforms; Inverse Laplace Transforms; Linear Algebra-I (Matrices); Linear Algebra-II (Vector Spaces).
COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Apply the knowledge of Fourier and Laplace transform techniques to solve differential equations.
CO2. Analyze linear transformations and associated matrices to solve engineering problems by applying the knowledge of linear algebra.

I B. Tech. - II Semester
(19BT1BS04) **ENGINEERING CHEMISTRY**
(Common to EEE, ECE, EIE, CSE(AI) & CSE(DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --
COURSE DESCRIPTION: Atomic Structure and Bonding Theories; Water Treatment; Electrochemistry and Applications; Corrosion; Instrumental Methods and Applications; Fuel chemistry and Lubricants.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Apply the basic knowledge of quantum mechanical approach to atomic structure and bonding theories to identify shapes of different orbitals and molecules.
CO2. Analyze and solve problems associated with hardness of water, boiler troubles and address the societal, health and safety issues related to quality of water.
CO3. Apply the basic knowledge of corrosion phenomenon to identify solutions for control of corrosion and demonstrate competency in the basic concepts of electrochemical cells.
CO4. Demonstrate the basic knowledge of instrumental methods and their applications in the structural analysis of materials.
CO5. Apply the basic knowledge of fuel chemistry and lubricants to identify the quality of fuels and lubricants.

I B. Tech – II Semester
(19BT1HS01) **COMMUNICATIVE ENGLISH**
(Common to EEE, ECE, EIE, CSE(AI) & CSE(DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --
COURSE DESCRIPTION: Introduction to communication; Active listening; Effective speaking; Reading; Technical writing.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1: Demonstrate knowledge of English language, examining and applying the aspects of Process of communication, Paralinguistic features, Skimming, Scanning, and Elements of style in writing.
CO2: Analyze the modes and techniques of listening, speaking, reading, writing and apply appropriately to communicate effectively with the engineering community and society.
CO3: Apply reading and writing techniques in preparing documents by examining SQ3R Technique, Writer’s Block, and Précis Writing.
CO4: Communicate effectively applying appropriate speaking techniques by examining and applying the communication styles in Conferences, Symposia, Seminars and Persuasive Speaking.

I B. Tech. – II Semester
(19BT10501) **PROGRAMMING FOR PROBLEM SOLVING**
(Common to EEE, ECE, EIE & CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES: A course on Basic Mathematics
COURSE DESCRIPTION: Introduction to problem solving approach, Introduction to Python programming, control structures, sequences, sets, Dictionaries, Implementation of Data structures using Python, Modular programming, file handling, Data representation and Visualization.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Demonstrate knowledge on Python constructs to solve basic problems.
CO2. Develop and use Python modules to provide solutions to problems.

I B. Tech. – II Semester
(19BT20241) **NETWORK ANALYSIS**
(Common to ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES: Physics at Intermediate Level.
COURSE DESCRIPTION: Fundamentals of electrical circuits; Analysis of single phase AC circuits; Network theorems; Transient analysis and Two port networks.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO8. Analyze and solve various DC and single phase AC circuits by applying conceptual knowledge of network reduction, analyzing techniques and theorems
CO9. Design the Components for resonant, transient circuits and Two-port networks meeting the specified needs using circuit concepts.

I B. Tech. - II Semester
(19BT1BS32) **ENGINEERING CHEMISTRY LAB**
(Common to EEE, ECE, EIE, CSE(AI) & CSE(DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: --
COURSE DESCRIPTION: Estimation of hardness, alkalinity, dissolved oxygen of water samples, Iron, Strength of an acid in Pb-acid battery and residual chlorine in drinking water by volumetric methods; Measurement of viscosity of lubricants; Instrumental methods like conductivity meter, potentiometer, P^H meter and colorimeter; Characterization of simple organic compounds by UV-Vis and IR spectroscopy.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Apply analytical skills for the quantitative estimation of materials through volumetric methods of analysis and address the societal, health issues related to quality of water.
CO2. Develop analytical skills for the quantitative estimation of materials through instrumental methods of analysis.
CO3. Work independently and in teams to solve problems with effective communication.

I B. Tech. - II Semester
(19BT1HS31) **COMMUNICATIVE ENGLISH LAB**
(Common to EEE, ECE, EIE, CSE(AI) & CSE(DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: -
COURSE DESCRIPTION: Phonetics; Vocabulary Building; Grammar; Just a Minute; Elocution/Impromptu; Giving Directions; Role Plays; Public Speaking; Describing Objects; Reading Comprehension; Listening Comprehension; Information Transfer; Letter Writing
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1: Demonstrate knowledge of Phonetics by examining and applying sounds of English in Phonetic Transcription.
CO2: Analyze sentence structures by applying and demonstrating the skills of Vocabulary and Grammar.
CO3: Apply appropriate listening and reading skills by analyzing the context and demonstrate in Listening Comprehension and Reading Comprehension.
CO4: Function effectively as an individual and as a member in diverse teams examining and applying speaking skills in Just A Minute and Role Play.
CO5: Communicate effectively applying appropriate writing and speaking techniques by examining and demonstrating knowledge through Describing Objects, Information Transfer and Letter Writing.

I B. Tech. – II Semester
(19BT10331) **COMPUTER AIDED ENGINEERING DRAWING**
(Common to EEE, ECE, EIE, CSE(AI) & CSE(DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	1	2	2

PRE-REQUISITES: --
COURSE DESCRIPTION: Engineering drawing conventions; Importance of engineering drawing; fundamental concepts of sketching; computer aided drafting and different types of projections of geometric entities (both 2D and 3D) through computer aided drafting packages.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1: Apply the principles of engineering drawing, Methods and CAD tools to draw the Geometries, Curves and Orthographic projections used to communicate in engineering applications.
CO2: Develop lateral surfaces of solids and draw Isometric views of given objects for engineering communication using principles of engineering drawing and CAD tools.
CO3: Work independently / in groups & communicate effectively in oral and written forms.

I B. Tech. – II Semester
(19BT10531) **PROGRAMMING FOR PROBLEM SOLVING LAB**
(Common to EEE, ECE, EIE & CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: A course on Basic Mathematics
COURSE DESCRIPTION: The course is designed to provide hands on practice on Scratch programming and python programming for problem solving.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Develop scripts using Scratch tool to simulate simple problems.
CO2. Apply Python Constructs and Modules to develop solutions for real-life problems.
CO3. Function effectively as an individual and in team to foster knowledge and creativity.
CO4. Write and present a substantial technical report/ document effectively.

I B. Tech. – II Semester
(19BT20251) **NETWORK ANALYSIS LAB**
(Common to ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: Physics at Intermediate Level.
COURSE DESCRIPTION: Practical investigations on DC, single phase AC circuits, circuit theorems, transient circuits and Two-Port networks.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO4. Analyze, measure, interpret and validate the practical observations by applying the conceptual knowledge of electrical networks.
CO5. Design resonant, transient and Two-port circuits/networks meeting the specified needs using electrical circuits/networks concepts.
CO6. Work independently and in teams to solve problems with effective communication.

II B. Tech. - I Semester
(19BT3BS02) **SPECIAL FUNCTIONS AND COMPLEX ANALYSIS**
(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES: A course on Differential equations and Multivariable calculus
COURSE DESCRIPTION: Special Functions (Beta and Gamma functions); Special Functions (Bessel's and Legendre's equations); Analytic Functions; Conformal Mapping; Complex Integration; Residue Theorem.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Apply the knowledge of special functions to evaluate improper integrals.
CO2. Analyze the behavior of functions through the knowledge of complex analysis and evaluate integrals on complex planes.

II B. Tech. – I Semester
(19BT30402) **ELECTRONIC DEVICES AND CIRCUITS**
(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Courses on Basic Electrical and Electronics Engineering, Differential Equations and Multivariable Calculus and Engineering Physics.
COURSE DESCRIPTION:
Linear and Non-Linear Wave shaping, Biasing and small signal analysis of BJT & FET, Operation and characteristics of Special Purpose electronic devices.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1: Analyze the response of High pass circuits, Low pass RC circuits for various signals and performance of clippers and clampers.
CO2: Design transistor biasing circuits and stabilize the operating point using appropriate techniques.
CO3: Develop mathematical model of BJT for CE, CB and CC configurations using h-parameters.
CO4: Analyze various configurations and biasing techniques for FET.
CO5: Demonstrate the operation and characteristics of special purpose semiconductor devices for real time applications.

II B. Tech – I Semester
(19BT30404) **SWITCHING THEORY AND LOGIC DESIGN**
(Common to ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: A course on Transformation Techniques and Linear algebra.
COURSE DESCRIPTION:
Number system and Boolean algebra; Minimization; Analysis and synthesis of digital circuits; Asynchronous Sequential Logic & Programmable Memories.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1: Demonstrate the knowledge of Boolean Algebra, various number systems and Logic gates to implement Digital Circuits.
CO2: Design subsystem by Analyzing combinational & sequential logic circuits for providing optimal solutions
CO3: Develop Asynchronous sequential logic and programmable memories for societal needs.
CO4: Design various programmable logic arrays using logic gates

II B. Tech – I Semester
(19BT31001) **ELECTRICAL AND ELECTRONIC MEASUREMENTS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES: A course on Network Analysis
COURSE DESCRIPTION: Science of measurement; construction and principle of operation of ammeters, voltmeters, ohmmeters; potentiometers; power meter; power factor meter; energy meter; design of AC and DC bridges; frequency and time measurements.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Select suitable measuring instrument for measurement of voltage, current, resistance, power and energy by applying the fundamental concepts of measuring instruments.
CO2. Calibrate the DC and AC potentiometers and apply the concepts for calibration of ammeter& voltmeter and measurement of resistance & inductance.
CO3. Design AC and DC bridges for measurement of resistance, capacitance and Inductance.
CO4. Demonstrate the digital measuring instrument used for measurement of frequency and time period.

II B. Tech. – I Semester
(19BT31002) **TRANSDUCERS IN INSTRUMENTATION**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Courses on Engineering Physics, Network Analysis
COURSE DESCRIPTION: Introduction to measuring instruments and characteristics of transducers; working principle of resistive, inductive, capacitive, self-generating and other sensors; applications of principles in sensors for measurement of Temperature, Torque, Velocity, Acceleration; Miscellaneous sensors.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Demonstrate knowledge on static and dynamic characteristics of transducers and estimate the errors in the measuring instrument.
CO2. Demonstrate the working principle of various sensors and its applications.
CO3. Analyze different temperature measuring transducers and develop measuring circuits to solve problems.
CO4. Analyze and measure torque, velocity and acceleration by applying different sensing techniques and transducers to solve problems.

II B. Tech. – I Semester
(19BT3HS31) **SOFT SKILLS LAB**
(Common to CE, ME, EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: --
COURSE DESCRIPTION: Body Language; Assertiveness; Goal Setting; Thinking Skills; Team Building; Conflict Management; Technical Report Writing; Résumé Writing; Group Discussions; Interview Skills; Interpersonal Skills; Etiquette.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Demonstrate knowledge of career skills by examining and applying the styles and strategies of Goal Setting, Thinking Skills, and Etiquettes.
CO2. Analyze the limitations and possibilities of favourable situations by applying the skills of Body Language and demonstrate through Assertiveness, and Interpersonal Skills.
CO3. Apply appropriate soft skills by analyzing the problem situations that arise in professional career through demonstrating remedies in Conflict Management.
CO4. Demonstrate ability to function effectively as an individual and as a member in diverse teams examining and applying soft skills in Interviews, Group Discussion and Team Building.
CO5. Apply appropriate speaking and writing techniques in preparing documents and to communicate effectively by examining and demonstrating knowledge in Technical Report Writing and Résumé Writing.

II B.Tech. – I Semester
(19BT30432) **ELECTRONIC DEVICES AND CIRCUITS LAB**
(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: A Course on Basic Electrical and Electronics Engineering.
COURSE DESCRIPTION: Integrator and Differentiator, Clippers and Clampers, Transistor switch, h-parameter calculation, Drain and Transfer characteristics of FET, Frequency response of CE and CS amplifiers, UJT Relaxation oscillator, Characteristics of DIAC and SCR
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Analyze the response of RC circuits for square input.
CO2: Analyze the characteristics of BJT, FET, DIAC and SCR.
CO3: Design BJT and FET Amplifiers and evaluate the performance parameters from the frequency response.
CO4: Develop the basic applications of diode, transistor and UJT for desired specifications.
CO5. Work independently and in teams to solve problems with effective Communication.

II B. Tech. – I Semester
(19BT31031) **INSTRUMENTATION WORKSHOP**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: Courses on Basics of Electrical and Electronic Engineering, Network Analysis
COURSE DESCRIPTION: Test various instrumentation devices; measure the current, voltage and power; solder and de-solder the components; PCB design and electrical wiring diagram for instrument panel.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Demonstrate knowledge on testing of various components using measuring instruments.
CO2. Develop printed circuit boards for simple electronic circuits.
CO3. Calibrate voltmeters and ammeters for specified range.
CO4. Apply simulation tool to develop electronic circuits.
CO5. Design electric circuit wiring loop with IEEE Standards for the given application.
CO6. Work independently and in teams to solve problems with effective communication.

II B. Tech. – I Semester
(19BT31032) **MEASUREMENTS AND TRANSDUCERS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: Basics of Electrical and Electronic Engineering, Network Analysis
COURSE DESCRIPTION: Calibration of measuring instruments; Measurement of voltage, resistance, inductance, capacitance, displacement, pressure, temperature and weight; Design of AC/DC bridges.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Analyze the performance of instruments to measure voltage, current, resistance, inductance, capacitance and energy by calibrating the instruments.
CO2. Analyze the performance of sensors to measure temperature, displacement, acceleration, pressure and weight by calibrating the experimental setup.
CO3. Design and develop the appropriate circuit for measurement of voltage, current, resistance, Inductance and capacitance based on the application.
CO4. Work independently and in teams to solve problems with effective communication.

II B. Tech. – I Semester
(19BT3MC01) **ENVIRONMENTAL SCIENCE**
(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	-	40	2	-	-	-

PRE-REQUISITES: -
COURSE DESCRIPTION: Natural resources; Ecosystems; Biodiversity; Environment pollution and control; Social issues and environment; Human population and environment.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO6 Analyze natural resources to solve complex environmental problems and natural resource management considering society, environment and sustainability.
CO7 Analyze ecosystems and biodiversity to solve complex environmental problems by following environmental ethics considering society, environment and sustainability besides communicating effectively in graphical form.
CO8 Analyze various types of pollution and their control measures to solve environmental problems through appropriate tools and techniques following latest developments considering society, ethics, environment and sustainability.
CO9 Analyze social issues and its impact on environment, environmental acts to solve complex environmental problems considering society, environment and sustainability besides communicating effectively in graphical form.

CO10 Analyze human population and its impact on environment to solve complex environmental problems through team work and using appropriate tools and techniques considering ethics, society, environment and sustainability.

II B. Tech. – II Semester
(19BT50201) **CONTROL SYSTEMS**
(Common to ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Courses on Network Analysis, Transformation Techniques and Linear Algebra
COURSE DESCRIPTION:
Concepts of control system; Transfer function of various physical systems; Time response analysis; Frequency response analysis; Controller design and state space analysis.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Develop the mathematical model for various physical systems to determine the transfer function by applying the fundamental principles.
CO2. Analyze the time response of first and second order system to evaluate steady state errors.
CO3. Analyze stability of a system in time and frequency domains.
CO4. Design compensator for a system using bode plot and root locus technique to meet the desired specification for sustainable operation.
CO5. Apply state space method to model the system, to investigate controllability and observability.

II B. Tech. – II Semester
(19BT30403) **SIGNALS AND SYSTEMS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: A course on Differential Equations and Multivariable Calculus.
COURSE DESCRIPTION: Analysis of signals and systems; Representation of signals using Fourier series and Fourier transforms; Time-Domain and Frequency-Domain aspects of signals and systems; concept of convolution and correlation; Sampling and types of sampling; Laplace transform of signals.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1 Understand the basic operations on signals & sequences and determine the response of LTI systems using convolution.
CO2 Apply Fourier series and transform to analyze spectral characteristics of continuous-time periodic and aperiodic signals.
CO3 Analyze the properties of correlation and convolution to extract signals from noisy signal in various applications.
CO4 Apply Laplace transformation technique to analyze the characteristics of LTI systems.
CO5 Analyze sampling & it's effects and reconstruct signals using interpolation.

II B. Tech. – II Semester
(19BT40402) **ELECTRONIC CIRCUIT ANALYSIS AND DESIGN**
(Common to ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES: A course on Basic Electrical and Electronic Engineering and Electronic Devices & circuits.
COURSE DESCRIPTION: Demonstrate Single Stage Amplifiers; Multi Stage amplifiers; Frequency Response; Negative Feedback Amplifiers; Oscillators; Large Signal Amplifiers; Tuned Amplifiers.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Design multistage amplifiers using voltage divider bias to determine the Gain, Bandwidth, Input and Output Impedances.
CO2. Analyze transistors at high frequencies using Hybrid-π Model to determine the gain and bandwidth.

CO3. Design negative Feedback Amplifiers with high stability and positive feedback amplifiers to generate sustained oscillations.
CO4. Analyze different classes of Power Amplifiers to improve power efficiency and understand frequency response of single stage tuned amplifiers.

II B. Tech. – II Semester
(19BT40403) **LINEAR AND DIGITAL IC APPLICATIONS**
(Common to ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Courses on Network Analysis, Switching Theory and Logic Design & Electronic Devices and Circuits
COURSE DESCRIPTION: Linear & Non-Linear Applications of Op-Amp; IC 555 timer and phase locked loops; Application of PLL; filters; A-D & D-A Converters; CMOS and Bipolar Logic Interfacing; HDL with combinational and sequential logic design.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1: Design different applications of op-amp, timer circuits and analyze PLL for specified applications.
CO2: Design active filters using op-amp for audio processing applications.
CO3: Analyze different analog to digital and digital to analog converters for data acquisition system.
CO4: Analyze Verilog HDL capabilities to model digital circuits.
CO5: Model combinational and sequential ICs using Verilog HDL to synthesize digital circuits.

II B. Tech. – II Semester
(19BT41001) **INDUSTRIAL INSTRUMENTATION**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Courses on Transducers in Instrumentation, Electrical and Electronic Measurements
COURSE DESCRIPTION: Measurement of humidity, Viscosity, Density, Pressure, Level and Flow parameters; Signal Conditioning & Safety Instruments.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Analyze and identify the appropriate transducer to measure density, viscosity, humidity and pressure based on applications.
CO2. Analyze and identify the appropriate transducer to measure level and flow based on applications.
CO3. Design signal conditioning circuit for amplifiers, range extension and conversion of V to I & I to V.
CO4. Demonstrate the safety instruments, requirements for safety and standards.

II B. Tech. – II Semester
(19BT4BS01) **MATERIAL SCIENCE**
(Open Elective-1)
(Common EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Introduction to Material Science and Engineering; Composite Materials; Smart Materials; Nano and Biomimetic Materials; Emerging Materials.
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1. Attain the basic knowledge on composites, smart materials, biomimetic materials and nano materials.
CO2. Demonstrate essential information about structure and properties of various composites used in various engineering applications.
CO3. Understand the basic properties of electro-rheostatic, magneto-rheostatic and shape memory alloys used in device applications.

CO4. Accomplish the basic knowledge in nano materials to familiarize various nano structured device applications.
CO5. Outline the processing and properties of functionally graded materials and identify its applications in various fields.

II B. Tech. - II Semester
(19BT4HS02) **BUSINESS COMMUNICATION AND CAREER SKILLS**
(Open Elective-1)
(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Nature and Scope of Communication; Corporate Communication; Writing Business Messages & Documents; Careers and Résumés; Interviews.
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1. Demonstrate knowledge of professional communication by examining and applying the styles and strategies of business communication in Communication Networks and Writing Messages.
CO2. Analyze the limitations of business communication by applying and demonstrating corporate communication aspects for effective communication through Interpersonal Communication, Informal Communication, and Crisis Management and Communication.
CO3. Apply appropriate writing techniques for effective professional communication in preparing documents by demonstrating and examining Stages in Writing Business Messages, Strategies for Writing the Body of a Letter, and Structuring Résumés.
CO4. Apply appropriate speaking techniques by examining and demonstrating effective communication in distinguished situations through Corporate Communication and Cross Cultural Communication

II B. Tech. - II Semester
(19BT4HS04) **ENTREPRENEURSHIP FOR MICRO, SMALL AND MEDIUM ENTERPRISES**
(Open Elective-1)
(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Introduction to Entrepreneur Development; Idea generation and formation of Business Plan; Micro and Small Enterprises; Institutional Finance and Support to Entrepreneur; Woman Entrepreneurship.
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1. Demonstrate knowledge in concepts, functions, Micro and Macro units, NGOs, Bharatiya Mahila Bank, Women Entrepreneurship, Schemes and Programmes.
CO2. Analyze the idea generation, business plans, business acumen, institutional finance and rural entrepreneurship.

II B. Tech. - II Semester
(19BT4HS06) **GERMAN LANGUAGE**
(Open Elective-1)
(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Oral communication; Basic grammar; Basic writing; Berufsdeutcsch (Business German)
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1. Communicate everyday using familiar words with expressions and simple sentences.

II B. Tech. - II Semester
(19BT4HS08) **INDIAN HISTORY**
(Open Elective-1)
(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: -
CORSE DESCRIPTION: Introduction; Ancient India; Classical and Medieval era; Modern India; India after independence.
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1. Demonstrate contextual knowledge on evolution of ancient and medieval Indian History and acquire awareness on societal and cultural issues.
CO2. Analyze the situations before and after Independence and assess the societal reforms implemented in India after Independence.

II B. Tech. - II Semester
(19BT4HS10) **PERSONALITY DEVELOPMENT**
(Open Elective-1)
(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: A course on Soft Skills Laboratory
COURSE DESCRIPTION: Personalities and Leadership Qualities; Self Esteem and self Development; Attitude; Communication Relationship; Critical Work Skills and Ethics.
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1. Demonstrate knowledge of leadership qualities by examining and applying personality traits through Positive self esteem, Open Communication and Self-Righteousness.
CO2. Analyze the limitations of Attitudes by applying and demonstrating communication traits through Decision Making, Ethics and Self Actualization.
CO3. Apply appropriate Analyzing techniques for comprehending different personalities by examining Positive and Negative Characteristic Traits and demonstrating through Leadership Styles, Mentoring and Behaviour Modification.
CO4. Apply appropriate techniques in Solving Problems by examining and demonstrating Time Management, Stress Management and Anger Management.

II B. Tech. - II Semester
(19BT4HS12) **WOMEN EMPOWERMENT**
(Open Elective-1)
(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Concept & Framework, Status of Women, Women's Right to work, International Women's Decade, and Women Entrepreneurship.
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1. Demonstrate the characteristics of empowered women, their achievements, and frame work for women empowerment, legal laws, and political status of women.
CO2. Apply the knowledge of women rights to address various societal issues and obstacles in different fields including science and technology.
CO3. Understand the significance of participation in policy debates, National conferences and common forums for women's' equality and development.
CO4. Analyze the concept of women entrepreneurship, government schemes and entrepreneurial challenges and opportunities.

II B. Tech. - II Semester
(19BT4HS14) **CONSTITUTION OF INDIA**
(Open Elective-1)
(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Preamble and its Philosophy; Union Legislature; Federalism in India; Judiciary and Public Services; Nation Building
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1. Gain knowledge in Parliamentary proceedings, Election Commission, Public Services and Foreign Policy of India.
CO2. Apply the reasoning informed by the various aspects in the Constitution, its provisions to assess societal issues and the consequent responsibilities relevant to the professional engineering practice.

II B. Tech. - II Semester
(19BT40205) **RELIABILITY AND SAFETY ENGINEERING**
(Open Elective-1)
(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Courses on Differential Equations and Multi-Variable Calculus & Transformation Techniques and Linear Algebra.

COURSE DESCRIPTION:
Fundamentals of reliability engineering; Network modeling and reliability evaluation; Markov chain and Markov processes; basics of safety concepts and safety techniques and applications.

COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1. Develop mathematical model of a network to evaluate the parameters for assessing the reliability of a system.
CO2. Analyze the time dependent/independent characteristics of a repairable system and frequency durations techniques to assess reliability.
CO3. Understand various safety management, policy, and planning strategies for personal and industrial safety.
CO4. Understand various safety and hazard identification techniques and follow appropriate safety measures in industry and society.

II B. Tech. - II Semester
(19BT50107) **ENVIRONMENTAL POLLUTION AND CONTROL**
(Open Elective-1)
(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PREREQUISITES: -
COURSE DESCRIPTION: Fundamentals of air pollution; Dispersion of pollutants; Effects and control of air pollution; Water pollution; Soil pollution and control; Municipal solid waste management.
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO6 Analyze air and noise pollution using appropriate tools and techniques to solve complex environmental issues following relevant standards considering society, environment and sustainability besides communicating effectively in graphical form.

CO7 Analyze air and noise pollution control measures using appropriate tools and techniques to solve complex environmental issues following relevant standards and latest developments considering society, environment and sustainability besides communicating effectively in graphical form.

CO8 Analyze water pollution and its control measures using appropriate tools and techniques to solve complex environmental issues following relevant standards and latest developments considering society, environment and sustainability besides communicating effectively in graphical form.

CO9 Analyze soil pollution and its control measures using appropriate tools and techniques to solve complex environmental issues following relevant standards and latest developments considering society, environment and sustainability besides communicating effectively in graphical form.

CO10 Analyze solid waste and its management measures using appropriate tools and techniques to solve solid waste disposal issues following relevant standards and latest developments considering society, environment and sustainability besides communicating effectively in graphical form.

II B. Tech. - II Semester

(19BT50108) **PLANNING FOR SUSTAINABLE DEVELOPMENT**

(Open Elective-1)

(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PREREQUISITES: -

COURSE DESCRIPTION: Sustainable development; Environmental impact; Sustainable Policies; Governance; Theories and strategies; Media and education for sustainability.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO6 Compare sustainable development theories in national and global context to protect the society and environment.

CO7 Analyze the unforeseen environmental impacts on sustainable development to protect the society and environment.

CO8 Analyze policies and governance for sustainable development considering ethics, economics, society and environment.

CO9 Analyze systems and strategies for sustainable development using appropriate tools and techniques considering ethics, economics, society and environment.

CO10 Analyze the role of media and education in sustainable development using appropriate tools and techniques considering ethics, society and environment besides communicating effectively.

II B. Tech. - II Semester

(19BT50109) **RURAL TECHNOLOGY**

(Open Elective-1)

(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PREREQUISITES: -

COURSE DESCRIPTION: Technology for rural development; Nonconventional energy; Technologies for rural development; Community development; IT in rural development.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO6 Compare various technologies for rural development by solving rural problems through different schemes by considering ethics, society, environment and sustainability.

CO7 Analyze non conventional energy sources using appropriate tools and techniques to solve rural energy problems considering society, environment and sustainability besides communicating effectively in graphical form.

CO8 Select appropriate technologies in different areas of rural development to solve rural issues following latest developments considering society, environment and sustainability.

CO9 Relate water conservation, health, safety and rural employment issues for community development to solve rural problems through appropriate technologies considering ethics, society, environment and sustainability.

CO10 Analyze the impact of IT, public and private partnership on rural development to solve complex rural problems using appropriate tools and techniques considering ethics, society, environment and sustainability.

II B. Tech. - II Semester
(19BT50505) **ETHICAL HACKING**
(Open Elective-1)
(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PREREQUISITES: -
COURSE DESCRIPTION:
Ethical hacking, Network and computer attacks, Foot printing, Social engineering, Port scanning, System hacking, Sniffers, Denial of service, Hacking web servers, Wireless hacking, Cryptography, Network Protection System.
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1. Demonstrate knowledge on the computer security, social engineering and the intent of ethical hacking.
CO2. Select and apply foot printing and port scanning tools to discover vulnerabilities of the computer system.
CO3. Investigate hacking techniques and tools to maintain computer security.
CO4. Analyze cryptosystems and network protection systems for information security and intrusion prevention.

II B. Tech. - II Semester
(19BT51207) **AI IN HEALTHCARE**
(Open Elective-1)
(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PREREQUISITES: -
COURSE DESCRIPTION: Concepts of Artificial Intelligence (AI) in Healthcare; The Present State and Future of AI in Healthcare Specialties; The Role of Major Corporations in AI in Healthcare; Applications of AI in Healthcare.
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO11. Understand the fundamental concepts of AI in Healthcare sector.
CO12. Understand the applications of AI in Healthcare specialties.
CO13. Demonstrate AI applications developed by corporate companies.
CO14. Demonstrate knowledge on future applications of Healthcare using AI.
CO15. Understand the principles of AI applications through case studies.

II B. Tech. - II Semester
(19BT51506) **BIOINFORMATICS**
(Open Elective-1)
(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: A course on Biology for Engineers.
COURSE DESCRIPTION:
Biological Data Acquisition, Databases, Data Processing, Methods of Analysis, Applications of Bio-informatics
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1. Understand basic biological data acquisition in bioinformatics.

CO2. Identify the proper databases for the information search by choosing the biological databases and also submission and retrieval of data from databases.
CO3. Analyze the results of bioinformatics data using text and sequence-based searching techniques.
CO4. Analyze the secondary and tertiary structures of proteins by applying different alignment programs
CO5. Design biological databases and novel drugs by using contextual knowledge on bioinformatics.

II B.Tech. II Semester
(19BT40432) **ELECTRONIC CIRCUIT ANALYSIS AND DESIGN LAB**
(Common to ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PREREQUISITES: A course on Electronic Devices and Circuits
COURSE DESCRIPTION: Design, Simulation and verification of BJT and FET Amplifiers; Multistage Amplifiers; Feedback Amplifiers; Oscillators; Power Amplifiers; Tuned Amplifiers.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1: Design Multistage amplifiers and determine Gain, Bandwidth, Input and Output impedances for specified applications.
CO2: Design negative feedback amplifiers to determine Gain, Bandwidth, Input and Output Impedances
CO3: Design Oscillator circuits to generate sustained oscillations
CO4: Analyze power amplifiers to determine efficiency.
CO5: Work individually and in groups to solve problems with effective communication.

II B. Tech. – II Semester
(19BT40433) **LINEAR AND DIGITAL IC APPLICATIONS LAB**
(Common to ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: A course on Switching Theory and Logic Design
COURSE DESCRIPTION: Design and verification of Op-Amp applications; Timers; ADC and DAC; Simulation and synthesis of combinational and sequential circuits; Simulation tools.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Design various op-amp applications and timers circuits for societal applications.
CO2. Implement filters, timers, D-A converter using Op-amps and digital circuits for specified applications
CO3. Analyze performance parameters for combinational and sequential circuits using any simulation tool.
CO4. Work independently and in teams to solve problems with effective Communication.

II B. Tech. – II Semester
(19BT41031) **INDUSTRIAL INSTRUMENTATION LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: Electrical and Electronic Measurements, Transducers in Instrumentation
COURSE DESCRIPTION: Lab VIEW basics; Circuit design and simulation in Multisim; Measurement of Torque, Temperature, Viscosity, Humidity, Pressure, Level and Flow.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Apply the Lab VIEW functions in programming.
CO2. Simulate electrical circuits using Multisim.
CO3. Analyze the characteristics of measuring instruments by applying the fundamental concepts.
CO4. Develop PC based data logger systems by interfacing hardware devices like my RIO, ELVIS and required sensors for measurement.
CO5. Design and solve problems in the measurement of parameters for required specifications.
CO6. Work independently and in teams to solve problems with effective communication.

II B. Tech. – II Semester
(19BT315AC) **DESIGN THINKING**
(Audit Course)
(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	2	-	-	

PRE-REQUISITES: -
COURSE DESCRIPTION:
Design thinking process, Design thinking phases, empathy tools; Idea generation, visualizing and empathizing; Fidelity for prototypes, prototyping; prototyping for physical products.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1: Analyze design thinking concepts and principles to perform human centered design process for creative problem solving.
CO2: Create empathy maps to visualize user attitudes and behavior for gaining insights of customers.
CO3: Develop innovative products or services for a customer base using ideation techniques.
CO4: Build prototypes for complex problems using gathered user requirements.
CO5: Apply design thinking tools techniques to produce good design and relevant products or services for a specific target market.
CO6: Improve prototype by testing it with a specific set of users for making it sustainable by following ethics.

Program: B.Tech. COMPUTER SCIENCE AND ENGINEERING

I B. Tech. - I Semester
(19BT1BS01) **DIFFERENTIAL EQUATIONS AND MULTIVARIABLE CALCULUS**
(Common to CE, ME, EEE, ECE, EIE, CSE, CSSE, IT, CSE (AI) and CSE (DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES: -
COURSE DESCRIPTION: Ordinary Differential Equations; Partial Differential Equations; Multivariable Calculus (Differentiation); Multivariable Calculus (Integration); Multivariable Calculus (Vector Calculus).
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1: Formulate and solve differential equations by applying knowledge of calculus for engineering problems.
CO2: Demonstrate knowledge in multivariable calculus for evaluating multiple integrals through techniques of integration.
CO3: Identify scalar and vector valued functions and evaluate vector integrals through knowledge of vector integral theorems and techniques.

I B. Tech. - I Semester
(19BT1BS04) **ENGINEERING CHEMISTRY**
(Common to CE, ME, CSE, CSSE and IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Atomic Structure and Bonding Theories; Water Treatment; Electrochemistry and Applications; Corrosion; Instrumental Methods and Applications; Fuel chemistry and Lubricants.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Apply the basic knowledge of quantum mechanical approach to atomic structure and bonding theories to identify shapes of different orbitals and molecules.
CO2. Analyze and solve problems associated with hardness of water, boiler troubles and address the societal, health and safety issues related to quality of water.
CO3. Apply the basic knowledge of corrosion phenomenon to identify solutions for control of corrosion and demonstrate competency in the basic concepts of electrochemical cells.
CO4. Demonstrate the basic knowledge of instrumental methods and their applications in the structural analysis of materials.
CO5. Apply the basic knowledge of fuel chemistry and lubricants to identify the quality of fuels and lubricants.

I B. Tech. – I Semester
(19BT1HS01) **COMMUNICATIVE ENGLISH**
(Common to CE, ME, CSE, CSSE, IT and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Introduction to communication; Active listening; Effective speaking; Reading; Technical writing.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Demonstrate knowledge of English language, examining and applying the aspects of Process of communication, Paralinguistic features, Skimming, Scanning, and Elements of style in writing.
CO2. Analyze the modes and techniques of listening, speaking, reading, writing and apply appropriately to communicate effectively with the engineering community and society.
CO3. Apply reading and writing techniques in preparing documents by examining SQ3R Technique, Writer's Block, and Précis Writing.

CO4. Communicate effectively applying appropriate speaking techniques by examining and applying the communication styles in Conferences, Symposia, Seminars and Persuasive Speaking.

1. **I B. Tech. – I Semester**
(19BT10501) **PROGRAMMING FOR PROBLEM SOLVING**
(Common to CE, ME, CSE, CSSE, IT, CSE (AI) and CSE (DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES: A course on Basic Mathematics
COURSE DESCRIPTION: Introduction to problem solving approach, Introduction to Python programming, control structures, sequences, sets, Dictionaries, Implementation of Data structures using Python, Modular programming, file handling, Data representation and Visualization.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Demonstrate knowledge on Python constructs to solve basic problems.
CO2. Develop and use Python modules to provide solutions to problems.

I B.Tech. - I Semester
(19BT1BS32) **ENGINEERING CHEMISTRY LAB**
(Common to CE, ME, CSE, CSSE and IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: -

COURSE DESCRIPTION: Estimation of hardness, alkalinity, dissolved oxygen of water samples, Iron, Strength of an acid in Pb-acid battery and residual chlorine in drinking water by volumetric methods; Measurement of viscosity of lubricants; Instrumental methods like conductivity meter, potentiometer, P^H meter and colorimeter; Characterization of simple organic compounds by UV-Vis and IR spectroscopy.

COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Apply analytical skills for the quantitative estimation of materials through volumetric methods of analysis and address the societal, health issues related to quality of water.
CO2. Develop analytical skills for the quantitative estimation of materials through instrumental methods of analysis.
CO3. Work independently and in teams to solve problems with effective communication.

I B. Tech.-I Semester
(19BT1HS31) **COMMUNICATIVE ENGLISH LAB**
(Common to CE, ME, CSE, CSSE, IT and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: -
COURSE DESCRIPTION: Phonetics; Vocabulary Building; Grammar; Just a Minute; Elocution/Impromptu; Giving Directions; Role Plays; Public Speaking; Describing Objects; Reading Comprehension; Listening Comprehension; Information Transfer; Letter Writing
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1.Demonstrate knowledge of Phonetics by examining and applying sounds of English in Phonetic Transcription.
CO2.Analyze sentence structures by applying and demonstrating the skills of Vocabulary and Grammar.
CO3.Apply appropriate listening and reading skills by analyzing the context and demonstrate in Listening Comprehension and Reading Comprehension.
CO4.Function effectively as an individual and as a member in diverse teams examining and applying speaking skills in Just A Minute and Role Play.
CO5. Communicate effectively applying appropriate writing and speaking techniques by examining and demonstrating knowledge through Describing Objects, Information Transfer and Letter Writing.

I B. Tech. – I Semester
(19BT10331) **COMPUTER AIDED ENGINEERING DRAWING**
(Common to CE, ME, CSE, CSSE and IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	1	2	2

PRE-REQUISITES: **--**
COURSE DESCRIPTION: Engineering drawing conventions; Importance of engineering drawing; fundamental concepts of sketching; computer aided drafting and different types of projections of geometric entities (both 2D and 3D) through computer aided drafting packages.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO4: Apply the principles of engineering drawing, Methods and CAD tools to draw the Geometries, Curves and Orthographic projections used to communicate in engineering applications.
CO5: Develop lateral surfaces of solids and draw Isometric views of given objects for engineering communication using principles of engineering drawing and CAD tools.
CO6: Work independently / in groups & communicate effectively in oral and written forms.

I B. Tech. – I Semester
(19BT10531) **PROGRAMMING FOR PROBLEM SOLVING LAB**
(Common to CE, ME, CSE, CSSE, IT, CSE (AI) and CSE (DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: A course on Basic Mathematics
COURSE DESCRIPTION: The course is designed to provide hands on practice on Scratch programming and python programming for problem solving.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Develop scripts using Scratch tool to simulate simple problems.
CO2. Apply Python Constructs and Modules to develop solutions for real-life problems.
CO3. Function effectively as an individual and in team to foster knowledge and creativity.
CO4. Write and present a substantial technical report/ document effectively.

I B. Tech. - II semester
(19BT2BS01) **TRANSFORMATION TECHNIQUES AND LINEAR ALGEBRA**
(Common to CE, ME, EEE, ECE, EIE, CSE, CSSE, IT, CSE (AI) and CSE (DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES: -
COURSE DESCRIPTION: Fourier Series and Fourier Transforms; Laplace Transforms; Inverse Laplace Transforms; Linear Algebra-I (Matrices); Linear Algebra-II (Vector Spaces).
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1: Apply the knowledge of Fourier and Laplace transform techniques to solve differential equations.
CO2: Analyze linear transformations and associated matrices to solve engineering problems by applying the knowledge of linear algebra.

I B. Tech. - II Semester
(19BT1BS02) **BIOLOGY FOR ENGINEERS**
(Common to CE, ME, CSE, CSSE, IT and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	2	-	-	2

PRE-REQUISITES: --
COURSE DESCRIPTION: Living Organisms; Proteins, Nucleic acids and Enzymes; Genetics and Molecular Biology; Recombinant DNA technology; Human Physiology and Applied Biology.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Apply the basic knowledge of biology to understand the significance of various biological techniques.

CO2. Identify the role of DNA in the molecular basis of information transfer and understand single gene disorders related to the health perspective.
CO3. Apply the basic knowledge of bio-analytical devices and methods to assess health issues.

I B. Tech. - II Semester
(19BT1BS03) **ENGINEERING PHYSICS**
(Common to CSE, CSSE and IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: **-**
COURSE DESCRIPTION: Wave Optics; Electromagnetic Waves; Fiber Optics; Semiconductors; Dielectrics; Magnetism; Superconductors and Nanomaterials
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Apply the knowledge of light waves to interpret the concepts of Interference, Diffraction and Polarization.
CO2. Demonstrate the concepts of electromagnetic wave propagation in an Optical fibers.
CO3. Apply the basic knowledge of semiconductors to understand the functioning of various optoelectronic devices.
CO4. Demonstrate the basic knowledge of dielectric and magnetic properties to understand the various dielectric polarizations and magnetic materials.
CO5. Understand the concepts of superconductors and nanomaterials to familiarize their applications in relevant fields.

I B. Tech. – II Semester
(19BT10201) **BASIC ELECTRICAL AND ELECTRONICS ENGINEERING**
(Common to CE, ME, CSE, CSSE and IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --
COURSE DESCRIPTION: Principles of Electrical Systems; AC Machines; Semiconductor Devices and Op-Amps.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO13. Analyze electrical circuits by applying the conceptual knowledge of circuit elements.
CO14. Demonstrate knowledge on various generation technologies, protection devices, safety procedures and BEE standards.
CO15. Demonstrate knowledge on characteristics and applications of transformers and AC machines.
CO16. Demonstrate knowledge on characteristics and applications of diode, BJT and Op-amps.

I B. Tech. – II Semester
(19BT20501) **DIGITAL LOGIC DESIGN**
(Common to CSE, CSSE, IT, CSE (AI) and CSE (DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --
COURSE DESCRIPTION: Foundation in design and analysis of the operation of digital gates; Concepts of Boolean algebra, Minimization of logic circuits; Design and implementation of combinational and sequential logic circuits; Analysis and design of flip-flops, registers, and counters and comparison of their behavior and characteristics; Design digital systems using Programmable logic.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Apply knowledge of binary systems, logic gates and Boolean functions to minimize and implement digital circuits.
CO2. Develop digital systems using combinational and sequential logic to solve engineering problems.

I B. Tech. – II Semester
(19BT21501) **OBJECT ORIENTED PROGRAMMING THROUGH JAVA**
(Common to CSE, CSSE, IT, CSE (AI) and CSE (DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES:A course on Programming for Problem Solving
COURSE DESCRIPTION: Introduction to Object Oriented Programming, Classes and Objects; Inheritance, Packages, Interfaces; Exception handling, Multithreading; Collection Classes; Applets, Swings, Event handling.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Demonstrate knowledge on object oriented programming constructs to solve programming problems.
CO2. Analyze object oriented programming features – polymorphism, inheritance, exception handling and multithreading for reusability.
CO3. Develop user interfaces using GUI programming techniques.

I B. Tech. - II Semester
(19BT1BS31**) ENGINEERING PHYSICS LAB**
(Common to CSE, CSSE and IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: --
COURSE DESCRIPTION: Determination of wavelength of light and thickness of a thin film; numerical aperture and acceptance angle of optical fiber; Characteristics of various semiconductor diodes; Resistivity of semiconductor; magnetic field along axial line of a current carrying coil

COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Apply the basic knowledge of light waves and semiconductors to demonstrate the functioning of optoelectronic devices.
CO2. Understand the experimental procedures to calculate the thickness of a thin film, Hall coefficient, Hysteresis losses, and acceptance angle of an optical fiber.
CO3. Determine the experimental values of magnetic field induction, wave length of a light source, energy gap of a semiconductor.
CO4: Apply skills to plot characteristic curves to determine the various parameters of semiconductor diodes.
CO5. Work independently and in teams to solve problems with effective communication.

I B. Tech. – II Semester
(19BT10231) **BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB**
(Common to CE, ME, CSE, CSSE and IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: Physics at intermediate level.
COURSE DESCRIPTION: Practical investigations on Electrical circuits, AC Machines, Semiconductor Devices and Op-Amps.
COURSE OUTCOMES: After successful completion of the course, student will be able to:
CO1. Analyze, measure, interpret and validate the practical observations by applying the fundamental knowledge of electrical circuits, machines and electronic devices.
CO2. Design Op-amp based amplifier, voltage summer and integrator circuits for desired specifications.
CO3. Work independently and in teams to solve problems with effective communication.

I B. Tech. – II Semester
(19BT20331) **ENGINEERING WORKSHOP**
(Common to CE, ME, CSE, CSSE, IT, CSE (AI) and CSE (DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: --
COURSE DESCRIPTION: Knowledge on various workshop hand and power tools; hands on experience in different manufacturing trades such as fitting, carpentry, sheet metal forming and foundry; Demonstration on dismantling and assembling of various two wheeler parts, power tools in machining and metal joining, basics of plumbing and working of 3D printer.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Design and model various basic prototypes in the trade of fitting such as square/half round mating, V- mating and dovetail mating from the given MS work pieces using fitting tools.
CO2. Develop different prototypes in the carpentry trade such as cross lap joint, dovetail / bridle joints and Mortise and Ten on joint using carpentry tools.
CO3. Design and model different prototypes in the sheet metal forming trade such as rectangular tray, square vessel/cylinder, Funnel as per the dimensions using sheet metal forming tools.
CO4. Develop sand mold using single piece pattern and split piece pattern in the foundry trade using foundry tools.
CO5. Demonstrate the knowledge on automobile parts, power tools, plumbing operation, 3D printing technology involved in different engineering applications.
CO6. Work independently / in groups & communicate effectively in oral and written forms.

I B. Tech. – II Semester
(19BT21531) **OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB**
(Common to CSE, CSSE, IT, CSE (AI) and CSE (DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	1	2	2

PRE-REQUISITES: A course on OOPS through Java.
COURSE DESCRIPTION: Hands-on experience on Polymorphism; Inheritance and Interfaces; Exception Handling; Multithreading; Event Handling; Applets, swings.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Apply syntactic constructs of the JAVA programming language to solve logic based problems
CO2. Develop application programs using concepts of object oriented programming.
CO3. Function effectively as an individual and on terms to solve problems with effective communication.
CO4. Write and prepare mini project reports/ documents effectively.

I B. Tech. - II Semester
(19BT1AC01) **SPOKEN ENGLISH**
(Audit Course)
(Common to CE, ME, CSE, CSSE, IT and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	2	-	-	-

PRE-REQUISITES: **-**
COURSE DESCRIPTION: Functional English; Vocabulary Building; Functional Grammar-I; Functional Grammar – II; Communication Skills.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Demonstrate knowledge of grammar and vocabulary in writing effective formal letters and e-mails.
CO2. Communicate effectively by applying appropriate speaking and writing techniques by examining and applying functional English.

II B. Tech. - I Semester
(19BT3BS01) **NUMERICAL METHODS, PROBABILITY AND STATISTICS**
(Common to CE, ME, CSE, CSSE, IT, CSE (AI) and CSE (DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES: --

COURSE DESCRIPTION: Numerical solutions of equations; interpolation; Numerical differentiation and integration; Random variables; Mathematical expectations; Probability distributions; Test of hypothesis.

COURSE OUTCOMES: *After successful completion of the course, students will be able to:*

CO1. Analyse the data and develop skills to solve equations and integrals by applying numerical methods.

CO2. Demonstrate knowledge in statistics and analyse the data for validations by applying statistical testing methods and distributions.

II B. Tech. - I Semester

(19BT31201) **DISCRETE MATHEMATICAL STRUCTURES**

(Common to CSE, CSSE, IT, CSE (AI) and CSE (DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: A course on "Transformation Techniques and Linear Algebra"

COURSE DESCRIPTION: Mathematical logic; Predicates; Relations; Algebra structures; Mathematical reasoning; Recurrence relations; Graphs; Graph theory and its applications.

COURSE OUTCOMES: *After successful completion of the course, students will be able to:*

CO1. Demonstrate knowledge on mathematical logic and predicates.

CO2. Analyze sets using functions and relations.

CO3. Analyze properties of different algebraic structures.

CO4. Apply mathematical reasoning, recurrence relations, permutations and combinations to solve computational problems.

CO5. Apply concepts of graph theory and trees to implement computer applications.

II B. Tech. – I Semester

(19BT31502) **OPERATING SYSTEMS**

(Common to CSE, CSSE, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: A course on "Computer Organization"

COURSE DESCRIPTION: Operating systems operations; Process scheduling; Process synchronization, Deadlocks; Paging and segmentation; Disk scheduling; File concepts, I/O interface; Concepts of protection and security.

COURSE OUTCOMES: *After successful completion of the course, students will be able to:*

CO1. Analyze performance of CPU scheduling algorithms.

CO2. Design solutions for process synchronization problems by using semaphores and monitors.

CO3. Devise solutions for deadlocks using deadlock handling mechanisms.

CO4. Solve memory management problems using page replacement and disk scheduling algorithms.

CO5. Identify efficient file allocation methods for optimal disk utilization.

CO6. Analyze services of I/O subsystems and mechanisms of security & protection.

II B. Tech. – I Semester

(19BT30501) **COMPUTER GRAPHICS**

(Common to CSE, IT, CSE (AI) and CSE (DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: A course on "Transformation Techniques and Linear Algebra"

COURSE DESCRIPTION: Introduction to computer graphics; Output primitives; 2D geometric transformations and viewing; 3D geometric transformations and viewing; 3D object representation; Illumination models; Visible surface detection methods and rendering methods.

COURSE OUTCOMES: *After successful completion of the course, students will be able to:*

CO1. Analyze raster scan and random scan systems by applying knowledge on graphical interactive devices.

CO2. Design algorithms for output primitives such as lines, circles and filled area primitives to fill specified area.

CO3. Analyze the concepts of geometrical transformations, representations, and viewing for 2D and 3D objects.

CO4. Apply appropriate techniques for visible surface detection, illumination models and rendering methods.

II B. Tech. - I Semester

(19BT30502) **COMPUTER ORGANIZATION**

(Common to CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: A course on "Digital Logic Design"

COURSE DESCRIPTION: Basic structure and operation of a digital computer; Organization and functional principles of the arithmetic and logic unit, control unit, memory unit and I/O unit; Concepts of pipelining and parallel processing techniques; Multicore computers.

COURSE OUTCOMES: *After successful completion of the course, students will be able to:*

CO1. Analyze computer arithmetic algorithms for fixed-point and floating-point binary operations.

CO2. Analyze the architecture, organization and functions of the components of a digital computer.

CO3. Design digital circuits for the given functional description of micro operations and memory elements.

CO4. Investigate the performance of memory systems, I/O systems, pipelined processors and multiprocessors to evaluate the cost-performance trade-offs.

II B. Tech. - I Semester

(19BT30503) **DATA STRUCTURES**

(Common to CSE, IT, CSE (AI) and CSE (DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES: A course on "Object Oriented Programming through Java"

COURSE DESCRIPTION: Introduction to data structures; Linked Lists; Types of lists; Stacks; Queues; Trees; Binary search trees; AVL trees; Red-Black Trees; Searching algorithms; Sorting algorithms; Graphs; Minimum spanning trees; Hashing.

COURSE OUTCOMES: *After successful completion of the course, students will be able to:*

CO1. Analyze linear data structures such as arrays, linked lists, stacks, queues for efficient data organization and manipulation.

CO2. Analyze data structures such as trees, graphs, hash tables for efficient search and retrieval of data.

CO3. Select and apply appropriate techniques for searching and sorting problems.

CO4. Apply knowledge to select appropriate data structures for modeling information in data.

II B. Tech. – I Semester

(19BT31532) **OPERATING SYSTEMS LAB**

(Common to CSE, CSSE, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: A course on "Operating Systems"

COURSE DESCRIPTION: Hands-on practice in simulating algorithms for CPU scheduling; Memory management; I/O management; Deadlock handling mechanisms; Implementing synchronization problems.

COURSE OUTCOMES: *After successful completion of the course, students will be able to:*

CO1. Analyze process scheduling problems by applying contextual knowledge on CPU scheduling algorithms.
CO2. Apply memory management and disk scheduling algorithms to attain optimal solutions.
CO3. Devise solution for deadlock avoidance using banker's algorithm.
CO4. Design solutions for process synchronization problems using semaphores and monitors.
CO5. Apply file allocation strategies to achieve optimal disk utilization.
CO6. Work independently and in team to solve problems with effective communication.

II B. Tech. - I Semester
(19BT30531) **DATA STRUCTURES LAB**
(Common to CSE, IT, CSE (AI) and CSE (DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: A course on "Data Structures"

COURSE DESCRIPTION: Hands on practice on implementation of Linked lists; Arrays; Stacks; Queues; Search algorithms; Sorting algorithms; Binary search tree representation and operations; Graph representation and operations; Hashing functions.

COURSE OUTCOMES: *After successful completion of the course, students will be able to:*

CO1. Implement linear data structures such as arrays, linked lists, stacks, queues for efficient data organization and manipulation.
CO2. Develop solutions using data structures such as trees, graphs, heaps, hash tables for efficient search and retrieval of data.
CO3. Select and apply appropriate techniques for searching and sorting problems.
CO4. Work independently and communicate effectively in oral and written forms.

II B. Tech. - I Semester
(19BT30532) **WORKSHOP IN COMPUTER SCIENCE**
(Common to CSE, CSE (AI) and CSE (DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: A course on "Programming for Problem Solving"

COURSE DESCRIPTION: Hands on practice sessions on Google cloud productivity and collaboration tools; AI Tools for speech recognition, language detection and object detection; Introduction to GitHub; Programming in C language.

COURSE OUTCOMES: *After successful completion of the course, students will be able to:*

CO1. Use Google productivity and collaboration tools for effective documentation and data sharing.
CO2. Use AI tools for speech recognition, language detection and object detection.
CO3. Use online code hosting platforms such as GitHub for hosting and collaborating software projects.
CO4. Develop modular programs in C programming language to solve engineering problems.
CO5. Work independently and communicate effectively in oral and written forms.

II B.Tech. - I Semester
(19BT315AC) **DESIGN THINKING**
(Audit Course)
(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	2	-	-	-

PRE-REQUISITES: --

COURSE DESCRIPTION: Design thinking process; Design thinking phases; Empathy tools; Idea generation, visualizing and empathizing; Fidelity for prototypes, Prototyping; Prototyping for physical products.

COURSE OUTCOMES: *After successful completion of the course, students will be able to:*

CO1. Analyze design thinking concepts and principles to perform human centered design process for creative problem solving.
CO2. Create empathy maps to visualize user attitudes and behavior for gaining insights of customers.
CO3. Develop innovative products or services for a customer base using ideation techniques.
CO4. Build prototypes for complex problems using gathered user requirements.
CO5. Apply design thinking tools, techniques to produce good design and relevant products or services for a specific target market.
CO6. Improve prototype by testing it with a specific set of users for making it sustainable by following ethics.

II B. Tech. – II Semester
(19BT31202) **SOFTWARE ENGINEERING**
(Common to CSE, CSSE, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --

COURSE DESCRIPTION: Concepts of software engineering; Software process models; Conventional and agile process models; Software requirements engineering process; System analysis; Architectural design; User interface design and re-engineering; Software testing; Risk and quality management.

COURSE OUTCOMES: *After successful completion of the course, students will be able to:*

CO1. Understand fundamental concepts of software engineering and analyze process models required to develop a software system.
CO2. Analyze software requirements and model requirements for the given scenario.
CO3. Apply design concepts and metrics for software development.
CO4. Apply testing strategies and techniques for quality software.
CO5. Analyze risks in software development life cycle and apply risk strategies to mitigate risks.

II B. Tech. - II Semester
(19BT40501) **COMPUTER NETWORKS**
(Common to CSE and IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: A course on "Operating Systems"

COURSE DESCRIPTION: Introduction to computer networks; Protocols of physical layer, data link layer, medium access control sub layer, network layer, transport layer, application layer.

COURSE OUTCOMES: *After successful completion of the course, students will be able to:*

CO1. Analyze the types of network topologies, layers and protocols.
CO2. Evaluate sub netting and routing algorithms for finding optimal paths in networks.
CO3. Solve problems related to flow control, error control and congestion control in data transmission.
CO4. Assess the impact of wired and wireless networks in the context of network protocols Like DNS, SMTP, HTTP, and FTP.
CO5. Apply ethical principles and standards for developing network-based solutions.

II B. Tech. - II Semester
(19BT40502) **DATABASE MANAGEMENT SYSTEMS**
(Common to CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES: A course on "Data Structures"

COURSE DESCRIPTION: Introduction to database systems; Database design; Relational model; Relational algebra; SQL queries; Constraints and triggers; PL/SQL; Schema refinement and normal forms; Transaction management; Concurrency control; Overview of storage and indexing.

COURSE OUTCOMES: *After successful completion of the course, students will be able to:*

CO1. Apply the concepts of ER-modeling and normalization to design viable data models for a given problem.

CO2. Formulate relational database schemas, apply suitable integrity constraints, for querying databases.

CO3. Use SQL to store, query, and manipulate data in relational databases.

CO4. Develop PL/SQL blocks to centralize database applications for maintainability and reusability.

CO5. Analyze transaction processing, concurrency control and storage methods for database management.

II B. Tech. - II Semester

(19BT40503) **DESIGN AND ANALYSIS OF ALGORITHMS**

(Common to CSE, CSSE, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES:A course on “Data Structures”

COURSE DESCRIPTION: Algorithms and asymptotic notations; Algorithm performance analysis; Amortized analysis; Recurrences; Disjoint sets; Divide and Conquer; Dynamic programming; Greedy algorithms; Back tracking; Branch and bound; NP-hard and NP-complete problems.

COURSE OUTCOMES: *After successful completion of the course, students will be able to:*

CO1. Analyze the complexity of algorithms by applying the knowledge of asymptotic notations and recurrence methods.

CO2. Analyze the given problem and identify appropriate algorithm design technique for problem solving.

CO3. Perceive and apply different algorithm design paradigms to find solutions for computing problems.

CO4. Apply the knowledge of NP-hard and NP-Complete complexity classes to classify decision problems.

II B. Tech. – II Semester

(19BT4HS01) **BANKING AND INSURANCE**

(Open Elective-2)

(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --

COURSE DESCRIPTION: Scope, Objectives and Elements of cost Accounting; Cost Sheet and Tender quotations; Variance Analysis: Material variances, Labor variances; Meaning and Scope, Liquidity, Profitability Ratios: concept of Risk and Return on Investment.

COURSE OUTCOMES: *After successful completion of the course, students will be able to:*

CO1. Demonstrate knowledge in concepts and functions of Banking and Insurance, RBI, bank and customer relationship, types of accounts, types of loans and advances, types of insurance and risk.

CO2. Develop skills to provide solutions in electronic payment system, business models and insurance claims.

II B. Tech. – II Semester

(19BT4HS03) **COST ACCOUNTING AND FINANCIAL MANAGEMENT**

(Open Elective-2)

(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --

COURSE DESCRIPTION: Scope, Objectives and Elements of cost Accounting; Cost Sheet and Tender quotations; Variance Analysis: Material variances, Labor variances; Meaning and Scope, Liquidity, Profitability Ratios: concept of Risk and Return on Investment.

COURSE OUTCOMES: *After successful completion of the course, students will be able to:*

CO1. Demonstrate knowledge in Costing, Material, Labor, Overheads, Cost control, risk and return, security analysis and portfolio management.

CO2. Design solutions for effective investment decisions, cost analysis, tenders, quotations, variance analysis, ratio analysis and capital budgeting techniques.

II B. Tech. - II Semester

(19BT4HS05) **GENDER AND ENVIRONMENT**

(Open Elective-2)

(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --

COURSE DESCRIPTION: Gender and the environment relationship, Gendered Roles in the family & community, Gender and sustainable development, Gender in environmental justice, Gender & environmental security.

COURSE OUTCOMES: *After successful completion of the course, students will be able to:*

CO1. Apply the knowledge of gender & environment connections, key issues and topics within global environmental politics in environmental decision-making.

CO2. Comprehend the concepts of gender and sustainable development through debates, and policy documents.

CO3. Analyze the concept of environmental security and justice by identifying the sources of insecurity.

II B. Tech. – II Semester

(19BT4HS07) **INDIAN ECONOMY**

(Open Elective-2)

(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --

COURSE DESCRIPTION: Introduction; Time Value of Money; Elementary Economic Analysis; Value Analysis/Value Engineering; Economic Planning.

COURSE OUTCOMES: *After successful completion of the course, students will be able to:*

CO1. Understand the basic concepts of economics, economic analysis, economic planning and strate.

CO2. Demonstrate knowledge in capital budgeting, evaluation of engineering projects, depreciation policy and familiarize with the concepts of value analysis vs value engineering.

II B. Tech. – II Semester

(19BT4HS09) **LIFE SKILLS**

(Open Elective-2)

(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --

COURSE DESCRIPTION: Positive attitude; Self-discovery-Interpersonal relationships; Cross-cultural communication; Core thinking-Problem solving and Decision making; Business presentations and Public speaking.

COURSE OUTCOMES: *After successful completion of the course, students will be able to:*

CO1. Gain knowledge in strategies involved in developing positive attitude, process of knowing oneself and managing effective interpersonal relationships.

CO2. Analyse problem solving strategies in Decision Making and SWOT analysis.

CO3. Communicate effectively with Engineering Community and Society by demonstrating presentation skills in professional arena.

II B. Tech. – II Semester
(19BT4HS11) **PROFESSIONAL ETHICS**
(Open Elective-2)
(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --
COURSE DESCRIPTION: Engineering Ethics; Professional Ideals and Virtues; Engineering as Social Experimentation; Responsibilities and Rights; Global Issues.
COURSE OUTCOMES: *After successful completion of the course, students will be able to:*
CO1. Demonstrate knowledge in Engineering Ethics, Responsibilities and Rights.
CO2. Analyze the concepts of Engineering in Social Experimentation and Global Issues.
CO3. Apply the nuances of professional ideals at work place and in social context.

II B. Tech. – II Semester
(19BT4HS13) **INDIAN TRADITION AND CULTURE**
(Open Elective-2)
(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --
COURSE DESCRIPTION: Basic traits of Indian Culture; Humanistic Reforms under Jainism and Buddhism; Culture in the medieval period; Socio Religious reforms in Indian Culture; Reform movements for harmonious relations.
COURSE OUTCOMES: *After successful completion of the course, students will be able to:*
CO1. Demonstrate the knowledge in Vedic culture, cultural aspects of Buddhism, Jainism and cultural conditions in the medieval period.
CO2. Understand the impact of socio religious reforms and movements on Indian tradition and culture to improve harmonious relations within society.

II B. Tech. - II Semester
(19BT40106) **DISASTER MITIGATION AND MANAGEMENT**
(Open Elective-2)
(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --
COURSE DESCRIPTION: Disasters; Earthquakes; Floods; Cyclones; Droughts; Landslides; Disaster management.
COURSE OUTCOMES: *After successful completion of the course, students will be able to:*
CO1. Analyze the vulnerability of an area to natural and man-made disasters/hazards as per the guidelines to solve complex problems using appropriate techniques ensuring safety, environment and sustainability.
CO2. Propose appropriate mitigation strategies for earthquake and tsunami impacts as per code of practice using suitable techniques ensuring safety, environment and sustainability besides communicating effectively in graphical form.
CO3. Analyze the causes and impacts of floods, cyclones and droughts using appropriate tools and techniques and suggest mitigation measures ensuring safety, environment and sustainability besides communicating effectively in graphical form.
CO4. Analyze the causes and impacts of landslides using appropriate tools and techniques and suggest mitigation measures ensuring safety, environment and sustainability.
CO5. Design disaster management strategies to solve pre, during and post disaster problems using appropriate tools and techniques following the relevant guidelines and latest developments

ensuring safety, environment and sustainability besides communicating effectively in graphical form.

II B. Tech. - II Semester
(19BT40107) **SUSTAINABLE ENGINEERING**
(Open Elective-2)
(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --
COURSE DESCRIPTION: Principles of sustainability; Sustainability metrics and assessment tools; Sustainable engineering practices; Sustainable engineering applications; Sustainable urbanization and industrialization.
COURSE OUTCOMES: *After successful completion of the course, students will be able to:*
CO1. Analyze the principles of sustainability to solve complex environmental problems following relevant standards/protocols considering society, health, safety and environment.
CO2. Analyze sustainability metrics and assessment tools to solve complex environmental problems following relevant standards and emerging trends considering society, health, safety, environment and economics besides communicating effectively in graphical form.
CO3. Analyze sustainable engineering practices to solve complex environmental problems using appropriate tools and techniques following relevant standards considering society, health, safety, environment, economics and management besides communicating effectively in graphical form.
CO4. Design sustainable engineering applications to solve complex environmental problems using appropriate tools and techniques following relevant standards considering society, health, safety, environment, economics and management besides communicating effectively in graphical form.
CO5. Analyze sustainable urbanization and industrialization principles to solve complex environmental problems using appropriate tools and techniques following relevant standards considering society, health, safety, environment, economics and management besides communicating effectively in graphical form.

II B. Tech. - II Semester
(19BT40108) **CONTRACT LAWS AND REGULATIONS**
(Open Elective-2)
(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --
COURSE DESCRIPTION: Construction contracts; Tenders; Arbitration; Legal requirements; Labour regulations.
COURSE OUTCOMES: *After successful completion of the course, students will be able to:*
CO1. Develop construction contracts to solve complex contract related problems by following laws and regulations considering project schedule, cost, quality and risk.
CO2. Prepare tenders as per the specifications by following latest developments, laws and regulations to solve complex tender problems considering project schedule, cost, quality and risk.
CO3. Analyze arbitration problems to address the contract disputes following the laws and regulations in the context of society.
CO4. Analyze legal issues pertaining to contracts and tenders considering society.
CO5. Analyze labour regulations to address labour safety issues.

II B. Tech. - II Semester
(19BT40306) **GLOBAL STRATEGY AND TECHNOLOGY**
(Open Elective-2)
(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PREREQUISITES: --

COURSE DESCRIPTION: Introduction to strategic management; Strategic management process; Principles of good strategy; Globalization strategies; Research and Development strategies; Technology Management and Transfer; Elements of Transfer Process; Corporate Governance in the Indian scenario.

COURSE OUTCOMES: *After successful completion of the course, students will be able to:*

CO1. Demonstrate the knowledge on strategic management, its approaches, and tools through ethical decision making.

CO2. Analyze the globalization challenges for scrupulous selection of globalization strategies.

CO3. Apply the R&D strategies and trends to enhance the technological breakthroughs for new products and applications.

CO4. Demonstrate the knowledge on technology management and transfer that strengthen the economy and accelerate the application of technology and resources.

CO5. Analyze the challenges of corporate governance in Indian scenario for the effective development of value oriented organizations.

II B. Tech. - II Semester

(19BT40307) **MANAGEMENT SCIENCE**

(Open Elective-2)

(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --

COURSE DESCRIPTION: Concepts of Management; Concepts Related to ethics and social responsibility; Human Resource Management; Operations Management; Statistical Process Control; Inventory Management; Marketing; Project Management; Project Crashing.

COURSE OUTCOMES: *After successful completion of the course, students will be able to:*

CO1. Demonstrate the concepts of management, its functions and processes used in optimum resource utilization within the context of ethics and social responsibility.

CO2. Apply the concepts of HRM for selection and management of human resources.

CO3. Analyze different operations management problems using quality management tools to produce effective, efficient and adoptable products/services.

CO4. Identify different marketing strategies to maximize enterprise profitability and customer satisfaction within the realistic constraints.

CO5. Develop network models in time-cost tradeoff for effective project management.

II B. Tech. - II Semester

(19BT40504) **CYBER LAWS AND SECURITY**

(Open Elective-2)

(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --

COURSE DESCRIPTION: Evolution of Cyberspace, Jurisdiction in the borderless Cyberspace, E-Contracting, Models of E-Commerce, Modes of Electronic signatures, E-Money, Intellectual Property Rights, Cybercrimes, Privacy and data security.

COURSE OUTCOMES: *After successful completion of the course, students will be able to:*

CO1. Demonstrate knowledge on jurisdiction in cyberspace and the impact of cybercrime to protect privacy on the Internet.

CO2. Analyze the Indian cyber laws on E-Contracting, E-Commerce, E-signatures and E-money to promote digital law enforcement.

CO3. Apply the knowledge of digital rights in Indian context to protect intellectual properties in electronic world.

CO4. Practice ethics and cyber law regulations for leading electronic transactions on the Internet.

II B. Tech. – II Semester

(19BT50208) **INTELLECTUAL PROPERTY RIGHTS**

(Open Elective-2)
(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --
COURSE DESCRIPTION: Introduction to Intellectual Property; Trade Marks; Law of Copy Rights; Law of Patents; Trade Secrets; Unfair Competition; New Development of Intellectual Property.
COURSE OUTCOMES: *After successful completion of the course, students will be able to:*
CO1. Understand the concepts of intellectual property right and new amendments enforced in filling intellectual property right.
CO2. Understand the processes and principles of trade mark registration and apply them for registering trade mark.
CO4. Understand the process and principles of copy rights for registration and judicial consequences for violating laws of copyright/patents.
CO5. Understand the process and principles of trade secrets and judicial consequences for coping trade secrets.

II B. Tech. - II Semester
(19BT50409) **GREEN TECHNOLOGIES**
(Open Elective-2)
(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --
COURSE DESCRIPTION: Principles of green engineering; Green communications; Green energy; Green computing; Green construction; Green manufacturing.
COURSE OUTCOMES: *After successful completion of the course, students will be able to:*
CO1. Analyze energy efficient communication systems such as Telecommunication systems, ICT, Wireless networks and cellular networks by understanding the principles of green communications.
CO2. Understand the impact of conventional energy sources on environment and realize the significance and principles of green energy sources for sustainability.
CO3. Understand the environmental impacts of IT and approaches for Green IT.
CO4. Analyze concepts of sustainable green construction using appropriate tools and techniques following latest developments and considering safety and environment besides communicating effectively in graphical form.
CO5. Demonstrate the environmental impact of traditional manufacturing and explore the need for green manufacturing process promoting sustainability.

II B. Tech. –II Semester
(19BT3HS31) **SOFT SKILLS LAB**
(Common to CSE, CSSE, IT, CSE (AI) and CSE (DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: --
COURSE DESCRIPTION: Body Language; Assertiveness; Goal Setting; Thinking Skills; Team Building; Conflict Management; Technical Report Writing; Résumé Writing; Group Discussions; Interview Skills; Interpersonal Skills; Etiquette.
COURSE OUTCOMES: *After successful completion of the course, students will be able to:*
CO1. Demonstrate knowledge of career skills by examining and applying the styles and strategies of Goal Setting, Thinking Skills, and Etiquettes.
CO2. Analyze the limitations and possibilities of favourable situations by applying the skills of Body Language and demonstrate through Assertiveness, and Interpersonal Skills.
CO3. Apply appropriate soft skills by analyzing the problem situations that arise in professional career through demonstrating remedies in Conflict Management.

CO4. Demonstrate ability to function effectively as an individual and as a member in diverse teams examining and applying soft skills in Interviews, Group Discussion and Team Building.
CO5. Apply appropriate speaking and writing techniques in preparing documents and to communicate effectively by examining and demonstrating knowledge in TechnicalReport Writing and Résumé Writing.

II B.Tech. – II Semester
(19BT31232) **SOFTWARE ENGINEERING LAB**
(Common to CSE, CSSE, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: A course on "Software Engineering"
COURSE DESCRIPTION: Software Development Life Cycle activities-requirements specification, SRS preparation, Modeling case studies–Online Ticket Reservation system; Point of sales.
COURSE OUTCOMES: *After successful completion of the course, students will be able to:*
CO1. Analyse user requirements and prepare software requirements specifications.
CO2. Apply design principles of UML for software design.
CO3. Apply tools for developing UML diagrams.
CO4. Use cost estimation models for project evaluation.
CO5. Work effectively as an individual to design UML models.
CO6. Write and present a substantial technical report/document effectively.

II B. Tech. - II Semester
(19BT40531) **COMPUTER NETWORKS LAB**
(Common to CSE and IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES:A course on "Computer Networks"
COURSE DESCRIPTION: Hands on practice with NS3; Packet Tracer network simulation tools; Simulation of network topologies; ARP protocol; CSMA/CD protocol; Distance Vector/Link State Routing protocols; Transmission errors; Sliding window protocol; TCP; UDP.
COURSE OUTCOMES: *After successful completion of the course, students will be able to:*
CO1. Apply mathematical foundations to solve computational problems in computer networks.
CO2. Select and apply network simulation tools like NS3, Packet Tracer to simulate networking protocols.
CO3. Simulate and analyze network topologies, network protocols to provide efficient networking solutions.
CO4. Work independently and communicate effectively in oral and written forms.

II B. Tech. - II Semester
(19BT40532) **DATABASE MANAGEMENT SYSTEMS LAB**
(Common to CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: A course on "Database Management Systems"
COURSE DESCRIPTION:
Design of an ER Models; Hands-on experience on - DDL, DML commands, Query processing using operators, Joins, Views, Synonyms, Indexes, Single row functions, Group functions and Set functions; PL/SQL programming - Basic programs, Exception handling, Triggers, Functions, Cursors and Stored procedures.
COURSE OUTCOMES: *After successful completion of the course, students will be able to:*
CO1. Analyze the requirements of a given database problem and design viable ER-Models for implementation of database.
CO2. Create database schemas, select and apply suitable integrity constraints for querying databases using SQL interface.

CO3. Develop and interpret PL/SQL blocks to centralize database applications for maintainability and reusability.
CO4. Develop database applications for societal applications such as ticket reservation system, employee payroll system using modern tools.
CO5. Work independently and communicate effectively in oral and written forms.

II B.Tech. - II Semester
(19BT3MC01) **ENVIRONMENTAL SCIENCE**
(Mandatory Course)
(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	-	40	2	-	-	-

PRE-REQUISITES: --
COURSE DESCRIPTION: Natural resources; Ecosystems; Biodiversity; Environment pollution and control; Social issues and environment; Human population and environment.
COURSE OUTCOMES: *After successful completion of the course, students will be able to:*
CO1. Analyze natural resources to solve complex environmental problems and natural resource management considering society, environment and sustainability.
CO2. Analyze ecosystems and biodiversity to solve complex environmental problems by following environmental ethics considering society, environment and sustainability besides communicating effectively in graphical form.
CO3. Analyze various types of pollution and their control measures to solve environmental problems through appropriate tools and techniques following latest developments considering society, ethics, environment and sustainability.
CO4. Analyze social issues and its impact on environment, environmental acts to solve complex environmental problems considering society, environment and sustainability besides communicating effectively in graphical form.
CO5. Analyze human population and its impact on environment to solve complex environmental problems through team work and using appropriate tools and techniques considering ethics, society, environment and sustainability.

Program: B.Tech. INFORMATION TECHNOLOGY

I B. Tech. - I Semester
(19BT1BS01) **DIFFERENTIAL EQUATIONS AND MULTIVARIABLE CALCULUS**
(Common to CE, ME, EEE, ECE, EIE, CSE, CSSE, IT, CSE (AI) and CSE (DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES: -
COURSE DESCRIPTION: Ordinary Differential Equations; Partial Differential Equations; Multivariable Calculus (Differentiation); Multivariable Calculus (Integration); Multivariable Calculus (Vector Calculus).
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1: Formulate and solve differential equations by applying knowledge ofcalculus for engineering problems.
CO2: Demonstrate knowledge in multivariable calculus for evaluating multiple integrals through techniques of integration.
CO3: Identify scalar and vector valued functions and evaluate vector integrals through knowledge of vector integral theorems and techniques.

I B. Tech. - I Semester
(19BT1BS04) **ENGINEERING CHEMISTRY**
(Common to CE, ME, CSE, CSSE and IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Atomic Structure and Bonding Theories; Water Treatment; Electrochemistry and Applications; Corrosion; Instrumental Methods and Applications; Fuel chemistry and Lubricants.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Apply the basic knowledge of quantum mechanical approach to atomic structure and bonding theories to identify shapes of different orbitals and molecules.
CO2. Analyze and solve problems associated with hardness of water, boiler troubles and address the societal, health and safety issues related to quality of water.
CO3. Apply the basic knowledge of corrosion phenomenon to identify solutions for control of corrosion and demonstrate competency in the basic concepts of electrochemical cells.
CO4. Demonstrate the basic knowledge of instrumental methods and their applications in the structural analysis of materials.
CO5. Apply the basic knowledge of fuel chemistry and lubricants to identify the quality of fuels and lubricants.

I B. Tech. – I Semester
(19BT1HS01) **COMMUNICATIVE ENGLISH**
(Common to CE, ME, CSE, CSSE, IT and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Introduction to communication; Active listening; Effective speaking; Reading; Technical writing.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1 .Demonstrate knowledge of English language, examining and applying the aspects of Process of communication, Paralinguistic features, Skimming, Scanning, and Elements of style in writing.

CO2. Analyze the modes and techniques of listening, speaking, reading, writing and apply appropriately to communicate effectively with the engineering community and society.
CO3. Apply reading and writing techniques in preparing documents by examining SQ3R Technique, Writer's Block, and Précis Writing.
CO4. Communicate effectively applying appropriate speaking techniques by examining and applying the communication styles in Conferences, Symposia, Seminars and Persuasive Speaking.

I B. Tech. – I Semester
(19BT10501) **PROGRAMMING FOR PROBLEM SOLVING**
(Common to CE, ME, CSE, CSSE, IT, CSE (AI) and CSE (DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES: A Course on Basic Mathematics
COURSE DESCRIPTION: Introduction to problem solving approach, Introduction to Python programming, control structures, sequences, sets, Dictionaries, Implementation of Data structures using Python, Modular programming, file handling, Data representation and Visualization.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Demonstrate knowledge on Python constructs to solve basic problems.
CO2. Develop and use Python modules to provide solutions to problems.

I B.Tech. - I Semester
(19BT1BS32) **ENGINEERING CHEMISTRY LAB**
(Common to CE, ME, CSE, CSSE and IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: -
COURSE DESCRIPTION: Estimation of hardness, alkalinity, dissolved oxygen of water samples, Iron, Strength of an acid in Pb-acid battery and residual chlorine in drinking water by volumetric methods; Measurement of viscosity of lubricants; Instrumental methods like conductivity meter, potentiometer, P^H meter and colorimeter; Characterization of simple organic compounds by UV-Vis and IR spectroscopy.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Apply analytical skills for the quantitative estimation of materials through volumetric methods of analysis and address the societal, health issues related to quality of water.
CO2. Develop analytical skills for the quantitative estimation of materials through instrumental methods of analysis.
CO3. Work independently and in teams to solve problems with effective communication.

I B. Tech.-I Semester
(19BT1HS31) **COMMUNICATIVE ENGLISH LAB**
(Common to CE, ME, CSE, CSSE, IT and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: -
COURSE DESCRIPTION: Phonetics; Vocabulary Building; Grammar; Just a Minute; Elocution/Impromptu; Giving Directions; Role Plays; Public Speaking; Describing Objects; Reading Comprehension; Listening Comprehension; Information Transfer; Letter Writing
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1.Demonstrate knowledge of Phonetics by examining and applying sounds of English in Phonetic Transcription.
CO2. Analyse sentence structures by applying and demonstrating the skills of Vocabulary and Grammar.
CO3. Apply appropriate listening and reading skills by analyzing the context and demonstrate in Listening Comprehension and Reading Comprehension.
CO4.Function effectively as an individual and as a member in diverse teams examining and applying speaking skills in Just A Minute and Role Play.

CO5. Communicate effectively applying appropriate writing and speaking techniques by examining and demonstrating knowledge through Describing Objects, Information Transfer and Letter Writing.

I B. Tech. – I Semester
(19BT10331) **COMPUTER AIDED ENGINEERING DRAWING**
(Common to CE, ME, CSE, CSSE and IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	1	2	2

PRE-REQUISITES: -
COURSE DESCRIPTION: Engineering drawing conventions; Importance of engineering drawing; fundamental concepts of sketching; computer aided drafting and different types of projections of geometric entities (both 2D and 3D) through computer aided drafting packages.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1: Apply the principles of engineering drawing, Methods and CAD tools to draw the Geometries, Curves and Orthographic projections used to communicate in engineering applications.
CO2: Develop lateral surfaces of solids and draw Isometric views of given objects for engineering communication using principles of engineering drawing and CAD tools.
CO3: Work independently / in groups and communicate effectively in oral and written forms.

I B. Tech. – I Semester
(19BT10531) **PROGRAMMING FOR PROBLEM SOLVING LAB**
(Common to CE, ME, CSE, CSSE, IT, CSE (AI) and CSE (DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: A Course on Programming for Problem Solving
COURSE DESCRIPTION: The course is designed to provide hands on practice on Scratch programming and python programming for problem solving.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Develop scripts using Scratch tool to simulate simple problems.
CO2. Apply Python Constructs and Modules to develop solutions for real-life problems.
CO3. Function effectively as an individual and in team to foster knowledge and creativity.
CO4. Write and present a substantial technical report/ document effectively.

I B. Tech. - II semester
(19BT2BS01) **TRANSFORMATION TECHNIQUES AND LINEAR ALGEBRA**
(Common to CE, ME, EEE, ECE, EIE, CSE, IT, CSE (AI) and CSE (DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES: -
COURSE DESCRIPTION: Fourier Series and Fourier Transforms; Laplace Transforms; Inverse Laplace Transforms; Linear Algebra-I (Matrices); Linear Algebra-II (Vector Spaces).
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1: Apply the knowledge of Fourier and Laplace transform techniques to solve differential equations.
CO2: Analyze linear transformations and associated matrices to solve engineering problems by applying the knowledge of linear algebra.

I B. Tech. - II Semester
(19BT1BS02) **BIOLOGY FOR ENGINEERS**
(Common to CE, ME, CSE, CSSE, IT and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	2	-	-	2

PRE-REQUISITES: -

COURSE DESCRIPTION: Living Organisms; Proteins, Nucleic acids and Enzymes; Genetics and Molecular Biology; Recombinant DNA technology; Human Physiology and Applied Biology.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Apply the basic knowledge of biology to understand the significance of various biological techniques.
CO2. Identify the role of DNA in the molecular basis of information transfer and understand single gene disorders related to the health perspective.
CO3. Apply the basic knowledge of bio-analytical devices and methods to assess health issues.

I B. Tech. - II Semester
(19BT1BS03) **ENGINEERING PHYSICS**
(Common to CSE, CSSE and IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Wave Optics; Electromagnetic Waves; Fiber Optics; Semiconductors; Dielectrics; Magnetism; Superconductors and Nanomaterials
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Apply the knowledge of light waves to interpret the concepts of Interference, Diffraction and Polarization
CO2. Demonstrate the concepts of electromagnetic wave propagation in an Optical fibers.
CO3. Apply the basic knowledge of semiconductors to understand the functioning of various optoelectronic devices.
CO4. Demonstrate the basic knowledge of dielectric and magnetic properties to understand the various dielectric polarizations and magnetic materials.
CO5. Understand the concepts of superconductors and nanomaterials to familiarize their applications in relevant fields.

I B. Tech. – II Semester
(19BT10201) **BASIC ELECTRICAL AND ELECTRONICS ENGINEERING**
(Common to CE, ME, CSE, CSSE and IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES:-
COURSE DESCREPTION: Principles of Electrical Systems; AC Machines; Semiconductor Devices and Op-Amps.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO17. Analyze electrical circuits by applying the conceptual knowledge of circuit elements.
CO18. Demonstrate knowledge on various generation technologies, protection devices, safety procedures and BEE standards.
CO19. Demonstrate knowledge on characteristics and applications of transformers and AC machines.
CO20. Demonstrate knowledge on characteristics and applications of diode, BJT and Op-amps.

I B. Tech. – II Semester
(19BT20501) **DIGITAL LOGIC DESIGN**
(Common to CSE, CSSE, IT, CSE (AI) and CSE (DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Foundation in design and analysis of the operation of digital gates; Concepts of Boolean algebra, Minimization of logic circuits; Design and implementation of combinational and sequential logic circuits; Analysis and design of flip-flops, registers, and counters and comparison of their behavior and characteristics; Design digital systems using Programmable logic.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Apply knowledge of binary systems, logic gates and Boolean functions to minimize and implement digital circuits.
CO2. Develop digital systems using combinational and sequential logic to solve engineering problems.

I B. Tech. – II Semester
(19BT21501) **OBJECT ORIENTED PROGRAMMING THROUGH JAVA**
(Common to CSE, CSSE, IT, CSE (AI) and CSE (DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES:A course on Programming for Problem Solving
COURSE DESCRIPTION: Introduction to Object Oriented Programming, Classes and Objects; Inheritance, Packages, Interfaces; Exception handling, Multithreading; Collection Classes; Applets, Swings, Event handling.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Demonstrate knowledge on object oriented programming constructs to solve programming problems.
CO2. Analyze object oriented programming features – polymorphism, inheritance, exception handling and multithreading for reusability.
CO3. Develop user interfaces using GUI programming techniques.

I B. Tech. - II Semester
(19BT1BS31**) ENGINEERING PHYSICS LAB**
(Common to CSE, CSSE and IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: -
COURSE DESCRIPTION: Determination of wavelength of light and thickness of a thin film; numerical aperture and acceptance angle of optical fiber; Characteristics of various semiconductor diodes; Resistivity of semiconductor; magnetic field along axial line of a current carrying coil
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Apply the basic knowledge of light waves and semiconductors to demonstrate the functioning of optoelectronic devices.
CO2. Understand the experimental procedures to calculate the thickness of a thin film, Hall coefficient, Hysteresis losses, and acceptance angle of an optical fiber.
CO3. Determine the experimental values of magnetic field induction, wave length of a light source, energy gap of a semiconductor.
CO4: Apply skills to plot characteristic curves to determine the various parameters of semiconductor diodes.
CO5. Work independently and in teams to solve problems with effective communication.

I B. Tech. – II Semester
(19BT10231) **BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB**
(Common to CE, ME, CSE, CSSE and IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: Physics at intermediate level.
COURSE DESCREPTION: Practical investigations on Electrical circuits, AC Machines, Semiconductor Devices and Op-Amps.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO7. Analyze, measure, interpret and validate the practical observations by applying the fundamental knowledge of electrical circuits, machines and electronic devices.
CO8. Design Op-amp based amplifier, voltage summer and integrator circuits for desired specifications.
CO9. Work independently and in teams to solve problems with effective communication.

I B. Tech. – II Semester
(19BT20331) **ENGINEERING WORKSHOP**
(Common to CE, ME, CSE, CSSE, IT, CSE (AI) and CSE (DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: -
COURSE DESCRIPTION: Knowledge on various workshop hand and power tools; hands on experience in different manufacturing trades such as fitting, carpentry, sheet metal forming and foundry; Demonstration on dismantling and assembling of various two wheeler parts, power tools in machining and metal joining, basics of plumbing and working of 3D printer.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO7. Design and model various basic prototypes in the trade of fitting such as square/half round mating, V- mating and dovetail mating from the given MS work pieces using fitting tools.
CO8. Develop different prototypes in the carpentry trade such as cross lap joint, dovetail / bridle joints and Mortise and Tenon joint using carpentry tools.
CO9. Design and model different prototypes in the sheet metal forming trade such as rectangular tray, square vessel/cylinder, Funnel as per the dimensions using sheet metal forming tools.
CO10. Develop sand mold using single piece pattern and split piece pattern in the foundry trade using foundry tools.
CO11. Demonstrate the knowledge on automobile parts, power tools, plumbing operation, 3D printing technology involved in different engineering applications.
CO12. Work independently / in groups & communicate effectively in oral and written forms.

I B. Tech. – II Semester
(19BT21531) **OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB**
(Common to CSE, CSSE, IT, CSE (AI) and CSE (DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	1	2	2

PRE-REQUISITES: A course on Object Oriented Programming through Java.
COURSE DESCRIPTION: Hands-on experience on Polymorphism; Inheritance and Interfaces; Exception Handling; Multithreading; Event Handling; Applets, swings.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO5. Apply syntactic constructs of the JAVA programming language to solve logic based problems
CO6. Develop application programs using concepts of object oriented programming.
CO7. Function effectively as an individual and on terms to solve problems with effective communication.
CO8. Write and prepare mini project reports/ documents effectively.

I B. Tech. - II Semester
(19BT1AC01) **SPOKEN ENGLISH**
(Audit Course)
(Common to CE, ME, CSE, CSSE, IT and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	2	-	-	-

PRE-REQUISITES: -
COURSEDESCRIPTION: Functional English; Vocabulary Building; Functional Grammar-I; Functional Grammar – II; Communication Skills.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1: Demonstrate knowledge of grammar and vocabulary in writing effective formal letters and e-mails.
CO2: Communicate effectively by applying appropriate speaking and writing techniques by examining and applying functional English.

II B. Tech. - I Semester
(19BT3BS01) **NUMERICAL METHODS, PROBABILITY AND STATISTICS**
(Common to CE, ME, CSE, CSSE, IT, CSE (AI) and CSE (DS))

Int. Marks	Ext. Marks	Total Marks		L	T	P	C
40	60	100		3	1	-	4

PRE-REQUISITES: -

COURSE DESCRIPTION: Numerical solutions of equations; interpolation; numerical differentiation and integration; random variables; mathematical expectations; probability distributions; test of hypothesis.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Analyse the data and develop skills to solve equations and integrals by applying numerical methods.

CO2. Demonstrate knowledge in statistics and analyse the data for validations by applying statistical testing methods and distributions.

II B. Tech. - I Semester

(19BT30501) **COMPUTER GRAPHICS**

(Common to CSE, IT, CSE (AI) and CSE (DS))

Int. Marks	Ext. Marks	Total Marks		L	T	P	C
40	60	100		3	-	-	3

PRE-REQUISITES: A Course on Transformation Techniques and Linear Algebra.

COURSE DESCRIPTION: Introduction to computer graphics; Output primitives; 2D geometric transformations and viewing; 3D geometric transformations and viewing; 3D object representation; Illumination models; Visible surface detection methods and rendering methods.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Analyze raster scan and random scan systems by applying knowledge on graphical interactive devices.

CO2. Design algorithms for output primitives such as lines, circles and filled area primitives to fill specified area.

CO3. Analyze the concepts of geometrical transformations, representations, and viewing for 2D and 3D objects.

CO4. Apply appropriate techniques for visible surface detection, illumination models and rendering methods.

II B. Tech. - I Semester

(19BT30502) **COMPUTER ORGANIZATION**

(Common to CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks		L	T	P	C
40	60	100		3	-	-	3

PRE-REQUISITES: A Course on Digital Logic Design.

COURSE DESCRIPTION: Basic structure and operation of a digital computer; Organization and functional principles of the arithmetic and logic unit, control unit, memory unit and I/O unit; Concepts of pipelining and parallel processing techniques; Multicore computers.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Analyze computer arithmetic algorithms for fixed-point and floating-point binary operations.

CO2. Analyze the architecture, organization and functions of the components of a digital computer.

CO3. Design digital circuits for the given functional description of microoperations and memory elements.

CO4. Investigate the performance of memory systems, I/O systems, pipelined processors and multiprocessors to evaluate the cost-performance trade-offs.

II B. Tech. - I Semester

(19BT30503) **DATA STRUCTURES**

(Common to CSE, IT, CSE (AI) and CSE (DS))

Int. Marks	Ext. Marks	Total Marks		L	T	P	C
40	60	100		3	1	-	4

PRE-REQUISITES: A Course on Object Oriented Programming through Java.

COURSE DESCRIPTION: Introduction to data structures, Linked Lists, Types of lists, Stacks, Queues, Trees, Binary search trees, AVL trees, Red-Black Trees, Searching algorithms, Sorting algorithms, Graphs, Minimum spanning trees, Hashing.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Analyze linear data structures such as arrays, linked lists, stacks, queues for efficient data organization and manipulation.
CO2. Analyze data structures such as trees, graphs, hash tables for efficient search and retrieval of data.
CO3. Select and apply appropriate techniques for searching and sorting problems.
CO4. Apply knowledge to select appropriate data structures for modeling information in data.

II B. Tech. - I Semester

(19BT31201) **DISCRETE MATHEMATICAL STRUCTURES**

(Common to CSE, CSSE, IT, CSE (AI) and CSE (DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: A Course on Transformation Techniques and Linear Algebra.

COURSE DESCRIPTION: Mathematical Logic; Predicates; Relations; Algebra Structures; Mathematical Reasoning; Recurrence Relations; Graphs; Graph Theory and its Applications.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on mathematical logic and predicates.
CO2. Analyze sets using functions and relations.
CO3. Analyze properties of different algebraic structures.
CO4. Apply mathematical reasoning, recurrence relations, permutations and combinations to solve computational problems.
CO5. Apply concepts of graph theory and trees to implement computer applications.

II B. Tech. – I Semester

(19BT31202) **SOFTWARE ENGINEERING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: -

COURSE DESCRIPTION: Concepts of Software Engineering; Software Process Models; Conventional and Agile Process Models; Software Requirements Engineering Process; System Analysis; Architectural Design; User Interface Design and Re-engineering; Software Testing; Risk and Quality Management.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Understand fundamental concepts of software engineering and analyze process models required to develop a software system.
CO2. Analyze software requirements and model requirements for the given scenario.
CO3. Apply design concepts and metrics for software development.
CO4. Apply testing strategies and techniques for quality software.
CO5. Analyze risks in software development life cycle and apply risk strategies to mitigate risks.

II B. Tech. - I Semester

(19BT30531) **DATA STRUCTURES LAB**

(Common to CSE, IT, CSE (AI) and CSE (DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: A Course on Data Structures.

COURSE DESCRIPTION: Hands on practice on implementation of Linked lists, Arrays, Stacks, Queues, Search algorithms, Sorting algorithms, Binary search tree representation and operations, Graph representation and operations, Hashing functions.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Implement linear data structures such as arrays, linked lists, stacks, queues for efficient data organization and manipulation.
CO2. Develop solutions using data structures such as trees, graphs, heaps, hash tables for efficient search and retrieval of data.
CO3. Select and apply appropriate techniques for searching and sorting problems.
CO4. Work independently and communicate effectively in oral and written forms.

II B. Tech. – I Semester
(19BT31231) **IT WORKSHOP**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITE:-
COURSE DESCRIPTION: Practice sessions on PC Hardware and Microsoft Office; Installation of Microsoft Windows software; Hands on practice in developing and executing simple programs using C Programming constructs such as Conditional statements, Loops, Arrays, Strings, Functions, Structures and Pointers.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Demonstrate knowledge on:
- Identification of functional parts of PC
- Installing Operating System.

CO2. Create documents, spreadsheets and presentations using MS Office.
CO3. Develop ‘C’ programs as per given specifications.
CO4.Work effectively as an individual for implementation of programs.
CO5.Write and present a substantial technical report effectively.

II B. Tech. – I Semester
(19BT31232) **SOFTWARE ENGINEERING LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: A Course on Software Engineering.
COURSE DESCRIPTION: Software Development Life Cycle activities-requirements specification, SRS preparation, Modeling case studies–Online Ticket Reservation system; Point of sales.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Analyse user requirements and prepare software requirements specifications.
CO2. Apply design principles of UML for software design.
CO3. Apply tools for developing UML diagrams.
CO4. Use cost estimation models for project evaluation.
CO5. Work effectively as an individual to design UML models.
CO6. Write and present a substantial technical report/document effectively.

II B. Tech. – I Semester
(19BT315AC) **DESIGN THINKING**
(Audit Course)
(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

L	T	P	C
2	-	-	-

PRE-REQUISITES: -
COURSE DESCRIPTION: Design thinking process, Design thinking phases, empathy tools; Idea generation, visualizing and empathizing; Fidelity for prototypes, prototyping; prototyping for physical products.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Analyze design thinking concepts and principles to perform human centered design process for creative problem solving.
CO2. Create empathy maps to visualize user attitudes and behavior for gaining insights of customers.

CO3. Develop innovative products or services for a customer base using ideation techniques.
CO4. Build prototypes for complex problems using gathered user requirements.
CO5. Apply design thinking tools techniques to produce good design and relevant products or services for a specific target market.
CO6. Improve prototype by testing it with a specific set of users for making it sustainable by following ethics.

II B. Tech. - II Semester
(19BT40501) **COMPUTER NETWORKS**
(Common to CSE and IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: A course on Operating Systems.
COURSE DESCRIPTION: Introduction to computer networks, Protocols of physical layer, data link layer, medium access control sub layer, network layer, transport layer, application layer.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Analyze the types of network topologies, layers and protocols.
CO2. Evaluate subnetting and routing algorithms for finding optimal paths in networks.
CO3. Solve problems related to flow control, error control and congestion control in data transmission.
CO4. Assess the impact of wired and wireless networks in the context of network protocols Like DNS, SMTP, HTTP, and FTP.
CO5. Apply ethical principles and standards for developing network-based solutions.

II B. Tech. - II Semester
(19BT40502) **DATABASE MANAGEMENT SYSTEMS**
(Common to CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES:A Course on Data Structures.
COURSE DESCRIPTION: Introduction to database systems, Database design, Relational model, Relational algebra, SQL queries, Constraints and triggers, PL/SQL, Schema refinement and normal Forms, Transaction management, Concurrency control, Overview of storage and indexing.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Apply the concepts of ER-modeling and normalization to design viable data models for a given problem.
CO2. Formulate relational database schemas, apply suitable integrity constraints, for querying databases.
CO3. Use SQL to store, query, and manipulate data in relational databases.
CO4. Develop PL/SQL blocks to centralize database applications for maintainability and reusability.
CO5. Analyze transaction processing, concurrency control and storage methods for database management.

II B. Tech. – II Semester
(19BT31502) **OPERATING SYSTEMS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES:A Course on Computer Organization.
COURSE DESCRIPTION: Operating Systems Operations; Process Scheduling; Process Synchronization, Deadlocks; Paging and Segmentation, Disk Scheduling; File Concepts, I/O Interface; Concepts of Protection and Security.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Analyze performance of CPU scheduling algorithms.
CO2. Design solutions for process synchronization problems by using semaphores and monitors.
CO3. Devise solutions for deadlocks using deadlock handling mechanisms.
CO4. Solve memory management problems using page replacement and disk scheduling algorithms.

CO5. Identify efficient file allocation methods for optimal disk utilization.
CO6. Analyze services of I/O subsystems and mechanisms of security and protection.

II B. Tech. –II Semester
(19BT41501) **THEORY OF COMPUTATION**
(Common to CSSE and IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: A Course on Discrete Mathematical Structures.
COURSE DESCRIPTION: Finite automata; Nondeterministic Finite automata; Regular expressions; Applications of the pumping lemma; Context-Free Grammars; Normal forms for context-free grammars; pushdown automata; Chomsky hierarchy of languages; Turing machines.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1: Design finite state machines to recognize formal languages.
CO2: Analyze formal languages using automata.
CO3: Identify different types of grammars in formal languages.
CO4: Construct context free grammars for context free languages
CO5: Develop Turing machine for different computational problems.
CO6: Validate formal languages of automata by applying closure properties.

II B. Tech. – II Semester
(19BT4HS01) **BANKING AND INSURANCE**
(Open Elective-2)
(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --
COURSE DESCRIPTION: Scope, Objectives and Elements of cost Accounting; Cost Sheet and Tender quotations; Variance Analysis: Material variances, Labor variances; Meaning and Scope, Liquidity, Profitability Ratios: concept of Risk and Return on Investment.
COURSE OUTCOMES: *After successful completion of the course, students will be able to:*
CO1. Demonstrate knowledge in concepts and functions of Banking and Insurance, RBI, bank and customer relationship, types of accounts, types of loans and advances, types of insurance and risk.
CO2. Develop skills to provide solutions in electronic payment system, business models and insurance claims.

II B. Tech. – II Semester
(19BT4HS03) **COST ACCOUNTING AND FINANCIAL MANAGEMENT**
(Open Elective-2)
(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --
COURSE DESCRIPTION: Scope, Objectives and Elements of cost Accounting; Cost Sheet and Tender quotations; Variance Analysis: Material variances, Labor variances; Meaning and Scope, Liquidity, Profitability Ratios: concept of Risk and Return on Investment.
COURSE OUTCOMES: *After successful completion of the course, students will be able to:*
CO1. Demonstrate knowledge in Costing, Material, Labor, Overheads, Cost control, risk and return, security analysis and portfolio management.
CO2. Design solutions for effective investment decisions, cost analysis, tenders, quotations, variance analysis, ratio analysis and capital budgeting techniques.

II B. Tech. - II Semester
(19BT4HS05) **GENDER AND ENVIRONMENT**
(Open Elective-2)
(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --
COURSE DESCRIPTION: Gender and the environment relationship, Gendered Roles in the family & community, Gender and sustainable development, Gender in environmental justice, Gender & environmental security.
COURSE OUTCOMES: *After successful completion of the course, students will be able to:*
CO1. Apply the knowledge of gender & environment connections, key issues and topics within global environmental politics in environmental decision-making.
CO2. Comprehend the concepts of gender and sustainable development through debates, and policy documents.
CO3. Analyze the concept of environmental security and justice by identifying the sources of insecurity.

II B. Tech. – II Semester
(19BT4HS07) **INDIAN ECONOMY**
(Open Elective-2)
(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --
COURSE DESCRIPTION: Introduction; Time Value of Money; Elementary Economic Analysis; Value Analysis/Value Engineering; Economic Planning.
COURSE OUTCOMES: *After successful completion of the course, students will be able to:*
CO1. Understand the basic concepts of economics, economic analysis, economic planning and strate.
CO2. Demonstrate knowledge in capital budgeting, evaluation of engineering projects, depreciation policy and familiarize with the concepts of value analysis vs value engineering.

II B. Tech. – II Semester
(19BT4HS09) **LIFE SKILLS**
(Open Elective-2)
(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --
COURSE DESCRIPTION: Positive attitude; Self-discovery-Interpersonal relationships; Cross-cultural communication; Core thinking-Problem solving and Decision making; Business presentations and Public speaking.
COURSE OUTCOMES: *After successful completion of the course, students will be able to:*
CO1. Gain knowledge in strategies involved in developing positive attitude, process of knowing oneself and managing effective interpersonal relationships.
CO2. Analyse problem solving strategies in Decision Making and SWOT analysis.
CO3. Communicate effectively with Engineering Community and Society by demonstrating presentation skills in professional arena.

II B. Tech. – II Semester
(19BT4HS11) **PROFESSIONAL ETHICS**
(Open Elective-2)
(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --

COURSE DESCRIPTION: Engineering Ethics; Professional Ideals and Virtues; Engineering as Social Experimentation; Responsibilities and Rights; Global Issues.

COURSE OUTCOMES: *After successful completion of the course, students will be able to:*

CO1. Demonstrate knowledge in Engineering Ethics, Responsibilities and Rights.

CO2. Analyze the concepts of Engineering in Social Experimentation and Global Issues.

CO3. Apply the nuances of professional ideals at work place and in social context.

II B. Tech. – II Semester

(19BT4HS13) **INDIAN TRADITION AND CULTURE**

(Open Elective-2)

(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --

COURSE DESCRIPTION: Basic traits of Indian Culture; Humanistic Reforms under Jainism and Buddhism; Culture in the medieval period; Socio Religious reforms in Indian Culture; Reform movements for harmonious relations.

COURSE OUTCOMES: *After successful completion of the course, students will be able to:*

CO1. Demonstrate the knowledge in Vedic culture, cultural aspects of Buddhism, Jainism and cultural conditions in the medieval period.

CO2. Understand the impact of socio religious reforms and movements on Indian tradition and culture to improve harmonious relations within society.

II B. Tech. - II Semester

(19BT40106) **DISASTER MITIGATION AND MANAGEMENT**

(Open Elective-2)

(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --

COURSE DESCRIPTION: Disasters; Earthquakes; Floods; Cyclones; Droughts; Landslides; Disaster management.

COURSE OUTCOMES: *After successful completion of the course, students will be able to:*

CO1. Analyze the vulnerability of an area to natural and man-made disasters/hazards as per the guidelines to solve complex problems using appropriate techniques ensuring safety, environment and sustainability.

CO2. Propose appropriate mitigation strategies for earthquake and tsunami impacts as per code of practice using suitable techniques ensuring safety, environment and sustainability besides communicating effectively in graphical form.

CO3. Analyze the causes and impacts of floods, cyclones and droughts using appropriate tools and techniques and suggest mitigation measures ensuring safety, environment and sustainability besides communicating effectively in graphical form.

CO4. Analyze the causes and impacts of landslides using appropriate tools and techniques and suggest mitigation measures ensuring safety, environment and sustainability.

CO5. Design disaster management strategies to solve pre, during and post disaster problems using appropriate tools and techniques following the relevant guidelines and latest developments ensuring safety, environment and sustainability besides communicating effectively in graphical form.

II B. Tech. - II Semester

(19BT40107) **SUSTAINABLE ENGINEERING**

(Open Elective-2)

(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --

COURSE DESCRIPTION: Principles of sustainability; Sustainability metrics and assessment tools; Sustainable engineering practices; Sustainable engineering applications; Sustainable urbanization and industrialization.

COURSE OUTCOMES: *After successful completion of the course, students will be able to:*

CO1. Analyze the principles of sustainability to solve complex environmental problems following relevant standards/protocols considering society, health, safety and environment.

CO2. Analyze sustainability metrics and assessment tools to solve complex environmental problems following relevant standards and emerging trends considering society, health, safety, environment and economics besides communicating effectively in graphical form.

CO3. Analyze sustainable engineering practices to solve complex environmental problems using appropriate tools and techniques following relevant standards considering society, health, safety, environment, economics and management besides communicating effectively in graphical form.

CO4. Design sustainable engineering applications to solve complex environmental problems using appropriate tools and techniques following relevant standards considering society, health, safety, environment, economics and management besides communicating effectively in graphical form.

CO5. Analyze sustainable urbanization and industrialization principles to solve complex environmental problems using appropriate tools and techniques following relevant standards considering society, health, safety, environment, economics and management besides communicating effectively in graphical form.

II B. Tech. - II Semester

(19BT40108) **CONTRACT LAWS AND REGULATIONS**

(Open Elective-2)

(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --

COURSE DESCRIPTION: Construction contracts; Tenders; Arbitration; Legal requirements; Labour regulations.

COURSE OUTCOMES: *After successful completion of the course, students will be able to:*

CO1. Develop construction contracts to solve complex contract related problems by following laws and regulations considering project schedule, cost, quality and risk.

CO2. Prepare tenders as per the specifications by following latest developments, laws and regulations to solve complex tender problems considering project schedule, cost, quality and risk.

CO3. Analyze arbitration problems to address the contract disputes following the laws and regulations in the context of society.

CO4. Analyze legal issues pertaining to contracts and tenders considering society.

CO5. Analyze labour regulations to address labour safety issues.

II B. Tech. - II Semester

(19BT40306) **GLOBAL STRATEGY AND TECHNOLOGY**

(Open Elective-2)

(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PREREQUISITES: --

COURSE DESCRIPTION: Introduction to strategic management; Strategic management process; Principles of good strategy; Globalization strategies; Research and Development strategies; Technology Management and Transfer; Elements of Transfer Process; Corporate Governance in the Indian scenario.

COURSE OUTCOMES: *After successful completion of the course, students will be able to:*

CO1. Demonstrate the knowledge on strategic management, its approaches, and tools through ethical decision making.

CO2. Analyze the globalization challenges for scrupulous selection of globalization strategies.

CO3. Apply the R&D strategies and trends to enhance the technological breakthroughs for new products and applications.
CO4. Demonstrate the knowledge on technology management and transfer that strengthen the economy and accelerate the application of technology and resources.
CO5. Analyze the challenges of corporate governance in Indian scenario for the effective development of value oriented organizations.

II B. Tech. - II Semester
(19BT40307) **MANAGEMENT SCIENCE**
(Open Elective-2)
(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --
COURSE DESCRIPTION: Concepts of Management; Concepts Related to ethics and social responsibility; Human Resource Management; Operations Management; Statistical Process Control; Inventory Management; Marketing; Project Management; Project Crashing.
COURSE OUTCOMES: *After successful completion of the course, students will be able to:*
CO1. Demonstrate the concepts of management, its functions and processes used in optimum resource utilization within the context of ethics and social responsibility.
CO2. Apply the concepts of HRM for selection and management of human resources.
CO3. Analyze different operations management problems using quality management tools to produce effective, efficient and adoptable products/services.
CO4. Identify different marketing strategies to maximize enterprise profitability and customer satisfaction within the realistic constraints.
CO5. Develop network models in time-cost tradeoff for effective project management.

II B. Tech. - II Semester
(19BT40504) **CYBER LAWS AND SECURITY**
(Open Elective-2)
(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --
COURSE DESCRIPTION: Evolution of Cyberspace, Jurisdiction in the borderless Cyberspace, E-Contracting, Models of E-Commerce, Modes of Electronic signatures, E-Money, Intellectual Property Rights, Cybercrimes, Privacy and data security.
COURSE OUTCOMES: *After successful completion of the course, students will be able to:*
CO1. Demonstrate knowledge on jurisdiction in cyberspace and the impact of cybercrime to protect privacy on the Internet.
CO2. Analyze the Indian cyber laws on E-Contracting, E-Commerce, E-signatures and E-money to promote digital law enforcement.
CO3. Apply the knowledge of digital rights in Indian context to protect intellectual properties in electronic world.
CO4. Practice ethics and cyber law regulations for leading electronic transactions on the Internet.

II B. Tech. – II Semester
(19BT50208) **INTELLECTUAL PROPERTY RIGHTS**
(Open Elective-2)
(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --
COURSE DESCRIPTION: Introduction to Intellectual Property; Trade Marks; Law of Copy Rights; Law of Patents; Trade Secrets; Unfair Competition; New Development of Intellectual Property.

COURSE OUTCOMES: *After successful completion of the course, students will be able to:*

CO1. Understand the concepts of intellectual property right and new amendments enforced in filling intellectual property right.

CO2. Understand the processes and principles of trade mark registration and apply them for registering trade mark.

CO4. Understand the process and principles of copy rights for registration and judicial consequences for violating laws of copyright/patents.

CO5. Understand the process and principles of trade secrets and judicial consequences for coping trade secrets.

II B. Tech. - II Semester

(19BT50409) **GREEN TECHNOLOGIES**

(Open Elective-2)

(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --

COURSE DESCRIPTION: Principles of green engineering; Green communications; Green energy; Green computing; Green construction; Green manufacturing.

COURSE OUTCOMES: *After successful completion of the course, students will be able to:*

CO1. Analyze energy efficient communication systems such as Telecommunication systems, ICT, Wireless networks and cellular networks by understanding the principles of green communications.

CO2. Understand the impact of conventional energy sources on environment and realize the significance and principles of green energy sources for sustainability.

CO3. Understand the environmental impacts of IT and approaches for Green IT.

CO4. Analyze concepts of sustainable green construction using appropriate tools and techniques following latest developments and considering safety and environment besides communicating effectively in graphical form.

CO5. Demonstrate the environmental impact of traditional manufacturing and explore the need for green manufacturing process promoting sustainability.

II B. Tech. - II Semester

(19BT3HS31) **SOFT SKILLS LAB**

(Common to CSE, CSSE, IT, CSE (AI) and CSE (DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: -

COURSE DESCRIPTION: Body Language; Assertiveness; Goal Setting; Thinking Skills; Team Building; Conflict Management; Technical Report Writing; Résumé Writing; Group Discussions; Interview Skills; Interpersonal Skills; Etiquette.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Demonstrate knowledge of career skills by examining and applying the styles and strategies of Goal Setting, Thinking Skills, and Etiquettes.

CO2. Analyze the limitations and possibilities of favourable situations by applying the skills of Body Language and demonstrate through Assertiveness, and Interpersonal Skills.

CO3. Apply appropriate soft skills by analyzing the problem situations that arise in professional career through demonstrating remedies in Conflict Management.

CO4. Demonstrate ability to function effectively as an individual and as a member in diverse teams examining and applying soft skills in Interviews, Group Discussion and Team Building.

CO5. Apply appropriate speaking and writing techniques in preparing documents and to communicate effectively by examining and demonstrating knowledge in Technical Report Writing and Résumé Writing.

II B. Tech. - II Semester

(19BT40531) **COMPUTER NETWORKS LAB**

(Common to CSE and IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: A Course on Computer Networks.
COURSE DESCRIPTION: Hands on practice with NS3, Packet Tracer network simulation tools, Simulation of network topologies, ARP protocol, CSMA/CD protocol, Distance Vector/Link State Routing protocols, Transmission errors, Sliding window protocol, TCP, UDP.
COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Apply mathematical foundations to solve computational problems in computer networks.
CO2. Select and apply network simulation tools like NS3, Packet Tracer to simulate networking protocols.
CO3. Simulate and analyze network topologies, network protocols to provide efficient networking solutions.
CO4. Work independently and communicate effectively in oral and written forms.

II B. Tech. - II Semester
(19BT40532) **DATABASE MANAGEMENT SYSTEMS LAB**
(Common to CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: A Course on Database Management Systems.
COURSE DESCRIPTION: Design of an ER Models, Hands-on experience on - DDL, DML commands, Query processing using operators, Joins, Views, Synonyms, Indexes, Single row functions, Group functions and Set functions; PL/SQL programming - Basic programs, Exception handling, Triggers, Functions, Cursors and Stored procedures.
COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Analyze the requirements of a given database problem and design viable ER-Models for implementation of database.
CO2. Create database schemas, select and apply suitable integrity constraints for querying databases using SQL interface.
CO3. Develop and interpret PL/SQL blocks to centralize database applications for maintainability and reusability.
CO4. Develop database applications for societal applications such as ticket reservation system, employee payroll system using modern tools.
CO5. Work independently and communicate effectively in oral and written forms.

II B. Tech. – II Semester
(19BT31532) **OPERATING SYSTEMS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: A Course on Operating Systems.
COURSE DESCRIPTION: Hands-on practice in simulating algorithms for CPU Scheduling, Memory Management, I/O Management, Deadlock Handling mechanisms; Implementing Synchronization problems.
COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Analyze process scheduling problems by applying contextual knowledge on CPU scheduling algorithms.
CO2. Apply memory management and disk scheduling algorithms to attain optimal solutions.
CO3. Devise solution for deadlock avoidance using banker's algorithm.
CO4. Design solutions for process synchronization problems using semaphores and monitors.
CO5. Apply file allocation strategies to achieve optimal disk utilization.
CO6. Work independently and in team to solve problems with effective communication

II B.Tech. - II Semester
(19BT3MC01) **ENVIRONMENTAL SCIENCE**
(Mandatory Course)
(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks		L	T	P	C
40	-	40		2	-	-	-

PRE-REQUISITES: A Course on Engineering Chemistry.
COURSE DESCRIPTION: Natural resources; Ecosystems; Biodiversity; Environment pollution and control; Social issues and environment; Human population and environment.
COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1 Analyze natural resources to solve complex environmental problems and natural resource management considering society, environment and sustainability.

CO2 Analyze ecosystems and biodiversity to solve complex environmental problems by following environmental ethics considering society, environment and sustainability besides communicating effectively in graphical form.

CO3 Analyze various types of pollution and their control measures to solve environmental problems through appropriate tools and techniques following latest developments considering society, ethics, environment and sustainability.

CO4 Analyze social issues and its impact on environment, environmental acts to solve complex environmental problems considering society, environment and sustainability besides communicating effectively in graphical form.

CO5 Analyze human population and its impact on environment to solve complex environmental problems through team work and using appropriate tools and techniques considering ethics, society, environment and sustainability.

Program: B.Tech. COMPUTER SCIENCE AND SYSTEMS ENGINEERING

I B. Tech. - I Semester
(19BT1BS01) **DIFFERENTIAL EQUATIONS AND MULTIVARIABLE CALCULUS**
(Common to CE, ME, EEE, ECE, EIE, CSE, CSSE, IT, CSE (AI) and CSE(DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES: -
COURSE DESCRIPTION: Ordinary Differential Equations; Partial Differential Equations; Multivariable Calculus (Differentiation); Multivariable Calculus (Integration); Multivariable Calculus (Vector Calculus).
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1: Formulate and solve differential equations by applying knowledge of calculus for engineering problems.
CO2: Demonstrate knowledge in multivariable calculus for evaluating multiple integrals through techniques of integration.
CO3: Identify scalar and vector valued functions and evaluate vector integrals through knowledge of vector integral theorems and techniques.

I B. Tech. - I Semester
(19BT1BS04) **ENGINEERING CHEMISTRY**
(Common to CE, ME, CSE, CSSE and IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Atomic Structure and Bonding Theories; Water Treatment; Electrochemistry and Applications; Corrosion; Instrumental Methods and Applications; Fuel chemistry and Lubricants.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1: Apply the basic knowledge of quantum mechanical approach to atomic structure and bonding theories to identify shapes of different orbitals and molecules.
CO2: Analyze and solve problems associated with hardness of water, boiler troubles and address the societal, health and safety issues related to quality of water.
CO3: Apply the basic knowledge of corrosion phenomenon to identify solutions for control of corrosion and demonstrate competency in the basic concepts of electrochemical cells.
CO4: Demonstrate the basic knowledge of instrumental methods and their applications in the structural analysis of materials.
CO5: Apply the basic knowledge of fuel chemistry and lubricants to identify the quality of fuels and lubricants.

I B. Tech. – I Semester
(19BT1HS01) **COMMUNICATIVE ENGLISH**
(Common to CE, ME, CSE, CSSE, IT and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Introduction to communication; Active listening; Effective speaking; Reading; Technical writing.
COURSE OUTCOMES: After successful completion of this course, students will be able to:
CO1: Demonstrate knowledge of English language, examining and applying the aspects of Process of communication, Paralinguistic features, Skimming, Scanning, and Elements of style in writing.
CO2: Analyze the modes and techniques of listening, speaking, reading, writing and apply appropriately to communicate effectively with the engineering community and society.
CO3: Apply reading and writing techniques in preparing documents by examining SQ3R Technique, Writer’s Block, and Précis Writing.
CO4: Communicate effectively applying appropriate speaking techniques by examining and applying the communication styles in Conferences, Symposia, Seminars and Persuasive Speaking.

I B. Tech. – I Semester
(19BT10501) **PROGRAMMING FOR PROBLEM SOLVING**
(Common to CE, ME, CSE, CSSE, IT, CSE (AI) and CSE(DS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES: A course on Basic Mathematics
COURSE DESCRIPTION: Introduction to problem solving approach, Introduction to Python programming, control structures, sequences, sets, Dictionaries, Implementation of Data structures using Python, Modular programming, file handling, Data representation and Visualization.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1: Demonstrate knowledge on Python constructs to solve basic problems.
CO2: Develop and use Python modules to provide solutions to problems.

I B. Tech. - I Semester
(19BT1BS32) **ENGINEERING CHEMISTRY LAB**
(Common to CE, ME, CSE, CSSE and IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: -
COURSE DESCRIPTION: Estimation of hardness, alkalinity, dissolved oxygen of water samples, Iron, Strength of an acid in Pb-acid battery and residual chlorine in drinking water by volumetric methods; Measurement of viscosity of lubricants; Instrumental methods like conductivity meter, potentiometer, P^H meter and colorimeter; Characterization of simple organic compounds by UV-Vis and IR spectroscopy.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1: Apply analytical skills for the quantitative estimation of materials through volumetric methods of analysis and address the societal, health issues related to quality of water.
CO2: Develop analytical skills for the quantitative estimation of materials through instrumental methods of analysis.
CO3: Work independently and in teams to solve problems with effective communication.

I B. Tech.-I Semester
(19BT1HS31) **COMMUNICATIVE ENGLISH LAB**
(Common to CE, ME, CSE, CSSE, IT and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: -
COURSE DESCRIPTION: Phonetics; Vocabulary Building; Grammar; Just a Minute; Elocution/Impromptu; Giving Directions; Role Plays; Public Speaking; Describing Objects; Reading Comprehension; Listening Comprehension; Information Transfer; Letter Writing
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1: Demonstrate knowledge of Phonetics by examining and applying sounds of English in Phonetic Transcription.
CO2: Analyze sentence structures by applying and demonstrating the skills of Vocabulary and Grammar.
CO3: Apply appropriate listening and reading skills by analyzing the context and demonstrate in Listening Comprehension and Reading Comprehension.
CO4: Function effectively as an individual and as a member in diverse teams examining and applying speaking skills in Just A Minute and Role Play.
CO5: Communicate effectively applying appropriate writing and speaking techniques by examining and demonstrating knowledge through Describing Objects, Information Transfer and Letter Writing.

I B. Tech. – I Semester
(19BT10331) **COMPUTER AIDED ENGINEERING DRAWING**
(Common to CE, ME, CSE, CSSE and IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	1	2	2

PRE-REQUISITES: - -
COURSE DESCRIPTION: Engineering drawing conventions; Importance of engineering drawing; fundamental concepts of sketching; computer aided drafting and different types of projections of geometric entities (both 2D and 3D) through computer aided drafting packages.
COURSE OUTCOMES: After successful completion of this course, students will be able to:
CO7: Apply the principles of engineering drawing, Methods and CAD tools to draw the Geometries, Curves and Orthographic projections used to communicate in engineering applications.
CO8: Develop lateral surfaces of solids and draw Isometric views of given objects for engineering communication using principles of engineering drawing and CAD tools.
CO9: Work independently / in groups & communicate effectively in oral and written forms.

I B. Tech. – I Semester
(19BT10531) **PROGRAMMING FOR PROBLEM SOLVING LAB**
(Common to CE, ME, CSE, CSSE, IT, CSE (AI) and CSE (DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: A course on Basic Mathematics
COURSE DESCRIPTION: The course is designed to provide hands on practice on Scratch programming and python programming for problem solving.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1: Develop scripts using Scratch tool to simulate simple problems.
CO2: Apply Python Constructs and Modules to develop solutions for real-life problems.
CO3: Function effectively as an individual and in team to foster knowledge and creativity.
CO4: Write and present a substantial technical report/ document effectively.

I B. Tech. - II Semester
(19BT2BS01) **TRANSFORMATION TECHNIQUES AND LINEAR ALGEBRA**
(Common to CE, ME, EEE, ECE, EIE, CSE, CSSE, IT, CSE (AI) and CSE (DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES: -
COURSE DESCRIPTION: Fourier Series and Fourier Transforms; Laplace Transforms; Inverse Laplace Transforms; Linear Algebra-I (Matrices); Linear Algebra-II (Vector Spaces).
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1: Apply the knowledge of Fourier and Laplace transform techniques to solve differential equations.
CO2: Analyze linear transformations and associated matrices to solve engineering problems by applying the knowledge of linear algebra.

I B. Tech. - II Semester
(19BT1BS02) **BIOLOGY FOR ENGINEERS**
(Common to CE, ME, CSE, CSSE, IT and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	2	-	-	2

PRE-REQUISITES: --
COURSE DESCRIPTION: Living Organisms; Proteins, Nucleic acids and Enzymes; Genetics and Molecular Biology; Recombinant DNA technology; Human Physiology and Applied Biology.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1: Apply the basic knowledge of biology to understand the significance of various biological techniques.
CO2: Identify the role of DNA in the molecular basis of information transfer and understand single gene disorders related to the health perspective.
CO3: Apply the basic knowledge of bio-analytical devices and methods to assess health issues.

I B. Tech. - II Semester
(19BT1BS03) **ENGINEERING PHYSICS**
(Common to CSE, CSSE and IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Wave Optics; Electromagnetic Waves; Fiber Optics; Semiconductors; Dielectrics; Magnetism; Superconductors and Nanomaterials
COURSE OUTCOMES: After successful completion of course, students will be able to:
CO1: Apply the knowledge of light waves to interpret the concepts of Interference, Diffraction and Polarization
CO2: Demonstrate the concepts of electromagnetic wave propagation in an Optical fibers.
CO3: Apply the basic knowledge of semiconductors to understand the functioning of various optoelectronic devices.
CO4: Demonstrate the basic knowledge of dielectric and magnetic properties to understand the various dielectric polarizations and magnetic materials.
CO5: Understand the concepts of superconductors and nanomaterials to familiarize their applications in relevant fields.

I B. Tech. – II Semester
(19BT10201) **BASIC ELECTRICAL AND ELECTRONICS ENGINEERING**
(Common to CE, ME, CSE, CSSE and IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: -
COURSE DESCREPTION: Principles of Electrical Systems; AC Machines; Semiconductor Devices and Op-Amps.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO10. Analyze and solve various DC and single phase AC circuits by applying conceptual knowledge of network reduction, analyzing techniques and theorems
CO11. Design the Components for resonant, transient circuits and Two-port networks meeting the specified needs using circuit concepts.

I B. Tech. – II Semester
(19BT20501) **DIGITAL LOGIC DESIGN**
(Common to CSE, CSSE, IT, CSE (AI) and CSE (DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --
COURSE DESCRIPTION: Foundation in design and analysis of the operation of digital gates; Concepts of Boolean algebra, Minimization of logic circuits; Design and implementation of combinational and sequential logic circuits; Analysis and design of flip-flops, registers, and counters and comparison of their behavior and characteristics; Design digital systems using Programmable logic.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1: Apply knowledge of binary systems, logic gates and Boolean functions to minimize and implement digital circuits.
CO2: Develop digital systems using combinational and sequential logic to solve engineering problems.

I B. Tech. – II Semester
(19BT21501) **OBJECT ORIENTED PROGRAMMING THROUGH JAVA**
(Common to CSE, CSSE, IT, CSE (AI) and CSE (DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: A course on Programming for Problem Solving
COURSE DESCRIPTION: Introduction to Object Oriented Programming, Classes and Objects; Inheritance, Packages, Interfaces; Exception handling, Multithreading; Collection Classes; Applets, Swings, Event handling.
COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO4. Demonstrate knowledge on object oriented programming constructs to solve programming problems.
CO5. Analyze object oriented programming features – polymorphism, inheritance, exception handling and multithreading for reusability.
CO6. Develop user interfaces using GUI programming techniques.

I B. Tech. - II Semester
(19BT1BS31**) ENGINEERING PHYSICS LAB**
(Common to CSE, CSSE and IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: --
COURSE DESCRIPTION: Determination of wavelength of light and thickness of a thin film; numerical aperture and acceptance angle of optical fiber; Characteristics of various semiconductor diodes; Resistivity of semiconductor; magnetic field along axial line of a current carrying coil
COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1: Apply the basic knowledge of light waves and semiconductors to demonstrate the functioning of optoelectronic devices.
CO2: Understand the experimental procedures to calculate the thickness of a thin film, Hall coefficient, Hysteresis losses, and acceptance angle of an optical fiber.
CO3: Determine the experimental values of magnetic field induction, wave length of a light source, energy gap of a semiconductor.
CO4: Apply skills to plot characteristic curves to determine the various parameters of semiconductor diodes.
CO5: Work independently and in teams to solve problems with effective communication.

I B. Tech. – II Semester
(19BT10231) **BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB**
(Common to CE, ME, CSE, CSSE and IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: Physics at intermediate level.
COURSE DESCREPTION: Practical investigations on Electrical circuits, AC Machines, Semiconductor Devices and Op-Amps.
COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO10. Analyze, measure, interpret and validate the practical observations by applying the fundamental knowledge of electrical circuits, machines and electronic devices.
CO11. Design Op-amp based amplifier, voltage summer and integrator circuits for desired specifications.
CO12. Work independently and in teams to solve problems with effective communication.

I B. Tech. – II Semester
(19BT20331) **ENGINEERING WORKSHOP**
(Common to CE, ME, CSE, CSSE, IT, CSE (AI) and CSE (DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: --

COURSE DESCRIPTION: Knowledge on various workshop hand and power tools; hands on experience in different manufacturing trades such as fitting, carpentry, sheet metal forming and foundry; Demonstration on dismantling and assembling of various two wheeler parts, power tools in machining and metal joining, basics of plumbing and working of 3D printer.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO13. Design and model various basic prototypes in the trade of fitting such as square/half round mating, V- mating and dovetail mating from the given MS work pieces using fitting tools.

CO14. Develop different prototypes in the carpentry trade such as cross lap joint, dovetail / bridle joints and Mortise and Tenon joint using carpentry tools.

CO15. Design and model different prototypes in the sheet metal forming trade such as rectangular tray, square vessel/cylinder, Funnel as per the dimensions using sheet metal forming tools.

CO16. Develop sand mold using single piece pattern and split piece pattern in the foundry trade using foundry tools.

CO17. Demonstrate the knowledge on automobile parts, power tools, plumbing operation, 3D printing technology involved in different engineering applications.

CO18. Work independently / in groups & communicate effectively in oral and written forms.

I B. Tech. – II Semester

(19BT21531) **OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB**

(Common to CSE, CSSE, IT, CSE (AI) and CSE (DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	1	2	2

PRE-REQUISITES: A course on OOPS through Java.

COURSE DESCRIPTION: Hands-on experience on Polymorphism; Inheritance and Interfaces; Exception Handling; Multithreading; Event Handling; Applets, swings.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Apply syntactic constructs of the JAVA programming language to solve logic based problems

CO2. Develop application programs using concepts of object oriented programming.

CO3. Function effectively as an individual and on terms to solve problems with effective communication.

CO4. Write and prepare mini project reports/ documents effectively.

I B. Tech. - II Semester

(19BT1AC01) **SPOKEN ENGLISH**

(Audit Course)

(Common to CE, ME, CSE, CSSE, IT and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	2	-	-	-

PRE-REQUISITES: -

COURSE DESCRIPTON: Functional English; Vocabulary Building; Functional Grammar-I; Functional Grammar – II; Communication Skills.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Demonstrate knowledge of grammar and vocabulary in writing effective formal letters and e-mails.

CO2: Communicate effectively by applying appropriate speaking and writing techniques by examining and applying functional English.

II B. Tech. - I Semester

(19BT3BS01) **NUMERICAL METHODS, PROBABILITY AND STATISTICS**

Common to CE, ME, CSE, CSSE, IT, CSE (AI) and CSE (DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES: -

COURSE DESCRIPTION: Numerical solutions of equations; interpolation; numerical differentiation and integration; random variables; mathematical expectations; probability distributions; test of hypothesis.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1: Analyse the data and develop skills to solve equations and integrals by applying numerical methods.

CO2: Demonstrate knowledge in statistics and analyse the data for validations by applying statistical testing methods and distributions.

II B. Tech. -I Semester

(19BT30502) **COMPUTER ORGANIZATION**

(Common to CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: A course on "Digital Logic Design"

COURSE DESCRIPTION:

Basic structure and operation of a digital computer; Organization and functional principles of the arithmetic and logic unit, control unit, memory unit and I/O unit; Concepts of pipelining and parallel processing techniques; Multicore computers.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO1: Analyze computer arithmetic algorithms for fixed-point and floating-point binary operations.

CO2: Analyze the architecture, organization and functions of the components of a digital computer.

CO3: Design digital circuits for the given functional description of micro operations and memory elements.

CO4: Investigate the performance of memory systems, I/O systems, pipelined processors and multiprocessors to evaluate the cost-performance trade-offs.

II B. Tech. I Semester

(19BT31201) **DISCRETE MATHEMATICAL STRUCTURES**

(Common to CSE, CSSE, IT, CSE (AI) and CSE (DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: A Course on Transformation Techniques and Linear Algebra.

COURSE DESCRIPTION: Mathematical Logic; Predicates; Relations; Algebra Structures; Mathematical Reasoning; Recurrence Relations; Graphs; Graph Theory and its Applications.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1: Demonstrate knowledge on mathematical logic and predicates.

CO2: Analyze sets using functions and relations.

CO3: Analyze properties of different algebraic structures.

CO4: Apply mathematical reasoning, recurrence relations, permutations and combinations to solve computational problems.

CO5: Apply concepts of graph theory and trees to implement computer applications.

II B. Tech. – I Semester

(19BT31501) **DATA STRUCTURES AND ALGORITHMS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES: A Course on "Object Oriented Programming"

COURSE DESCRIPTION:

Algorithm Analysis; Linked Lists; Stacks and Queues; Trees; Binary search trees; AVL trees; Heaps; Multiway search trees; Graphs; Sorting and Searching; Hashing

COURSE OUTCOMES: After successful completion of this course, the students will be able to:

CO1: Understand the fundamental concepts of data structures, asymptotic notations and Algorithm analysis techniques to measure the performance of an algorithm.

CO2: Analyze performance of sorting and searching algorithms by making use of time and space complexity.
CO3: Design algorithms to solve societal problems by applying contextual knowledge on linked lists
CO4: Solve computational problems by using stacks and queues
CO5: Apply suitable data structure to perform operations on trees and graphs
CO6: Construct hash tables by using Hash functions and relevant collision resolution technique.

II B. Tech. – I Semester
(19BT31502) **OPERATING SYSTEMS**
(Common to CSE, CSSE, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES:- A course on "Computer Organization"
COURSE DESCRIPTION: Operating Systems Operations; Process Scheduling; Process Synchronization, Deadlocks; Paging and Segmentation, Disk Scheduling; File Concepts, I/O Interface; Concepts of Protection and Security.
COURSE OUTCOMES:
On successful completion of this course, the students will be able to:
CO7. Analyze performance of CPU scheduling algorithms.
CO8. Design solutions for process synchronization problems by using semaphores and monitors.
CO9. Devise solutions for deadlocks using deadlock handling mechanisms.
CO10. Solve memory management problems using page replacement and disk scheduling algorithms.
CO11. Identify efficient file allocation methods for optimal disk utilization.
CO12. Analyze services of I/O subsystems and mechanisms of security & protection.

II B. Tech. – I Semester
(19BT31503) **SYSTEM PROGRAMMING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES:- -
COURSE DESCRIPTION: Synchronized I/O, Direct I/O, Buffered I/O, Scatter/Gather I/O, I/O Schedulers, Device Drivers, Kernel Modules, Debugging System
COURSE OUTCOMES:
On successful completion of this course, the students will be able to:
CO1: Apply system programming APIs for performing operations on files.
CO2: Implement buffer through streams for interactive I/O management.
CO3: Analyze I/O performance using synchronous and asynchronous operations
CO4: Identify classes of device drivers and its security issues in kernel development
CO5: Build running modules for setting up a system using module parameters in the user space
CO6: Analyze different I/O operations and debugging techniques in the design of char drivers.

II B. Tech. – I Semester
(19BT31531) **DATA STRUCTURES AND ALGORITHMS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: A course on "Data Structures and Algorithms"
COURSE DESCRIPTION:
Sorting and Searching; Linked Lists; Stacks and Queues; Binary Search Trees; AVL trees; Graph Traversing Techniques; Collision Resolution Techniques
COURSE OUTCOMES: After successful completion of this course, the students will be able to:
CO1: Implement sorting and searching algorithms using suitable data structure.
CO2: Develop algorithms to solve real time problems using Linked lists
CO3: Solve computational problems using stacks and queues
CO4: Develop algorithms to perform operations on trees and graphs

CO5: Build solution for collisions in hash tables using suitable data structure
CO6: Work independently and in team to solve problems with effective communication

II B. Tech. – I Semester
(19BT31532) **OPERATING SYSTEMS LAB**
(Common to CSE, CSSE, CSE (AI) and CSE (DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: A course on "Operating Systems."
COURSE DESCRIPTION: Hands-on practice in simulating algorithms for CPU Scheduling, Memory Management, I/O Management, Deadlock Handling mechanisms; Implementing Synchronization problems;
COURSE OUTCOMES: *On successful completion of this course, the students will be able to:*
CO1. Analyze process scheduling problems by applying contextual knowledge on CPU scheduling algorithms.
CO2. Apply memory management and disk scheduling algorithms to attain optimal solutions.
CO3. Devise solution for deadlock avoidance using banker's algorithm.
CO4. Design solutions for process synchronization problems using semaphores and monitors.
CO5. Apply file allocation strategies to achieve optimal disk utilization.
CO6. Work independently and in team to solve problems with effective communication

II B. Tech. – I Semester
(19BT31533) **WORKSHOP IN COMPUTER SCIENCE AND SYSTEMS ENGINEERING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: A course on "Programming for Problem Solving"
COURSE DESCRIPTION:
Hands-on practice PC Hardware; Installation of Operating System; Software and Hardware Troubleshooting; Microsoft Office- Word and Excel; C Language- Operators, Expressions, Decision Making Statements, Looping Statements, Arrays and Functions.
COURSE OUTCOMES:
On successful completion of this course, the students will be able to:
CO1: Devise solutions to the basic problems using C Language constructs.
CO2: Solve problems by applying functions, structures, dynamic memory allocation and pointers.
CO3: Develop, maintain and modify Web pages effectively using markdown.
CO4: Design personal portfolioin customized style by using git and Jekyll themes.
CO5: Build simple mobile applications using MIT App inventor.
CO6: Work independently and communicate effectively in oral and written forms.

II B.Tech. I Semester
(19BT315AC) **DESIGN THINKING**
(Audit Course)
(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	2	-	-	-

PRE-REQUISITES: -
COURSE DESCRIPTION: Design thinking process, Design thinking phases, empathy tools; Idea generation, visualizing and empathizing; Fidelity for prototypes, prototyping; prototyping for physical products.
COURSE OUTCOMES: After successful completion of this course, the students will be able to:
CO1: Analyze design thinking concepts and principles to perform human centered design process for creative problem solving.
CO2: Create empathy maps to visualize user attitudes and behavior for gaining insights of customers.

CO3: Develop innovative products or services for a customer base using ideation techniques.
CO4: Build prototypes for complex problems using gathered user requirements.
CO5: Apply design thinking tools techniques to produce good design and relevant products or services for a specific target market.
CO6: Improve prototype by testing it with a specific set of users for making it sustainable by following ethics.

II B. Tech. - II Semester
(19BT40502) **DATABASE MANAGEMENT SYSTEMS**
(Common to CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES: A Course on "Data Structures"
COURSE DESCRIPTION:
Introduction to database systems, Database design, Relational model, Relational algebra, SQL queries, Constraints and triggers, PL/SQL, Schema refinement and normal Forms, Transaction management, Concurrency control, Overview of storage and indexing.
COURSE OUTCOMES: *After successful completion of the course, students will be able to:*
CO1: Apply the concepts of ER-modeling and normalization to design viable data models for a given problem.
CO2: Formulate relational database schemas, apply suitable integrity constraints, for querying databases.
CO3: Use SQL to store, query, and manipulate data in relational databases.
CO4: Develop PL/SQL blocks to centralize database applications for maintainability and reusability.
CO5: Analyze transaction processing, concurrency control and storage methods for database management.

II B. Tech.- II Semester
(19BT40503) **DESIGN AND ANALYSIS OF ALGORITHMS**
(Common to CSE, CSSE, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: A Course on "Data Structures"
COURSE DESCRIPTION: Algorithms and asymptotic notations, Algorithm performance analysis, Amortized analysis, Recurrences, Disjoint sets, Divide and Conquer, Dynamic programming, Greedy algorithms, Back tracking, Branch and bound, NP-hard and NP-complete problems.
COURSE OUTCOMES: *After successful completion of the course, students will be able to:*
CO1: Analyze the complexity of algorithms by applying the knowledge of asymptotic notations and recurrence methods.
CO2: Analyze the given problem and identify appropriate algorithm design technique for problem solving.
CO3: Perceive and apply different algorithm design paradigms to find solutions for computing problems.
CO4: Apply the knowledge of NP-hard and NP-Complete complexity classes to classify decision problems.

II B. Tech. – II Semester
(19BT31202) **SOFTWARE ENGINEERING**
(Common to CSE, CSSE, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Concepts of Software Engineering; Software Process Models; Conventional and Agile Process Models; Software Requirements Engineering Process; System Analysis; Architectural Design; User Interface Design and Re-engineering; Software Testing; Risk and Quality Management.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO16. Understand fundamental concepts of software engineering and analyze process models required to develop a software system.

CO17. Analyze software requirements and model requirements for the given scenario.

CO18. Apply design concepts and metrics for software development.

CO19. Apply testing strategies and techniques for quality software.

CO20. Analyze risks in software development life cycle and apply risk strategies to mitigate risks.

II B. Tech. – II Semester

(19BT41501) **THEORY OF COMPUTATION**

(Common to CSSE and IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: A course on “Discrete Mathematical Structures”.

COURSE DESCRIPTION: Finite automata; Nondeterministic Finite automata; Regular expressions; Applications of the pumping lemma; Context-Free Grammars; Normal forms for context-free grammars; pushdown automata; Chomsky hierarchy of languages; Turing machines.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1: Design finite state machines to recognize formal languages.

CO2: Analyze formal languages using automata.

CO3: Identify different types of grammars in formal languages.

CO4: Construct context free grammars for context free languages

CO5: Develop Turing machine for different computational problems.

CO6*:* Validate formal languages of automata by applying closure properties.

II B. Tech. – II Semester

(19BT4HS01) **BANKING AND INSURANCE**

(Open Elective-2)

(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --

COURSE DESCRIPTION: Scope, Objectives and Elements of cost Accounting; Cost Sheet and Tender quotations; Variance Analysis: Material variances, Labor variances; Meaning and Scope, Liquidity, Profitability Ratios: concept of Risk and Return on Investment.

COURSE OUTCOMES: *After successful completion of the course, students will be able to:*

CO1. Demonstrate knowledge in concepts and functions of Banking and Insurance, RBI, bank and customer relationship, types of accounts, types of loans and advances, types of insurance and risk.

CO2. Develop skills to provide solutions in electronic payment system, business models and insurance claims.

II B. Tech. – II Semester

(19BT4HS03) **COST ACCOUNTING AND FINANCIAL MANAGEMENT**

(Open Elective-2)

(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --

COURSE DESCRIPTION: Scope, Objectives and Elements ofcost Accounting; Cost Sheet and Tender quotations; Variance Analysis: Material variances, Labor variances; Meaning and Scope, Liquidity, Profitability Ratios: concept of Risk and Return on Investment.

COURSE OUTCOMES: *After successful completion of the course, students will be able to:*

CO1. Demonstrate knowledge in Costing, Material, Labor, Overheads, Cost control, risk and return, security analysis and portfolio management.

CO2. Design solutions for effective investment decisions, cost analysis, tenders, quotations, variance analysis, ratio analysis and capital budgeting techniques.

II B. Tech. - II Semester
(19BT4HS05) **GENDER AND ENVIRONMENT**
(Open Elective-2)
(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --
COURSE DESCRIPTION: Gender and the environment relationship, Gendered Roles in the family & community, Gender and sustainable development, Gender in environmental justice, Gender & environmental security.
COURSE OUTCOMES: *After successful completion of the course, students will be able to:*
CO1. Apply the knowledge of gender & environment connections, key issues and topics within global environmental politics in environmental decision-making.
CO2. Comprehend the concepts of gender and sustainable development through debates, and policy documents.
CO3. Analyze the concept of environmental security and justice by identifying the sources of insecurity.

II B. Tech. – II Semester
(19BT4HS07) **INDIAN ECONOMY**
(Open Elective-2)
(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --
COURSE DESCRIPTION: Introduction; Time Value of Money; Elementary Economic Analysis; Value Analysis/Value Engineering; Economic Planning.
COURSE OUTCOMES: *After successful completion of the course, students will be able to:*
CO1. Understand the basic concepts of economics, economic analysis, economic planning and strate.
CO2. Demonstrate knowledge in capital budgeting, evaluation of engineering projects, depreciation policy and familiarize with the concepts of value analysis vs value engineering.

II B. Tech. – II Semester
(19BT4HS09) **LIFE SKILLS**
(Open Elective-2)
(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --
COURSE DESCRIPTION: Positive attitude; Self-discovery-Interpersonal relationships; Cross-cultural communication; Core thinking-Problem solving and Decision making; Business presentations and Public speaking.
COURSE OUTCOMES: *After successful completion of the course, students will be able to:*
CO1. Gain knowledge in strategies involved in developing positive attitude, process of knowing oneself and managing effective interpersonal relationships.
CO2. Analyse problem solving strategies in Decision Making and SWOT analysis.
CO3. Communicate effectively with Engineering Community and Society by demonstrating presentation skills in professional arena.

II B. Tech. – II Semester
(19BT4HS11) **PROFESSIONAL ETHICS**
(Open Elective-2)

(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --
COURSE DESCRIPTION: Engineering Ethics; Professional Ideals and Virtues; Engineering as Social Experimentation; Responsibilities and Rights; Global Issues.
COURSE OUTCOMES: *After successful completion of the course, students will be able to:*
CO1. Demonstrate knowledge in Engineering Ethics, Responsibilities and Rights.
CO2. Analyze the concepts of Engineering in Social Experimentation and Global Issues.
CO3. Apply the nuances of professional ideals at work place and in social context.

II B. Tech. – II Semester
(19BT4HS13) **INDIAN TRADITION AND CULTURE**
(Open Elective-2)
(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --
COURSE DESCRIPTION: Basic traits of Indian Culture; Humanistic Reforms under Jainism and Buddhism; Culture in the medieval period; Socio Religious reforms in Indian Culture; Reform movements for harmonious relations.
COURSE OUTCOMES: *After successful completion of the course, students will be able to:*
CO1. Demonstrate the knowledge in Vedic culture, cultural aspects of Buddhism, Jainism and cultural conditions in the medieval period.
CO2. Understand the impact of socio religious reforms and movements on Indian tradition and culture to improve harmonious relations within society.

II B. Tech. - II Semester
(19BT40106) **DISASTER MITIGATION AND MANAGEMENT**
(Open Elective-2)
(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --
COURSE DESCRIPTION: Disasters; Earthquakes; Floods; Cyclones; Droughts; Landslides; Disaster management.
COURSE OUTCOMES: *After successful completion of the course, students will be able to:*
CO1. Analyze the vulnerability of an area to natural and man-made disasters/hazards as per the guidelines to solve complex problems using appropriate techniques ensuring safety, environment and sustainability.
CO2. Propose appropriate mitigation strategies for earthquake and tsunami impacts as per code of practice using suitable techniques ensuring safety, environment and sustainability besides communicating effectively in graphical form.
CO3. Analyze the causes and impacts of floods, cyclones and droughts using appropriate tools and techniques and suggest mitigation measures ensuring safety, environment and sustainability besides communicating effectively in graphical form.
CO4. Analyze the causes and impacts of landslides using appropriate tools and techniques and suggest mitigation measures ensuring safety, environment and sustainability.
CO5. Design disaster management strategies to solve pre, during and post disaster problems using appropriate tools and techniques following the relevant guidelines and latest developments ensuring safety, environment and sustainability besides communicating effectively in graphical form.

II B. Tech. - II Semester

(19BT40107) **SUSTAINABLE ENGINEERING**
(Open Elective-2)
(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --
COURSE DESCRIPTION: Principles of sustainability; Sustainability metrics and assessment tools; Sustainable engineering practices; Sustainable engineering applications; Sustainable urbanization and industrialization.
COURSE OUTCOMES: *After successful completion of the course, students will be able to:*
CO1. Analyze the principles of sustainability to solve complex environmental problems following relevant standards/protocols considering society, health, safety and environment.
CO2. Analyze sustainability metrics and assessment tools to solve complex environmental problems following relevant standards and emerging trends considering society, health, safety, environment and economics besides communicating effectively in graphical form.
CO3. Analyze sustainable engineering practices to solve complex environmental problems using appropriate tools and techniques following relevant standards considering society, health, safety, environment, economics and management besides communicating effectively in graphical form.
CO4. Design sustainable engineering applications to solve complex environmental problems using appropriate tools and techniques following relevant standards considering society, health, safety, environment, economics and management besides communicating effectively in graphical form.
CO5. Analyze sustainable urbanization and industrialization principles to solve complex environmental problems using appropriate tools and techniques following relevant standards considering society, health, safety, environment, economics and management besides communicating effectively in graphical form.

II B. Tech. - II Semester
(19BT40108) **CONTRACT LAWS AND REGULATIONS**
(Open Elective-2)
(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --
COURSE DESCRIPTION: Construction contracts; Tenders; Arbitration; Legal requirements; Labour regulations.
COURSE OUTCOMES: *After successful completion of the course, students will be able to:*
CO1. Develop construction contracts to solve complex contract related problems by following laws and regulations considering project schedule, cost, quality and risk.
CO2. Prepare tenders as per the specifications by following latest developments, laws and regulations to solve complex tender problems considering project schedule, cost, quality and risk.
CO3. Analyze arbitration problems to address the contract disputes following the laws and regulations in the context of society.
CO4. Analyze legal issues pertaining to contracts and tenders considering society.
CO5. Analyze labour regulations to address labour safety issues.

II B. Tech. - II Semester
(19BT40306) **GLOBAL STRATEGY AND TECHNOLOGY**
(Open Elective-2)
(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PREREQUISITES: --

COURSE DESCRIPTION: Introduction to strategic management; Strategic management process; Principles of good strategy; Globalization strategies; Research and Development strategies; Technology Management and Transfer; Elements of Transfer Process; Corporate Governance in the Indian scenario.

COURSE OUTCOMES: *After successful completion of the course, students will be able to:*

CO1. Demonstrate the knowledge on strategic management, its approaches, and tools through ethical decision making.

CO2. Analyze the globalization challenges for scrupulous selection of globalization strategies.

CO3. Apply the R&D strategies and trends to enhance the technological breakthroughs for new products and applications.

CO4. Demonstrate the knowledge on technology management and transfer that strengthen the economy and accelerate the application of technology and resources.

CO5. Analyze the challenges of corporate governance in Indian scenario for the effective development of value oriented organizations.

II B. Tech. - II Semester

(19BT40307) **MANAGEMENT SCIENCE**

(Open Elective-2)

(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --

COURSE DESCRIPTION: Concepts of Management; Concepts Related to ethics and social responsibility; Human Resource Management; Operations Management; Statistical Process Control; Inventory Management; Marketing; Project Management; Project Crashing.

COURSE OUTCOMES: *After successful completion of the course, students will be able to:*

CO1. Demonstrate the concepts of management, its functions and processes used in optimum resource utilization within the context of ethics and social responsibility.

CO2. Apply the concepts of HRM for selection and management of human resources.

CO3. Analyze different operations management problems using quality management tools to produce effective, efficient and adoptable products/services.

CO4. Identify different marketing strategies to maximize enterprise profitability and customer satisfaction within the realistic constraints.

CO5. Develop network models in time-cost tradeoff for effective project management.

II B. Tech. - II Semester

(19BT40504) **CYBER LAWS AND SECURITY**

(Open Elective-2)

(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --

COURSE DESCRIPTION: Evolution of Cyberspace, Jurisdiction in the borderless Cyberspace, E-Contracting, Models of E-Commerce, Modes of Electronic signatures, E-Money, Intellectual Property Rights, Cybercrimes, Privacy and data security.

COURSE OUTCOMES: *After successful completion of the course, students will be able to:*

CO1. Demonstrate knowledge on jurisdiction in cyberspace and the impact of cybercrime to protect privacy on the Internet.

CO2. Analyze the Indian cyber laws on E-Contracting, E-Commerce, E-signatures and E-money to promote digital law enforcement.

CO3. Apply the knowledge of digital rights in Indian context to protect intellectual properties in electronic world.

CO4. Practice ethics and cyber law regulations for leading electronic transactions on the Internet.

II B. Tech. – II Semester

(19BT50208) **INTELLECTUAL PROPERTY RIGHTS**
(Open Elective-2)
(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --
COURSE DESCRIPTION: Introduction to Intellectual Property; Trade Marks; Law of Copy Rights; Law of Patents; Trade Secrets; Unfair Competition; New Development of Intellectual Property.
COURSE OUTCOMES: *After successful completion of the course, students will be able to:*
CO1. Understand the concepts of intellectual property right and new amendments enforced in filling intellectual property right.
CO2. Understand the processes and principles of trade mark registration and apply them for registering trade mark.
CO4. Understand the process and principles of copy rights for registration and judicial consequences for violating laws of copyright/patents.
CO5. Understand the process and principles of trade secrets and judicial consequences for coping trade secrets.

II B. Tech. - II Semester
(19BT50409) **GREEN TECHNOLOGIES**
(Open Elective-2)
(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --
COURSE DESCRIPTION: Principles of green engineering; Green communications; Green energy; Green computing; Green construction; Green manufacturing.
COURSE OUTCOMES: *After successful completion of the course, students will be able to:*
CO1. Analyze energy efficient communication systems such as Telecommunication systems, ICT, Wireless networks and cellular networks by understanding the principles of green communications.
CO2. Understand the impact of conventional energy sources on environment and realize the significance and principles of green energy sources for sustainability.
CO3. Understand the environmental impacts of IT and approaches for Green IT.
CO4. Analyze concepts of sustainable green construction using appropriate tools and techniques following latest developments and considering safety and environment besides communicating effectively in graphical form.
CO5. Demonstrate the environmental impact of traditional manufacturing and explore the need for green manufacturing process promoting sustainability.

II B. Tech–II Semester
(19BT3HS31) **SOFT SKILLS LAB**
(Common to CSE, CSSE, IT, CSE (AI) and CSE (DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: -
COURSE DESCRIPTION: Body Language; Assertiveness; Goal Setting; Thinking Skills; Team Building; Conflict Management; Technical Report Writing; Résumé Writing; Group Discussions; Interview Skills; Interpersonal Skills; Etiquette.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1: Demonstrate knowledge of career skills by examining and applying the styles and strategies of Goal Setting, Thinking Skills, and Etiquettes.

CO2: Analyze the limitations and possibilities of favourable situations by applying the skills of Body Language and demonstrate through Assertiveness, and Interpersonal Skills.
CO3: Apply appropriate soft skills by analyzing the problem situations that arise in professional career through demonstrating remedies in Conflict Management.
CO4: Demonstrate ability to function effectively as an individual and as a member in diverse teams examining and applying soft skills in Interviews, Group Discussion and Team Building.
CO5: Apply appropriate speaking and writing techniques in preparing documents and to communicate effectively by examining and demonstrating knowledge in Technical Report Writing and Résumé Writing.

II B. Tech. - II Semester
(19BT40532) **DATABASE MANAGEMENT SYSTEMS LAB**
(Common to CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES:- A Course on Database Management System
COURSE DESCRIPTION: Design of an ER Models, Hands-on experience on- DDL, DML commands, Query processing using operators, Joins, Views, Synonyms, Indexes, Single row functions, Group functions and Set functions; PL/SQL programming-Basic programs, Exception handling, Triggers, Functions, Cursors and Stored procedures.
COURSE OUTCOMES: *After successful completion of the course, students will be able to:*
CO1: Analyze the requirements of a given database problem and design viable ER-Models for implementation of database.
CO2: Create database schemas, select and apply suitable integrity constraints for querying databases using SQL interface.
CO3: Develop and interpret PL/SQL blocks to centralize database applications for maintainability and reusability.
CO4: Develop database applications for societal applications such as ticket reservation system, employee payroll system using modern tools.
CO5: Work independently and communicate effectively in oral and written forms.

II B.Tech. – II Semester
(19BT31232) **SOFTWARE ENGINEERING LAB**
(Common to CSE, CSSE, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: A Course on Software Engineering.
COURSE DESCRIPTION: Software Development Life Cycle activities-requirements specification, SRS preparation, Modeling case studies–Online Ticket Reservation system; Point of sales.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO7. Analyze user requirements and prepare software requirements specifications.
CO8. Apply design principles of UML for software design.
CO9. Apply tools for developing UML diagrams.
CO10. Use cost estimation models for project evaluation.
CO11. Work effectively as an individual to design UML models.
CO12. Write and present a substantial technical report/document effectively.

II B. TECH. – II Semester
(19BT41531) **DESIGN AND ANALYSIS OF ALGORITHMS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: A course on "Design and Analysis of Algorithms"
COURSE DESCRIPTION: Divide and conquer; Quick Sort; Merge Sort; Kruskal's Algorithm; Prim's Algorithm; Dijkstra's Algorithm; Dynamic Programming; Greedy method; Back tracking method; Floyd's Algorithm
COURSE OUTCOMES: After successful completion of this course, the students will be able to:

CO1: Analyze the performance of Merge sort and quick sort algorithms using divide and conquer technique
CO2: Develop algorithms to solve knapsack problem using greedy and dynamic programming methods
CO3: Devise solutions for finding minimum cost spanning tree by using kruskal's and prim's algorithms
CO4: Solve different shortest path problems by applying Floyd's and Dijkstra's algorithms
CO5: Implement algorithms to solve real world problems using Dynamic Programming and backtracking methods
CO6: Work independently and communicate effectively in oral and written forms.

II B.TECH. II Semester
(19BT3MC01) **ENVIRONMENTAL SCIENCE**
(Mandatory Course)
(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	-	40	2	-	-	-

PRE-REQUISITES: Course on Engineering Chemistry.
COURSE DESCRIPTION: Natural resources; Ecosystems; Biodiversity; Environment pollution and control; Social issues and environment; Human population and environment.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1: Analyze natural resources to solve complex environmental problems and natural resource management considering society, environment and sustainability.
CO2: Analyze ecosystems and biodiversity to solve complex environmental problems by following environmental ethics considering society, environment and sustainability besides communicating effectively in graphical form.
CO3: Analyze various types of pollution and their control measures to solve environmental problems through appropriate tools and techniques following latest developments considering society, ethics, environment and sustainability.
CO4: Analyze social issues and its impact on environment, environmental acts to solve complex environmental problems considering society, environment and sustainability besides communicating effectively in graphical form.
CO5: Analyze human population and its impact on environment to solve complex environmental problems through team work and using appropriate tools and techniques considering ethics, society, environment and sustainability.

Program: B.Tech. MECHANICAL ENGINEERING

I B. Tech. - I Semester
(19BT1BS01) **DIFFERENTIAL EQUATIONS AND MULTIVARIABLE CALCULUS**
(Common to CE, ME, EEE, ECE, EIE, CSE, CSSE, IT, CSE (AI) and CSE (DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES: -
COURSE DESCRIPTION: Ordinary Differential Equations; Partial Differential Equations; Multivariable Calculus (Differentiation); Multivariable Calculus (Integration); Multivariable Calculus (Vector Calculus).
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1: Formulate and solve differential equations by applying knowledge of calculus for engineering problems.
CO2: Demonstrate knowledge in multivariable calculus for evaluating multiple integrals through techniques of integration.
CO3: Identify scalar and vector valued functions and evaluate vector integrals through knowledge of vector integral theorems and techniques.

I B. Tech. - I Semester
(19BT1BS04) **ENGINEERING CHEMISTRY**
(Common to CE, ME, CSE, CSSE and IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Atomic Structure and Bonding Theories; Water Treatment; Electrochemistry and Applications; Corrosion; Instrumental Methods and Applications; Fuel chemistry and Lubricants.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Apply the basic knowledge of quantum mechanical approach to atomic structure and bonding theories to identify shapes of different orbitals and molecules.
CO2. Analyze and solve problems associated with hardness of water, boiler troubles and address the societal, health and safety issues related to quality of water.
CO3. Apply the basic knowledge of corrosion phenomenon to identify solutions for control of corrosion and demonstrate competency in the basic concepts of electrochemical cells.
CO4. Demonstrate the basic knowledge of instrumental methods and their applications in the structural analysis of materials.
CO5. Apply the basic knowledge of fuel chemistry and lubricants to identify the quality of fuels and lubricants.

I B. Tech – I Semester
(19BT1HS01) **COMMUNICATIVE ENGLISH**
(Common to CE, ME, CSE, CSSE, IT and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Introduction to communication; Active listening; Effective speaking; Reading; Technical writing.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1: Demonstrate knowledge of English language, examining and applying the aspects of Process of communication, Paralinguistic features, Skimming, Scanning, and Elements of style in writing.
CO2: Analyze the modes and techniques of listening, speaking, reading, writing and apply appropriately to communicate effectively with the engineering community and society.
CO3: Apply reading and writing techniques in preparing documents by examining SQ3R Technique, Writer’s Block, and Précis Writing.

CO4: Communicate effectively applying appropriate speaking techniques by examining and applying the communication styles in Conferences, Symposia, Seminars and Persuasive Speaking.

I B. Tech. – I Semester
(19BT10501) **PROGRAMMING FOR PROBLEM SOLVING**
(Common to CE, ME, CSE, CSSE, IT, CSE (AI) and CSE (DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES: A course on Basic Mathematics
COURSE DESCRIPTION: Introduction to problem solving approach, Introduction to Python programming, control structures, sequences, sets, Dictionaries, Implementation of Data structures using Python, Modular programming, file handling, Data representation and Visualization.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Demonstrate knowledge on Python constructs to solve basic problems.
CO2. Develop and use Python modules to provide solutions to problems.

I B. Tech. - I Semester
(19BT1BS32) **ENGINEERING CHEMISTRY LAB**
(Common to CE, ME, CSE, CSSE and IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE - REQUISITES: -
COURSE DESCRIPTION: Estimation of hardness, alkalinity, dissolved oxygen of water samples, Iron, Strength of an acid in Pb-acid battery and residual chlorine in drinking water by volumetric methods; Measurement of viscosity of lubricants; Instrumental methods like conductivity meter, potentiometer, P^H meter and colorimeter; Characterization of simple organic compounds by UV-Vis and IR spectroscopy.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Apply analytical skills for the quantitative estimation of materials through volumetric methods of analysis and address the societal, health issues related to quality of water.
CO2. Develop analytical skills for the quantitative estimation of materials through instrumental methods of analysis.
CO3. Work independently and in teams to solve problems with effective communication.

I B. Tech. - I Semester
(19BT1HS31) **COMMUNICATIVE ENGLISH LAB**
(Common to CE, ME, CSE, CSSE, IT and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES:
COURSE DESCRIPTION: Phonetics; Vocabulary Building; Grammar; Just a Minute; Elocution/Impromptu; Giving Directions; Role Plays; Public Speaking; Describing Objects; Reading Comprehension; Listening Comprehension; Information Transfer; Letter Writing
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1: Demonstrate knowledge of Phonetics by examining and applying sounds of English in Phonetic Transcription.
CO2: Analyze sentence structures by applying and demonstrating the skills of Vocabulary and Grammar.
CO3: Apply appropriate listening and reading skills by analyzing the context and demonstrate in Listening Comprehension and Reading Comprehension.
CO4: Function effectively as an individual and as a member in diverse teams examining and applying speaking skills in Just A Minute and Role Play.
CO5: Communicate effectively applying appropriate writing and speaking techniques by examining and demonstrating knowledge through Describing Objects, Information Transfer and Letter Writing.

I B. Tech. – I Semester
(19BT10331) **COMPUTER AIDED ENGINEERING DRAWING**
(Common to CE, ME, CSE, CSSE and IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	1	2	2

PRE-REQUISITES: **--**
COURSE DESCRIPTION: Engineering drawing conventions; Importance of engineering drawing; fundamental concepts of sketching; computer aided drafting and different types of projections of geometric entities (both 2D and 3D) through computer aided drafting packages.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO10: Apply the principles of engineering drawing, Methods and CAD tools to draw the Geometries, Curves and Orthographic projections used to communicate in engineering field.
CO11: Develop lateral surfaces of solids and draw Isometric views of given objects for engineering communication using principles of engineering drawing and CAD tools.
CO3. Work independently / in groups & communicate effectively in oral and written forms.

I B. Tech. – I Semester
(19BT10531) **PROGRAMMING FOR PROBLEM SOLVING LAB**
(Common to CE, ME, CSE, CSSE, IT, CSE (AI) and CSE (DS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: A course on Basic Mathematics
COURSE DESCRIPTION: The course is designed to provide hands on practice on Scratch programming and python programming for problem solving.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Develop scripts using Scratch tool to simulate simple problems.
CO2. Apply Python Constructs and Modules to develop solutions for real-life problems.
CO3. Function effectively as an individual and in a team to foster knowledge and creativity.
CO4. Write and present a substantial technical report/ document effectively.

I B. Tech. - II semester
(19BT2BS01) **TRANSFORMATION TECHNIQUES AND LINEAR ALGEBRA**
(Common to CE, ME, EEE, ECE, EIE, CSE, CSSE, IT, CSE (AI) and CSE (DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES: -
COURSE DESCRIPTION: Fourier Series and Fourier Transforms; Laplace Transforms; Inverse Laplace Transforms; Linear Algebra-I (Matrices); Linear Algebra-II (Vector Spaces).
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1: Apply the knowledge of Fourier and Laplace transform techniques to solve differential equations.
CO2: Analyze linear transformations and associated matrices to solve engineering problems by applying the knowledge of linear algebra.

I B. Tech. - II Semester
(19BT1BS02) **BIOLOGY FOR ENGINEERS**
(Common to CE, ME, CSE, CSSE, IT and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	2	-	-	2

PRE-REQUISITES: --

COURSE DESCRIPTION: Living Organisms; Proteins, Nucleic acids and Enzymes; Genetics and Molecular Biology; Recombinant DNA technology; Human Physiology and Applied Biology.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Apply the basic knowledge of biology to understand the significance of various biological techniques.
CO2. Identify the role of DNA in the molecular basis of information transfer and understand single gene disorders related to the health perspective.
CO3. Apply the basic knowledge of bio-analytical devices and methods to assess health issues.

I B. Tech. – II Semester
(19BT2BS02) **APPLIED PHYSICS**
(Common to CE and ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE - REQUISITES: --
COURSE DESCRIPTION: Fiber Optics; Acoustics and Ultrasonics; Kinematics and Kinetics; Thermal Physics; Modern Engineering Materials.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Apply the knowledge of fiber optics, acoustics and ultrasonics to provide solutions for various engineering problems.
CO2. Analyze and solve the problems associated with kinetics, kinematics and thermal physics.
CO3. Demonstrate the knowledge on characteristics and applications of modern engineering materials.

I B. Tech. – II Semester
(19BT10201) **BASIC ELECTRICAL AND ELECTRONICS ENGINEERING**
(Common to CE, ME, CSE, CSSE and IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --
COURSE DESCRIPTION: Principles of Electrical Systems; AC Machines; Semiconductor Devices and Op-Amps.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO21. Analyze electrical circuits by applying the conceptual knowledge of circuit elements.
CO22. Demonstrate knowledge on various generation technologies, protection devices, safety procedures and BEE standards.
CO23. Demonstrate knowledge on characteristics and applications of transformers and AC machines.
CO24. Demonstrate knowledge on characteristics and applications of diode, BJT and Op-amps.

I B. Tech. – II Semester
(19BT20301) **BASIC ENGINEERING MECHANICS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES: -
COURSE DESCRIPTION: Statics of Particles and Rigid Bodies; Support Reactions; Analysis of Perfect Frames; Friction; Centroid, Centre of Gravity and Moment of Inertia; Kinetics and Vibrations
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Analyze the equilibrium of forces in static particles, rigid bodies, and the effect of friction by applying the principles of Engineering Mechanics, and solve the problems.
CO2. Analyze composite areas and bodies to find centroid, centre of gravity and moment of inertia.
CO3. Apply D'Alembert's Principle for analyzing the kinetics of rigid bodies.
CO4. Apply the basic principles of Simple Harmonic Motion and vibrations to solve problems in mechanical systems.

I B. Tech. - II Semester
(19BT20302) **MATERIAL SCIENCE AND ENGINEERING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Courses on Engineering Chemistry and Intermediate Physics
COURSE DESCRIPTION: Materials Structure and Constitution of Alloys; Heat treatment of steels; Properties of ferrous materials and its alloys; Properties of non-ferrous materials and its alloys; Properties and applications of ceramics, polymers and composite materials.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Demonstrate the principles of physical metallurgy, calculate atomic packing factor of different structures and discuss the properties of materials improvement through heat treatment processes
CO2. Identify and select commercially available important metals, alloys, ceramics, polymers and composite materials based upon their properties for various applications.

I B. Tech. – II Semester
(19BT2BS31) **APPLIED PHYSICS LAB**
(Common to CE and ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE–REQUISITES: --
COURSE DESCRIPTION: Determination of Moment of Inertia, Elastic Moduli, and Thermal properties of materials; Estimation of carrier concentration and energy gap of a semiconductor; Verification of Newton's Law of Cooling; Characteristics of Optical Fiber;
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Demonstrate the experimental procedures to compute the frequency of a tuning fork, hall coefficient, energy gap, moment of inertia, rigidity modulus and thermal conductivity of materials.
CO2. Apply skills to plot various characteristic curves of an optical Fiber and also determine thermal conductivity, thermo emf and energy gap.
CO3. Work independently and in teams to solve problems with effective communication.

I B. Tech. – II Semester
(19BT10231) **BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB**
(Common to CE, ME, CSE, CSSE and IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: Physics at intermediate level.
COURSE DESCRIPTION: Practical investigations on Electrical circuits, AC Machines, Semiconductor Devices and Op-Amps.
COURSE OUTCOMES: After successful completion of the course, student will be able to:
CO13. Analyze, measure, interpret and validate the practical observations by applying the fundamental knowledge of electrical circuits, machines and electronic devices.
CO14. Design Op-amp based amplifier, voltage summer and integrator circuits for desired specifications.
CO15. Work independently and in teams to solve problems with effective communication.

I B. Tech. – II Semester
(19BT20331) **ENGINEERING WORKSHOP**
(Common to CE, ME, CSE, CSSE, IT, CSE (AI) and CSE (DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: --

COURSE DESCRIPTION: Knowledge on various workshop hand and power tools; hands on experience in different manufacturing trades such as fitting, carpentry, sheet metal forming and foundry; Demonstration on dismantling and assembling of various two wheeler parts, power tools in machining and metal joining, basics of plumbing and working of 3D printer.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Design and model various basic prototypes in the trade of fitting such as square/half round mating, V- mating and dovetail mating from the given MS workpieces using fitting tools.

CO2. Develop different prototypes in the carpentry trade such as cross lap joint, dovetail / bridle joints and Mortise and Tenon joint using carpentry tools.

CO3. Design and model different prototypes in the sheet metal forming trade such as rectangular tray, square vessel/cylinder, Funnel as per the dimensions using sheet metal forming tools.

CO4. Develop sand mold using single piece pattern and split piece pattern in the foundry trade using foundry tools.

CO5. Demonstrate the knowledge on automobile parts, power tools, plumbing operation, 3D printing technology involved in different engineering applications.

CO6. Work independently / in groups & communicate effectively in oral and written forms.

I B. Tech. - II Semester

(19BT20332) **MATERIAL SCIENCE AND ENGINEERING LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: Intermediate Physics, Engineering Chemistry

COURSE DESCRIPTION: Characterization of microstructures of steels, cast irons and non-ferrous metals; heat treatment procedures; data acquisition and recording; grain size analysis; phase segmentation; non-destructive tests.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1: Analyze metallographic study of various metals using tools & software

CO2: Determine the mechanical properties of heat treated materials using tools & equipment

CO3: Apply non destructive methods to identify and analyze the metal defects

CO4: Work individually or in a team to solve problems with effective communication

I B. Tech. - II Semester

(19BT1AC01) **SPOKEN ENGLISH**

(Audit Course)

(Common to CE, ME, CSE, CSSE, IT and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	2	-	-	-

PRE-REQUISITES: **-**

COURSE DESCRIPTION:

Functional English; Vocabulary Building; Functional Grammar-I; Functional Grammar – II; Communication Skills.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO1: Demonstrate knowledge of grammar and vocabulary in writing effective formal letters and e-mails.

CO2: Communicate effectively by applying appropriate speaking and writing techniques by examining and applying functional English.

II B. Tech. - I Semester

(19BT3BS01) **NUMERICAL METHODS, PROBABILITY AND STATISTICS**

(Common to CE, ME, CSE, CSSE, IT, CSE (AI) and CSE (DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	--	4

PRE-REQUISITES: -
COURSE DESCRIPTION:
Numerical solutions of equations; interpolation; numerical differentiation and integration; random variables; mathematical expectations; probability distributions; test of hypothesis.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
CO1. Analyse the data and develop skills to solve equations and integrals by applying numerical methods.
CO2. Demonstrate knowledge in statistics and analyse the data for validations by applying statistical testing methods and distributions.

II B. Tech. - I Semester
(19BT30301) **ENGINEERING THERMODYNAMICS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES:
Courses on Applied Physics, and Engineering Chemistry.
COURSE DESCRIPTION:
Thermodynamic system; Energy interactions; Heat and work Transfer in flow and non- flow systems; Laws of thermodynamics; Reversible and irreversible processes; Entropy; Equation of state; Pure substance; Thermodynamic Relations; Gases and gas mixtures and Gas power cycles.
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1: Analyze thermodynamic systems using thermodynamic laws and estimate the thermodynamic properties during energy interactions in engineering application.
CO2: Calculate the properties of steam using PVT diagrams, H-S diagrams and steam tables considering steam power plant.
CO3: Determine the properties of ideal gases, real gases and gas mixtures using gas laws, volumetric analysis and gravimetric analysis for engineering applications.
CO4: Analyze the air stand cycles using P-V and T-S diagrams used in power generation systems and estimate the performance characteristics it.

II B. Tech. - I Semester
(19BT30302) **KINEMATICS OF MACHINERY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Basic Engineering Mechanics and Computer Aided Engineering Drawing.
COURSE DESCRIPTION:
Basic concepts and description of various plane mechanisms; Calculation of Displacement; Velocity and acceleration of simple plane mechanisms; Straight line mechanisms; Steering mechanisms; Hooke’s joint; Concepts of Gears and Gear trains; Preparation of cam profiles.
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1: Calculate degrees of freedom of kinematic pairs, kinematic chains and its inversions used in machines for engineering applications.
CO2: Demonstrate the knowledge on straight line motion mechanisms for exact straight line motion and approximate straight line motion conditions.
CO3: Analyze steering gear mechanisms for correct steering and Hookes joints for uniform velocity ratios.
C04: Analyze the gears to avoid interference and gear trains to find the velocity and number of teeth of its components.
CO5: Draw the profile of the cam based on follower motons and calculate the velocity and acceleration of the follower.
CO6: Analyze planar mechanisms for displacement, velocity and acceleration of different Points of it

using relative velocity and Instantaneous center methods.

II B. Tech. - I Semester
(19BT30303) **MANUFACTURING TECHNOLOGY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Course on Material Science and Engineering
COURSE DESCRIPTION:
Introduction to manufacturing processes; casting, welding, cutting of metals, metalworking processes, forging processes, extrusion of metals, Sheet Metal Operations and Plastic Processing.
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1: Design the gating system using the knowledge of foundry.
CO2: Demonstrate the knowledge on casting process, cast defects and operational procedures required in manufacturing the cast part.
CO3: Demonstrate the operational and procedural steps required in sheet metal process for manufacturing of sheet metal parts.
CO4: Demonstrate knowledge on welding processes required for weld parts.
CO5: Demonstrate knowledge on plastic processing and its sequences operations required for manufacturing a plastic product.

II B. Tech. - I Semester
(19BT30304) **STRENGTH OF MATERIALS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Course on Basic Engineering Mechanics.
COURSE DESCRIPTION:
Analysis of stresses and strains of mechanical and structural components; Shear force and Bending moment of beams; Bending and Torsional stresses and Deflection beams.
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1. Calculate stresses, strains and elastic constants of structural member subjected to external loading.
CO2. Draw shear force and bending momentum diagrams for beams and articulate stresses in beam structure under transverse loading.
CO3. Estimate the torsional shear stress and deflection on circular shafts subjected torsion and find principal stresses from mohr’s circle diagram.
CO4. Analyze deflections of cantilever and simply supported beams using Double Integration method and Macaulay’s method

II B. Tech. - I Semester
(19BT3HS31) **SOFT SKILLS LAB**
(Common to CE, ME, EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: -
COURSE DESCRIPTION:
Body Language; Assertiveness; Goal Setting; Thinking Skills; Team Building; Conflict Management; Technical Report Writing; Résumé Writing; Group Discussions; Interview Skills; Interpersonal Skills; Etiquette.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:

CO1. Demonstrate knowledge of career skills by examining and applying the styles and strategies of Goal Setting, Thinking Skills, and Etiquettes.
CO2. Analyze the limitations and possibilities of favourable situations by applying the skills of Body Language and demonstrate through Assertiveness, and Interpersonal Skills.
CO3. Apply appropriate soft skills by analyzing the problem situations that arise in professional career through demonstrating remedies in Conflict Management.
CO4. Demonstrate ability to function effectively as an individual and as a member in diverse teams examining and applying soft skills in Interviews, Group Discussion and Team Building.
CO5. Apply appropriate speaking and writing techniques in preparing documents and to communicate effectively by examining and demonstrating knowledge in Technical Report Writing and Résumé Writing.

II B. Tech. - I Semester
(19BT30132) **STRENGTH OF MATERIALS LAB**
(Common to CE and ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: Course on Mechanics of Solids/Strength of Materials.
COURSE DESCRIPTION:
Tests on strength of materials**:** Tension test; Compression test; Bending test; Shear test; Torsion test; Hardness test; Verification of Maxwell reciprocal theorem.
COURSE OUTCOMES:
On successful completion of this course, the students will be able to:
CO1. Evaluate the strength of materials such as steel, timber, metal using appropriate tools/techniques to solve complex problems in accordance with codal provisions ensuring safety.
CO2. Evaluate the load-deflection behavior for the materials used in beams and springs using appropriate tools/techniques to solve complex problems in accordance with codal provisions ensuring safety.
CO3. Perform material testing individually or in a team besides communicating effectively in written, oral and graphical forms on strength of materials.

II B. Tech. - I Semester
(19BT30331) **COMPUTER AIDED MACHINE DRAWING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: A Course on Computer Aided Engineering Drawing.
COURSE DESCRIPTION:
Principles of machine drawing; Sectional views; Tolerances; Thread profiles; Bolted joints; Locking arrangements for nuts; Foundation bolts; Keys; Assembling and Disassembling; Part drawing.
COURSE OUTCOMES:
On successful completion of this course, the students will be able to:.
CO1: Develop suitable drawing views of machine elements and simple parts using CAD software.
CO2: Draw assembled views for the part drawings with suitable tolerances using conventions and CAD software.
CO3: Work independently and Communicate about the assembly and part drawings through the computer aided drawings.

II B. Tech. - I Semester
(19BT30332) **MANUFACTURING TECHNOLOGY LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: Course on Material Science and Engineering
COURSE DESCRIPTION:

Provides skill on sand testing; Pattern making; Mould preparation; Metal casting; Mechanical press working; Welding; Sheet metal works; Plastic moulding; Manufacturing of composites.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO1: Develop cast components using sand/die/stir casting process considering societal and safety issues.

CO2: Develop welding joints using given welding process for the given design requirements considering societal and safely issues and simulate the welding process.

CO3: Develop sheet metal components with metal forming techniques using fly press and hydraulic press machines considering safely and societal issues.

CO4: Develop different components using plastic molding based on the given design requirements considering societal and safety issues.

CO5: Work independently / in groups & communicate effectively in oral and written forms.

II B. Tech. - I Semester

(19BT315AC) **DESIGN THINKING**

(Audit Course)

(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext.	Total Marks	L	T	P	C
-	-	-	2	-	-	-

PRE-REQUISITES: -

COURSE DESCRIPTION:

Design thinking process, Design thinking phases, empathy tools; Idea generation, visualizing and empathizing; Fidelity for prototypes, prototyping; prototyping for physical products.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO1. Analyze design thinking concepts and principles to perform human centered design process for creative problem solving.

CO2. Create empathy maps to visualize user attitudes and behavior for gaining insights of customers.

CO3. Develop innovative products or services for a customer base using ideation techniques.

CO4. Build prototypes for complex problems using gathered user requirements.

CO5. Apply design thinking tools techniques to produce good design and relevant products or services for a specific target market.

CO6. Improve prototype by testing it with a specific set of users for making it sustainable by following ethics.

II B. Tech. – II Semester

(19BT40301) **DYNAMICS OF MACHINERY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES:

Courses on Basic Engineering Mechanics & Kinematics of Machinery.

COURSE DESCRIPTION:

Force analysis; Clutches, brakes and dynamometers; Gyroscopic couple, Turning moment diagrams, flywheel design; Analysis and balancing of shaking forces in machines; Governors; Vibrations, single degree, Multi degrees of freedom vibrations, spring mass systems; transmissibility of forces, Dunkerley's method, Rayleigh's method; Whirling of shafts; isolation of systems.

COURSE OUTCOMES:

On successful completion of this course, the students will be able to:

CO1. Analyze the mechanism, clutches, brakes and dynamometers for the forces acting on it during its operation and calculate the forces involved in it.

CO2. Determine the effect of gyroscopic couple on transport vehicles for stabilization.

CO3. Analyze turning moment diagram for fluctuations of energy and flywheel for controlling the speed variations in machines.

CO4. Analyze the governors and calculate the forces acting on it during its operation.

CO5. Analyze the unbalanced forces of masses in engines using analytical and graphical methods.

CO6. Calculate the frequency of vibration in beams and rotating shafts.

II B. Tech. – II Semester
(19BT40302) **ENGINEERING METROLOGY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Courses on Applied Physics and Computer Aided Machine Drawing.
COURSE DESCRIPTION: Limits, Fits and Tolerances; Limit Gauges and Gauge Design; Comparators; Linear Measurement; Measurement of Angles and Tapers; Flatness Measurement, Surface Roughness Measurement; Measurement of Displacement; Measurement of Speed, Stress & Strain Measurements; Measurement of Temperature; Measurement of Pressure.
COURSE OUTCOMES: On successful completion of this course, students will be able to:
CO1. Demonstrate the knowledge on the linear measurements, fits and tolerances using principles of metrology.
CO2. Demonstrate the knowledge of limit gauges, comparators, angle measuring methods and instruments.
CO3. Determine surface roughness using surface measuring methods and discuss the flatness measuring methods and instruments.
CO4. Derive the equations for screw thread and gear teeth parameters and calculate the parameters for the given application.
CO5. Demonstrate the knowledge on methods and instruments used for the measurement of stress, strains, temperature and pressure.

II B. Tech. – II Semester
(19BT40303) **FLUID MECHANICS AND HYDRAULIC MACHINERY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: A course on Engineering Mechanics.
COURSE DESCRIPTION:
Properties of Fluids; Pressure Measurements; Types of flow; One-dimensional steady flow energy & momentum Equations; Flow measurements; Fluid flow; Impact of jets on stationary & moving plate; Hydraulic turbines & Pumps Components and its performance.
COURSE OUTCOMES:
On successful completion of this course, the students will be able to:
CO1. Calculate the properties of fluids using the principles of fluid properties.
CO2. Apply the principles of fluid kinematics and dynamics and determine the flow properties of the fluid.
CO3. Calculate the loss of energy in fluid flows using the principles of fluid flows.
CO4. Evaluate the hydrodynamic force acting on jets and the performance of Hydraulic turbines under various loading and head conditions.
CO5. Evaluate the performance pumps under various head conditions and analyze its performance characteristics curves.

II B. Tech. – II Semester
(19BT40304) **METAL CUTTING AND MACHINE TOOLS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: A course on Manufacturing Technology.
COURSE DESCRIPTION:

Theory of Metal Cutting; Geometry of Cutting Tools; Merchants Force Diagram; Lathe Machine-Principle of Operation; Tools; Multi spindle lathes; shaping; slotting and planning machines; drilling; boring; jig boring; milling machine Specifications; grinding; lapping; honing;

COURSE OUTCOMES:

On successful completion of this course, the students will be able to:

CO1. Demonstrate the knowledge on principles of metal cutting, machining methods, tool geometries, tool materials in connection with various machine tools.

CO2. Analyze cutting forces during machining and calculate machining parameters.

CO3. Illustrate the constructional features and describe the various operations related to the lathe.

CO4. Demonstrate the knowledge on Shaping, Slotting, planning, Drilling and Boring Machines.

CO5. Discuss the constructional features and the terminologies related to grinding, broaching and honing machines.

CO6. Demonstrate the knowledge on milling machines and describe the indexing mechanism for a milling machine.

II B. Tech. – II Semester

(19BT40305) **THERMAL ENGINEERING – I**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: A course on Engineering Thermodynamics.

COURSE DESCRIPTION:

Introduction to Internal Combustion (IC) engines; Components and working of 2-stroke and 4-stroke engines; Combustion phenomena in spark ignition and compression ignition engines; Performance parameters of an internal combustion engine; Gas turbines; Jet propulsions and Rocket propulsions; Reciprocating compressors; Rotary compressors; Concept of steam power cycles.

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO1: Analyze the combustion process in IC engines and calculate the Performance parameters of IC Engines under various testing conditions.

CO2: Analyze the gas turbines and jet propulsions using PV and TS diagrams and solve problems on it.

CO3: Calculate the performance parameters of air compressors using principles of air compressors.

CO4: Analyze the steam power cycles using PV and TS diagrams and calculate the thermal efficiencies of these cycles.

II B. Tech. – II Semester

(19BT4HS01) **BANKING AND INSURANCE**

(Open Elective-2)

(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --

COURSE DESCRIPTION: Scope, Objectives and Elements of cost Accounting; Cost Sheet and Tender quotations; Variance Analysis: Material variances, Labor variances; Meaning and Scope, Liquidity, Profitability Ratios: concept of Risk and Return on Investment.

COURSE OUTCOMES: *After successful completion of the course, students will be able to:*

CO1. Demonstrate knowledge in concepts and functions of Banking and Insurance, RBI, bank and customer relationship, types of accounts, types of loans and advances, types of insurance and risk.

CO2. Develop skills to provide solutions in electronic payment system, business models and insurance claims.

II B. Tech. – II Semester
(19BT4HS03) **COST ACCOUNTING AND FINANCIAL MANAGEMENT**
(Open Elective-2)
(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --
COURSE DESCRIPTION: Scope, Objectives and Elements ofcost Accounting; Cost Sheet and Tender quotations; Variance Analysis: Material variances, Labor variances; Meaning and Scope, Liquidity, Profitability Ratios: concept of Risk and Return on Investment.
COURSE OUTCOMES: *After successful completion of the course, students will be able to:*
CO1. Demonstrate knowledge in Costing, Material, Labor, Overheads, Cost control, risk and return, security analysis and portfolio management.
CO2. Design solutions for effective investment decisions, cost analysis, tenders, quotations, variance analysis, ratio analysis and capital budgeting techniques.

II B. Tech. - II Semester
(19BT4HS05) **GENDER AND ENVIRONMENT**
(Open Elective-2)
(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --
COURSE DESCRIPTION: Gender and the environment relationship, Gendered Roles in the family & community, Gender and sustainable development, Gender in environmental justice, Gender & environmental security.
COURSE OUTCOMES: *After successful completion of the course, students will be able to:*
CO1. Apply the knowledge of gender & environment connections, key issues and topics within global environmental politics in environmental decision-making.
CO2. Comprehend the concepts of gender and sustainable development through debates, and policy documents.
CO3. Analyze the concept of environmental security and justice by identifying the sources of insecurity.

II B. Tech. – II Semester
(19BT4HS07) **INDIAN ECONOMY**
(Open Elective-2)
(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --
COURSE DESCRIPTION: Introduction; Time Value of Money; Elementary Economic Analysis; Value Analysis/Value Engineering; Economic Planning.
COURSE OUTCOMES: *After successful completion of the course, students will be able to:*
CO1. Understand the basic concepts of economics, economic analysis, economic planning and strate.
CO2. Demonstrate knowledge in capital budgeting, evaluation of engineering projects, depreciation policy and familiarize with the concepts of value analysis vs value engineering.

II B. Tech. – II Semester
(19BT4HS09) **LIFE SKILLS**
(Open Elective-2)
(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C

40	60	100	3	-	-	3

PRE-REQUISITES: --

COURSE DESCRIPTION: Positive attitude; Self-discovery-Interpersonal relationships; Cross-cultural communication; Core thinking-Problem solving and Decision making; Business presentations and Public speaking.

COURSE OUTCOMES: *After successful completion of the course, students will be able to:*

CO1. Gain knowledge in strategies involved in developing positive attitude, process of knowing oneself and managing effective interpersonal relationships.

CO2. Analyse problem solving strategies in Decision Making and SWOT analysis.

CO3. Communicate effectively with Engineering Community and Society by demonstrating presentation skills in professional arena.

II B. Tech. – II Semester

(19BT4HS11) **PROFESSIONAL ETHICS**

(Open Elective-2)

(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --

COURSE DESCRIPTION: Engineering Ethics; Professional Ideals and Virtues; Engineering as Social Experimentation; Responsibilities and Rights; Global Issues.

COURSE OUTCOMES: *After successful completion of the course, students will be able to:*

CO1. Demonstrate knowledge in Engineering Ethics, Responsibilities and Rights.

CO2. Analyze the concepts of Engineering in Social Experimentation and Global Issues.

CO3. Apply the nuances of professional ideals at work place and in social context.

II B. Tech. – II Semester

(19BT4HS13) **INDIAN TRADITION AND CULTURE**

(Open Elective-2)

(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --

COURSE DESCRIPTION: Basic traits of Indian Culture; Humanistic Reforms under Jainism and Buddhism; Culture in the medieval period; Socio Religious reforms in Indian Culture; Reform movements for harmonious relations.

COURSE OUTCOMES: *After successful completion of the course, students will be able to:*

CO1. Demonstrate the knowledge in Vedic culture, cultural aspects of Buddhism, Jainism and cultural conditions in the medieval period.

CO2. Understand the impact of socio religious reforms and movements on Indian tradition and culture to improve harmonious relations within society.

II B. Tech. - II Semester

(19BT40106) **DISASTER MITIGATION AND MANAGEMENT**

(Open Elective-2)

(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --

COURSE DESCRIPTION: Disasters; Earthquakes; Floods; Cyclones; Droughts; Landslides; Disaster management.

COURSE OUTCOMES: *After successful completion of the course, students will be able to:*

CO1. Analyze the vulnerability of an area to natural and man-made disasters/hazards as per the guidelines to solve complex problems using appropriate techniques ensuring safety, environment and sustainability.

CO2. Propose appropriate mitigation strategies for earthquake and tsunami impacts as per code of practice using suitable techniques ensuring safety, environment and sustainability besides communicating effectively in graphical form.

CO3. Analyze the causes and impacts of floods, cyclones and droughts using appropriate tools and techniques and suggest mitigation measures ensuring safety, environment and sustainability besides communicating effectively in graphical form.

CO4. Analyze the causes and impacts of landslides using appropriate tools and techniques and suggest mitigation measures ensuring safety, environment and sustainability.

CO5. Design disaster management strategies to solve pre, during and post disaster problems using appropriate tools and techniques following the relevant guidelines and latest developments ensuring safety, environment and sustainability besides communicating effectively in graphical form.

II B. Tech. - II Semester
(19BT40107) **SUSTAINABLE ENGINEERING**
(Open Elective-2)
(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --
COURSE DESCRIPTION: Principles of sustainability; Sustainability metrics and assessment tools; Sustainable engineering practices; Sustainable engineering applications; Sustainable urbanization and industrialization.
COURSE OUTCOMES: *After successful completion of the course, students will be able to:*

CO1. Analyze the principles of sustainability to solve complex environmental problems following relevant standards/protocols considering society, health, safety and environment.

CO2. Analyze sustainability metrics and assessment tools to solve complex environmental problems following relevant standards and emerging trends considering society, health, safety, environment and economics besides communicating effectively in graphical form.

CO3. Analyze sustainable engineering practices to solve complex environmental problems using appropriate tools and techniques following relevant standards considering society, health, safety, environment, economics and management besides communicating effectively in graphical form.

CO4. Design sustainable engineering applications to solve complex environmental problems using appropriate tools and techniques following relevant standards considering society, health, safety, environment, economics and management besides communicating effectively in graphical form.

CO5. Analyze sustainable urbanization and industrialization principles to solve complex environmental problems using appropriate tools and techniques following relevant standards considering society, health, safety, environment, economics and management besides communicating effectively in graphical form.

II B. Tech. - II Semester
(19BT40108) **CONTRACT LAWS AND REGULATIONS**
(Open Elective-2)
(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --
COURSE DESCRIPTION: Construction contracts; Tenders; Arbitration; Legal requirements; Labour regulations.
COURSE OUTCOMES: *After successful completion of the course, students will be able to:*

CO1. Develop construction contracts to solve complex contract related problems by following laws and regulations considering project schedule, cost, quality and risk.
CO2. Prepare tenders as per the specifications by following latest developments, laws and regulations to solve complex tender problems considering project schedule, cost, quality and risk.
CO3. Analyze arbitration problems to address the contract disputes following the laws and regulations in the context of society.
CO4. Analyze legal issues pertaining to contracts and tenders considering society.
CO5. Analyze labour regulations to address labour safety issues.

II B. Tech. - II Semester
(19BT40306) **GLOBAL STRATEGY AND TECHNOLOGY**
(Open Elective-2)
(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PREREQUISITES: --
COURSE DESCRIPTION: Introduction to strategic management; Strategic management process; Principles of good strategy; Globalization strategies; Research and Development strategies; Technology Management and Transfer; Elements of Transfer Process; Corporate Governance in the Indian scenario.
COURSE OUTCOMES: *After successful completion of the course, students will be able to:*
CO1. Demonstrate the knowledge on strategic management, its approaches, and tools through ethical decision making.
CO2. Analyze the globalization challenges for scrupulous selection of globalization strategies.
CO3. Apply the R&D strategies and trends to enhance the technological breakthroughs for new products and applications.
CO4. Demonstrate the knowledge on technology management and transfer that strengthen the economy and accelerate the application of technology and resources.
CO5. Analyze the challenges of corporate governance in Indian scenario for the effective development of value oriented organizations.

II B. Tech. - II Semester
(19BT40307) **MANAGEMENT SCIENCE**
(Open Elective-2)
(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --
COURSE DESCRIPTION: Concepts of Management; Concepts Related to ethics and social responsibility; Human Resource Management; Operations Management; Statistical Process Control; Inventory Management; Marketing; Project Management; Project Crashing.
COURSE OUTCOMES: *After successful completion of the course, students will be able to:*
CO1. Demonstrate the concepts of management, its functions and processes used in optimum resource utilization within the context of ethics and social responsibility.
CO2. Apply the concepts of HRM for selection and management of human resources.
CO3. Analyze different operations management problems using quality management tools to produce effective, efficient and adoptable products/services.
CO4. Identify different marketing strategies to maximize enterprise profitability and customer satisfaction within the realistic constraints.
CO5. Develop network models in time-cost tradeoff for effective project management.

II B. Tech. - II Semester
(19BT40504) **CYBER LAWS AND SECURITY**
(Open Elective-2)
(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --
COURSE DESCRIPTION: Evolution of Cyberspace, Jurisdiction in the borderless Cyberspace, E-Contracting, Models of E-Commerce, Modes of Electronic signatures, E-Money, Intellectual Property Rights, Cybercrimes, Privacy and data security.
COURSE OUTCOMES: *After successful completion of the course, students will be able to:*
CO1. Demonstrate knowledge on jurisdiction in cyberspace and the impact of cybercrime to protect privacy on the Internet.
CO2. Analyze the Indian cyber laws on E-Contracting, E-Commerce, E-signatures and E-money to promote digital law enforcement.
CO3. Apply the knowledge of digital rights in Indian context to protect intellectual properties in electronic world.
CO4. Practice ethics and cyber law regulations for leading electronic transactions on the Internet.

II B. Tech. – II Semester
(19BT50208) **INTELLECTUAL PROPERTY RIGHTS**
(Open Elective-2)
(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --
COURSE DESCRIPTION: Introduction to Intellectual Property; Trade Marks; Law of Copy Rights; Law of Patents; Trade Secrets; Unfair Competition; New Development of Intellectual Property.
COURSE OUTCOMES: *After successful completion of the course, students will be able to:*
CO1. Understand the concepts of intellectual property right and new amendments enforced in filling intellectual property right.
CO2. Understand the processes and principles of trade mark registration and apply them for registering trade mark.
CO4. Understand the process and principles of copy rights for registration and judicial consequences for violating laws of copyright/patents.
CO5. Understand the process and principles of trade secrets and judicial consequences for coping trade secrets.

II B. Tech. - II Semester
(19BT50409) **GREEN TECHNOLOGIES**
(Open Elective-2)
(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --
COURSE DESCRIPTION: Principles of green engineering; Green communications; Green energy; Green computing; Green construction; Green manufacturing.
COURSE OUTCOMES: *After successful completion of the course, students will be able to:*
CO1. Analyze energy efficient communication systems such as Telecommunication systems, ICT, Wireless networks and cellular networks by understanding the principles of green communications.
CO2. Understand the impact of conventional energy sources on environment and realize the significance and principles of green energy sources for sustainability.
CO3. Understand the environmental impacts of IT and approaches for Green IT.
CO4. Analyze concepts of sustainable green construction using appropriate tools and techniques following latest developments and considering safety and environment besides communicating effectively in graphical form.
CO5. Demonstrate the environmental impact of traditional manufacturing and explore the need for green manufacturing process promoting sustainability.

II B. Tech. – II Semester
(19BT40132) **FLUID MECHANICS AND HYDRAULIC MACHINERY LAB**
(Common to CE and ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES:
Courses on Fluid Mechanics, Hydraulic Engineering/Fluid Mechanics and Hydraulic Machinery
COURSE DESCRIPTION:
Calibration of flow meters; Verification of Bernoulli's equation; Performance of turbines and pumps; Losses through pipes.
COURSE OUTCOMES:
On successful completion of this course, the students will able to:
CO1. Evaluate fluid flow characteristics using appropriate tools and techniques to solve fluid mechanics problems by following latest developments and ensuring safety.
CO2. Evaluate the performance and behaviour of hydraulic machinery using appropriate tools and techniques to solve hydraulic machinery problems by following latest developments and ensuring safety.
CO3. Perform individually or in a team besides communicating effectively in written, oral and graphical forms on fluid mechanics and hydraulic machinery.

II B. Tech. – II Semester
(19BT40331) **DYNAMICS OF MACHINERY LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: A course on Basic Engineering Mechanics and Kinematics of Machinery.
COURSE DESCRIPTION:
Determination of gyroscopic couple; Unbalanced couple and forces in static and dynamic balancing of rotating masses; Radius of gyration of compound pendulum; Moment of inertia of a flywheel; mass moment of inertia and radius of gyration of bifilar suspension; Coriolis component of acceleration; Pressure distribution in journal bearing; sensitivity and effort for governors; cam - follower mechanism; Vibration parameters of spring mass system, single rotor shaft, two rotor systems, cantilever beam, fixed beam and whirling of shaft.
COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO1: Determine the characteristics of the control mechanisms such as Governors, Gyroscope, Cam-follower, flywheel and Journal bearings.
CO2: Analyze the unbalanced forces and couple in masses (Rotating & Reciprocating) in different planes and determine the position and direction of the given masses.
CO3: Calculate the vibration parameters of spring mass system, single rotor shaft, two rotor systems, cantilever beam, fixed beam and whirling of shaft.
CO4: Compute the mass moment of inertia and radius of gyration of bifilar suspension, simple pendulum, compound pendulum.
CO5: Analyze the effect of the Coriolis component of acceleration of the link and derive the equations for Coriolis force.
CO6: Work independently / in groups & communicate effectively in oral and written forms.

II B. Tech. – II Semester
(19BT40332) **ENGINEERING METROLOGY AND MACHINE TOOLS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: --
COURSE DESCRIPTION:
Demonstration on lathe; drilling; milling; slotting machine; shaper; grinding machine; milling machine; provides skill on making products using machines tools; Demonstration on Calibration of instruments

such as Vernier calipers, Micrometer, Vernier height gauge; Measure dimensions of shafts, bearings; Straightness and flatness measurements; Identifying uncertainties in dimensional metrology; Measurement of gear and threaded profiles.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO1. Design and model different components by performing metal cutting operations using machine tools with in the realistic constraints.

CO2. Determine physical parameters using tools, instruments and measurement systems in practical applications.

CO3. Work independently / in groups & communicate effectively in oral and written forms.

II B. Tech. – II Semester

(19BT3MC01) **ENVIRONMENTAL SCIENCE**

(Mandatory Course)

(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	-	40	2	-	-	-

PRE-REQUISITES: -

COURSE DESCRIPTION: Natural resources; Ecosystems; Biodiversity; Environment pollution and control; Social issues and environment; Human population and environment.

COURSE OUTCOMES:

On successful completion of this course, the students will be able to:

CO6: Analyze natural resources to solve complex environmental problems and natural resource management considering society, environment and sustainability.

CO7: Analyze ecosystems and biodiversity to solve complex environmental problems by following environmental ethics considering society, environment and sustainability besides communicating effectively in graphical form.

CO8: Analyze various types of pollution and their control measures to solve environmental problems through appropriate tools and techniques following latest developments considering society, ethics, environment and sustainability.

CO9: Analyze social issues and its impact on environment, environmental acts to solve complex environmental problems considering society, environment and sustainability besides communicating effectively in graphical form.

CO10: Analyze human population and its impact on environment to solve complex environmental problems through team work and using appropriate tools and techniques considering ethics, society, environment and sustainability.

Program: B.Tech. CIVIL ENGINEERING

I B. Tech. - I Semester
(19BT1BS01) **DIFFERENTIAL EQUATIONS AND MULTIVARIABLE CALCULUS**
(Common to CE, ME, EEE, ECE, EIE, CSE, CSSE, IT, CSE(AI) and CSE(DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES: -
COURSE DESCRIPTION: Ordinary Differential Equations; Partial Differential Equations; Multivariable Calculus (Differentiation); Multivariable Calculus (Integration); Multivariable Calculus (Vector Calculus).
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1: Formulate and solve differential equations by applying knowledge of calculus for engineering problems.
CO2: Demonstrate knowledge in multivariable calculus for evaluating multiple integrals through techniques of integration.
CO3: Identify scalar and vector valued functions and evaluate vector integrals through knowledge of vector integral theorems and techniques.

I B. Tech. - I Semester
(19BT1BS04) **ENGINEERING CHEMISTRY**
(Common to CE, ME, CSE, CSSE and IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Atomic Structure and Bonding Theories; Water Treatment; Electrochemistry and Applications; Corrosion; Instrumental Methods and Applications; Fuel chemistry and Lubricants.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Apply the basic knowledge of quantum mechanical approach to atomic structure and bonding theories to identify shapes of different orbitals and molecules.
CO2. Analyze and solve problems associated with hardness of water, boiler troubles and address the societal, health and safety issues related to quality of water.
CO3. Apply the basic knowledge of corrosion phenomenon to identify solutions for control of corrosion and demonstrate competency in the basic concepts of electrochemical cells.
CO4. Demonstrate the basic knowledge of instrumental methods and their applications in the structural analysis of materials.
CO5. Apply the basic knowledge of fuel chemistry and lubricants to identify the quality of fuels and lubricants.

I B. Tech – I Semester
(19BT1HS01) **COMMUNICATIVE ENGLISH**
(Common to CE, ME, CSE, CSSE, IT and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Introduction to communication; Active listening; Effective speaking; Reading; Technical writing.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1: Demonstrate knowledge of English language, examining and applying the aspects of Process of communication, Paralinguistic features, Skimming, Scanning, and Elements of style in writing.
CO2: Analyze the modes and techniques of listening, speaking, reading, writing and apply appropriately to communicate effectively with the engineering community and society.
CO3: Apply reading and writing techniques in preparing documents by examining SQ3R Technique, Writer’s Block, and Précis Writing.
CO4: Communicate effectively applying appropriate speaking techniques by examining and applying the communication styles in Conferences, Symposia, Seminars and Persuasive Speaking.

I B. Tech. – I Semester
(19BT10501) **PROGRAMMING FOR PROBLEM SOLVING**
(Common to CE, ME, CSE, CSSE, IT, CSE(AI) and CSE(DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES: A Course on Basic Mathematics
COURSE DESCRIPTION: Introduction to problem solving approach, Introduction to Python programming, control structures, sequences, sets, Dictionaries, Implementation of Data structures using Python, Modular programming, file handling, Data representation and Visualization.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Demonstrate knowledge on Python constructs to solve basic problems.
CO2. Develop and use Python modules to provide solutions to problems.

I B. Tech. - I Semester
(19BT1BS32) **ENGINEERING CHEMISTRY LAB**
(Common to CE, ME, CSE, CSSE and IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: -
COURSE DESCRIPTION: Estimation of hardness, alkalinity, dissolved oxygen of water samples, Iron, Strength of an acid in Pb-acid battery and residual chlorine in drinking water by volumetric methods; Measurement of viscosity of lubricants; Instrumental methods like conductivity meter, potentiometer, P^H meter and colorimeter; Characterization of simple organic compounds by UV-Vis and IR spectroscopy.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Apply analytical skills for the quantitative estimation of materials through volumetric methods of analysis and address the societal, health issues related to quality of water.
CO2. Develop analytical skills for the quantitative estimation of materials through instrumental methods of analysis.
CO3. Work independently and in teams to solve problems with effective communication.

I B. Tech. - I Semester
(19BT1HS31) **COMMUNICATIVE ENGLISH LAB**
(Common to CE, ME, CSE, CSSE, IT and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: -
COURSE DESCRIPTION: Phonetics; Vocabulary Building; Grammar; Just a Minute; Elocution/Impromptu; Giving Directions; Role Plays; Public Speaking; Describing Objects; Reading Comprehension; Listening Comprehension; Information Transfer; Letter Writing
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1 Demonstrate knowledge of Phonetics by examining and applying sounds of English in Phonetic Transcription.
CO2 Analyze sentence structures by applying and demonstrating the skills of Vocabulary and Grammar.
CO3 Apply appropriate listening and reading skills by analyzing the context and demonstrate in Listening Comprehension and Reading Comprehension.
CO4 Function effectively as an individual and as a member in diverse teams examining and applying speaking skills in Just A Minute and Role Play.
CO5 Communicate effectively applying appropriate writing and speaking techniques by examining and demonstrating knowledge through Describing Objects, Information Transfer and Letter Writing.

I B. Tech. – I Semester
(19BT10331) **COMPUTER AIDED ENGINEERING DRAWING**
(Common to CE, ME, CSE, CSSE and IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	1	2	2

PRE-REQUISITES:--
COURSE DESCRIPTION: Engineering drawing conventions; Importance of engineering drawing; fundamental concepts of sketching; computer aided drafting and different types of projections of geometric entities (both 2D and 3D) through computer aided drafting packages.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO12: Apply the principles of engineering drawing, Methods and CAD tools to draw the Geometries, Curves and Orthographic projections used to communicate in engineering applications.
CO13: Develop lateral surfaces of solids and draw Isometric views of given objects for engineering communication using principles of engineering drawing and CAD tools.
CO14: Work independently / in groups & communicate effectively in oral and written forms.

I B. Tech. – I Semester
(19BT10531) **PROGRAMMING FOR PROBLEM SOLVING LAB**
(Common to CE, ME, CSE, CSSE, IT, CSE(AI) and CSE(DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: A course on Basic Mathematics
COURSE DESCRIPTION: The course is designed to provide hands on practice on Scratch programming and python programming for problem solving.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Develop scripts using Scratch tool to simulate simple problems.
CO2. Apply Python Constructs and Modules to develop solutions for real-life problems.
CO3. Function effectively as an individual and in team to foster knowledge and creativity.
CO4. Write and present a substantial technical report/ document effectively.

I B. Tech. - II semester
(19BT2BS01) **TRANSFORMATION TECHNIQUES AND LINEAR ALGEBRA**
(Common to CE, ME, EEE, ECE, EIE, CSE, CSSE, IT, CSE(AI) and CSE(DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES: -
COURSE DESCRIPTION: Fourier Series and Fourier Transforms; Laplace Transforms; Inverse Laplace Transforms; Linear Algebra-I (Matrices); Linear Algebra-II (Vector Spaces).
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1: Apply the knowledge of Fourier and Laplace transform techniques to solve differential equations.
CO2: Analyze linear transformations and associated matrices to solve engineering problems by applying the knowledge of linear algebra.

I- B. Tech. - II Semester
(19BT1BS02) **BIOLOGY FOR ENGINEERS**
(Common to CE, ME, CSE, CSSE, IT and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	2	-	-	2

PRE-REQUISITES: --

COURSE DESCRIPTION: Living Organisms; Proteins, Nucleic acids and Enzymes; Genetics and Molecular Biology; Recombinant DNA technology; Human Physiology and Applied Biology.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Apply the basic knowledge of biology to understand the significance of various biological techniques.
CO2. Identify the role of DNA in the molecular basis of information transfer and understand single gene disorders related to the health perspective.
CO3. Apply the basic knowledge of bio-analytical devices and methods to assess health issues.

I B. Tech. – II Semester
(19BT2BS02) **APPLIED PHYSICS**
(Common to CE and ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --
COURSE DESCRIPTION: Fiber Optics; Acoustics and Ultrasonics; Kinematics and Kinetics; Thermal Physics; Modern Engineering Materials.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Apply the knowledge of fiber optics, acoustics and ultrasonics to provide solutions for various engineering problems.
CO2. Analyze and solve the problems associated with kinetics, kinematics and thermal physics.
CO3. Demonstrate the knowledge on characteristics and applications of modern engineering materials.

I B. Tech. – II Semester
(19BT10201) **BASIC ELECTRICAL AND ELECTRONICS ENGINEERING**
(Common to CE, ME, CSE, CSSE and IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --
COURSE DESCREPTION: Principles of Electrical Systems; AC Machines; Semiconductor Devices and Op-Amps.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO25. Analyze electrical circuits by applying the conceptual knowledge of circuit elements.
CO26. Demonstrate knowledge on various generation technologies, protection devices, safety procedures and BEE standards.
CO27. Demonstrate knowledge on characteristics and applications of transformers and AC machines.
CO28. Demonstrate knowledge on characteristics and applications of diode, BJT and Op-amps.

I B. Tech. – II Semester
(19BT20101) **CIVIL ENGINEERING MATERIALS AND CONCRETE TECHNOLOGY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Engineering Chemistry
COURSE DESCRIPTION: Stones; Bricks; Tiles; Timber; Miscellaneous Materials in Construction; Cement, Admixtures and Aggregates; Fresh and Hardened Concrete; Elasticity, Shrinkage, Creep and Concrete Mix Design.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1 Analyze civil engineering materials, fresh and hardened concrete using different tools/techniques for civil engineering construction considering codes of practice, environment and sustainability.
CO2 Design a concrete mix for civil engineering construction considering appropriate codes of practice.

I B. Tech. – II Semester
(19BT20102) **ENGINEERING MECHANICS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES: -
COURSE DESCRIPTION: Statics of Particles and Rigid Bodies; Support Reactions; Analysis of Perfect Frames; Friction; Centroid, Centre of Gravity and Moment of Inertia; Simple Stresses and Strains; Thin and Thick Cylinders.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Analyze engineering problems related to statics of particles and rigid bodies; friction; sectional properties; simple stresses and strains, for effective solutions.
CO2. Design cylinders for different engineering applications ensuring safety.

I B. Tech. – II Semester
(19BT2BS31) **APPLIED PHYSICS LAB**
(Common to CE and ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: --
COURSE DESCRIPTION: Determination of Moment of Inertia, Elastic Moduli, and Thermal properties of materials; Estimation of carrier concentration and energy gap of a semiconductor; Verification of Newton's Law of Cooling; Characteristics of Optical Fiber;
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Demonstrate the experimental procedures to compute the frequency of a tuning fork, hall coefficient, energy gap, moment of inertia, rigidity modulus and thermal conductivity of materials.
CO2. Apply skills to plot various characteristic curves of an optical Fiber and also determine thermal conductivity, thermo emf and energy gap.
CO3. Work independently and in teams to solve problems with effective communication.

I B. Tech. – II Semester
(19BT10231) **BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB**
(Common to CE, ME, CSE, CSSE and IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: Physics at intermediate level.
COURSE DESCREPTION: Practical investigations on Electrical circuits, AC Machines, Semiconductor Devices and Op-Amps.
COURSE OUTCOMES: After successful completion of the course, student will be able to:
CO4. Analyze, measure, interpret and validate the practical observations by applying the fundamental knowledge of electrical circuits, machines and electronic devices.
CO5. Design Op-amp based amplifier, voltage summer and integrator circuits for desired specifications.
CO6. Work independently and in teams to solve problems with effective communication.

I B. Tech. – II Semester
(19BT20331) **ENGINEERING WORKSHOP**
(Common to CE, ME, CSE, CSSE, IT, CSE(AI) and CSE(DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: --

COURSE DESCRIPTION: Knowledge on various workshop hand and power tools; hands on experience in different manufacturing trades such as fitting, carpentry, sheet metal forming and foundry; Demonstration on dismantling and assembling of various two wheeler parts, power tools in machining and metal joining, basics of plumbing and working of 3D printer.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO13. Design and model various basic prototypes in the trade of fitting such as square/half round mating, V- mating and dovetail mating from the given MS work pieces using fitting tools.

CO14. Develop different prototypes in the carpentry trade such as cross lap joint, dovetail / bridle joints and Mortise and Tenon joint using carpentry tools.

CO15. Design and model different prototypes in the sheet metal forming trade such as rectangular tray, square vessel/cylinder, Funnel as per the dimensions using sheet metal forming tools.

CO16. Develop sand mold using single piece pattern and split piece pattern in the foundry trade using foundry tools.

CO17. Demonstrate the knowledge on automobile parts, power tools, plumbing operation, 3D printing technology involved in different engineering applications.

CO18. Work independently / in groups & communicate effectively in oral and written forms.

I B. Tech. – II Semester

(19BT20131) **ENGINEERING GEOLOGY LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: -

COURSE DESCRIPTION: Study of physical properties and identification of minerals and rocks; Rock forming minerals; Ore forming minerals; Igneous rocks; Sedimentary rocks; Metamorphic rocks; Geological maps; Problems on structural geology; Norm form calculations; Resistivity survey.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Identify minerals and rocks using appropriate tools/techniques in order to understand the impact of geological features on civil engineering projects

CO2. Analyze structural geology problems for feasible inferences associated with civil engineering projects.

CO3. Develop and interpret geological sections from the geological maps for the benefit of civil engineering projects.

CO4. Perform individually or in a team besides communicating effectively in written, oral and graphical forms on geological information.

I B. Tech. - II Semester

(19BT1AC01) **SPOKEN ENGLISH**

(Audit Course)

(Common to CE, ME, CSE, CSSE, IT and CSBS**)**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	2	-	-	-

PRE-REQUISITES: -

COURSE DESCRIPTON: Functional English; Vocabulary Building; Functional Grammar-I; Functional Grammar – II; Communication Skills.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Demonstrate knowledge of grammar and vocabulary in writing effective formal letters and e-mails.

CO2. Communicate effectively by applying appropriate speaking and writing techniques by examining and applying functional English.

II B. Tech. - I Semester
(19BT3BS01) **NUMERICAL METHODS, PROBABILITY AND STATISTICS**
(Common to CE, ME, CSE, CSSE, IT, CSE(AI) and CSE(DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES: -
COURSE DESCRIPTION: Numerical solutions of equations; interpolation; numerical differentiation and integration; random variables; mathematical expectations; probability distributions; test of hypothesis.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1 Analyse the data and develop skills to solve equations and integrals by applying numerical methods.
CO2 Demonstrate knowledge in statistics and analyse the data for validations by applying statistical testing methods and distributions.

II B. Tech. – I Semester
(19BT30101) **CONSTRUCTION, PLANNING AND PROJECT MANAGEMENT**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Course on Civil Engineering Materials and Concrete Technology
COURSE DESCRIPTION: Masonry and Foundations; Building Components; Finishings; Shoring; Scaffolding; Form Work; Organization and Resource Management; Project Management; Network Development; PERT and CPM.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1 Characterize masonry, foundations and building components using various tools and techniques besides communicating effectively in graphical form.
CO2 Analyze finishings, shoring, scaffolding and form work using various tools and techniques and through continuous learning considering safety, environment and sustainability.
CO3 Analyze organization and resource management through various tools and techniques in accordance with legislative laws and amendments in construction practice ensuring safety and sustainability.
CO4 Develop charts and event networks using appropriate tools and techniques for solving complex construction project management problems besides communicating effectively in graphical form.
CO5 Develop event networks for analyzing critical path by using CPM and PERT techniques and interpret various parameters for effective project management besides communicating effectively in graphical form.

II B. Tech. – I Semester
(19BT30102) **FLUID MECHANICS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE - REQUISITES: Applied Physics
COURSE DESCRIPTION: Fluid properties and fluid statics; Fluid kinematics; Fluid dynamics; Closed conduit flow and flow measurement; Laminar and turbulent flows; Hydraulic similitude and model analysis.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1 Analyze fluid properties and fluid statics to solve complex problems using appropriate techniques.
CO2 Analyze fluid flows and forces in fluid kinematics and dynamics using appropriate techniques for solving complex fluid flow problems

CO3 Analyze conduit flow and its measurement to solve complex fluid flow problems using appropriate tools and techniques following latest developments.
CO4 Design pipes and piping systems to solve complex conduit flow problems suing appropriate techniques.
CO5 Analyze laminar and turbulent flows to solve complex fluid flow problems using appropriate techniques.
CO6 Analyze problems associated with hydraulic similitude and model studies to solve complex fluid mechanics problems using appropriate techniques.

II B.Tech. – I Semester
(19BT30103) **MECHANICS OF SOLIDS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES: Course on Engineering Mechanics
COURSE DESCRIPTION: Shear force and bending moment; Stresses in beams; Combined direct and bending stresses; Torsion; Springs; Principal stresses and strains; Theories of failures; Columns and struts.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Analyze shear force and bending moment distributions for determinate beams with different loadings to solve complex structural analysis problems besides communicating effectively in graphical form.
CO2. Design beams considering bending stresses, shear stress, strain energy and theories of failures to solve complex problems ensuring safety besides communicating effectively in graphical form.
CO3. Analyze direct and bending stresses for columns and chimneys ensuring safety besides communicating effectively in graphical form.
CO4. Design shafts and springs to solve complex problems ensuring safety.
CO5. Analyze principal stresses and strains for bars and beams ensuring safety besides communicating effectively in graphical form.
CO6. Analyze columns and struts for critical loads using appropriate methods ensuring safety.

II B.Tech. – I Semester
(19BT30104) **SURVEYING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Courses on Numerical Methods, Probability and Statistics; Applied Physics.
COURSE DESCRIPTION: Chain surveying; Compass surveying; Plane tabling; Levelling and contouring; Theodolite surveying; Tacheometric surveying; Computation of areas and volumes; Curves; Electronic distance measurement; Drone surveying.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1 Analyze chain, compass and plane table surveying techniques for measuring distances, horizontal angles and preparing plans to solve complex surveying problems following ethics and considering society, environment and sustainability besides communicating effectively in graphical form.
CO2 Analyze leveling and contouring techniques for finding elevations to solve complex surveying problems following ethics and considering society besides communicating effectively in graphical form.
CO3 Analyze theodolite and tacheometric surveying techniques for finding distances, angles and elevations to solve complex surveying problems following ethics and considering society besides communicating effectively in graphical form.
CO4 Compute areas and volumes to solve complex surveying problems associated with civil engineering applications using appropriate techniques following ethics and considering society besides communicating effectively in graphical form.
CO5 Design different types of curves to solve transportation engineering problems using appropriate techniques following ethics and considering society besides communicating effectively in graphical form.

CO6 Analyze EDM and drone surveying techniques for various applications following ethics and latest developments considering society besides communicating effectively in graphical form.

II B.Tech. – I Semester
(19BT3HS31) **SOFT SKILLS LAB**
(Common to CE, ME, EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: -
COURSE DESCRIPTION: Body Language; Assertiveness; Goal Setting; Thinking Skills; Team Building; Conflict Management; Technical Report Writing; Résumé Writing; Group Discussions; Interview Skills; Interpersonal Skills; Etiquette.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Demonstrate knowledge of career skills by examining and applying the styles and strategies of Goal Setting, Thinking Skills, and Etiquettes.
CO2. Analyze the limitations and possibilities of favourable situations by applying the skills of Body Language and demonstrate through Assertiveness, and Interpersonal Skills.
CO3. Apply appropriate soft skills by analyzing the problem situations that arise in professional career through demonstrating remedies in Conflict Management.
CO4. Demonstrate ability to function effectively as an individual and as a member in diverse teams examining and applying soft skills in Interviews, Group Discussion and Team Building.
CO5. Apply appropriate speaking and writing techniques in preparing documents and to communicate effectively by examining and demonstrating knowledge in Technical Report Writing and Résumé Writing.

II B.Tech. – I Semester
(19BT30131) **CIVIL ENGINEERING MATERIALS AND CONSTRUCTION TECHNOLOGY WORKSHOP**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: Course on Civil Engineering Materials and Construction Technology.
COURSE DESCRIPTION: Experiments/Exercises on Civil Engineering Materials, Construction Equipment, Masonry, Bar bending, Reinforcement, Painting, House wiring, Shuttering and Scaffolding; Tests on Cement, Fine aggregates, Fresh and hardened concrete; Elasticity; NDT; Mix design - IS method.
COURSE OUTCOMES: After completion of this course, a successful student will be able to:
CO1 Evaluate civil engineering materials using various tools/techniques to solve complex civil engineering material problems by following relevant IS codes and latest developments ensuring cost effectiveness, safety, environment and sustainability.
CO2 Analyze various construction techniques to solve complex construction technology problems by following current developments ensuring cost effectiveness, safety, environment and sustainability.
CO3 Design the concrete mix using IS-10262.
CO4 Perform individually or in a team besides communicating effectively in written, oral and graphical forms on civil engineering materials and construction technology.

II B. Tech. – I Semester
(19BT30132) **STRENGTH OF MATERIALS LAB**
(Common to CE and ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C

50	50	100	-	-	2	1

PRE-REQUISITES: Course on Mechanics of Solids/Strength of Materials.
COURSE DESCRIPTION: Tests on strength of materials**:** Tension test; Compression test; Bending test; Shear test; Torsion test; Hardness test; Verification of Maxwell reciprocal theorem.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO4. Evaluate the strength of materials such as steel, timber, metal using appropriate tools/techniques to solve complex problems in accordance with codal provisions ensuring safety.
CO5. Evaluate the load-deflection behavior for the materials used in beams and springs using appropriate tools/techniques to solve complex problems in accordance with codal provisions ensuring safety.
CO6. Perform material testing individually or in a team besides communicating effectively in written, oral and graphical forms on strength of materials.

II B. Tech. – I Semester
(19BT30133) **SURVEYING LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: Course on Surveying
COURSE DESCRIPTION: Exercises on Chain surveying; Compass surveying; Plane table surveying; Auto Levelling; Theodolite surveying; Total station surveying; Drone surveying.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1 Develop survey plots using chain, compass, plane table, theodolite, total station and drone surveying techniques to solve complex surveying problems following ethics and latest developments considering society, environment and sustainability.
CO2 Develop contour maps using auto level, total station and drone surveying techniques to solve complex surveying problems following ethics and latest developments considering society, environment and sustainability.
CO3 Design simple curves to solve transportation engineering problems using appropriate techniques following ethics and considering society.
CO4 Analyze survey plots for areas using planimeter tool to solve complex surveying problems following ethics and considering society.
CO5 Perform individually or in a team besides communicating effectively in written, oral and graphical forms on surveying practice.

II B. Tech.–I Semester
(19BT315AC) **DESIGN THINKING**
(Audit Course)
(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	2	-	-	-

PRE-REQUISITES: -
COURSE DESCRIPTION:
Design thinking process, Design thinking phases, empathy tools; Idea generation, visualizing and empathizing; Fidelity for prototypes, prototyping; prototyping for physical products.
COURSE OUTCOMES: After successful completion of this course, the students will be able to:

CO1 Analyze design thinking concepts and principles to perform human centered design process for creative problem solving.
CO2 Create empathy maps to visualize user attitudes and behavior for gaining insights of customers.
CO3 Develop innovative products or services for a customer base using ideation techniques.
CO4 Build prototypes for complex problems using gathered user requirements.
CO5 Apply design thinking tools techniques to produce good design and relevant products or services for a specific target market.
CO6 Improve prototype by testing it with a specific set of users for making it sustainable by following ethics.

II B.Tech.– II Semester
(19BT40101) ENGINEERING HYDROLOGY

Internal Marks	External Marks	Total Marks	L	T	P	C
40	60	100	3	-	–	3

PRE-REQUISITES: Course on Fluid Mechanics
COURSE DESCRIPTION: Hydrologic cycle; Applications and history; Weather and seasons in India; Precipitation; Evaporation; Evapotranspiration; Runoff; Streamflow; Groundwater hydrology; Hydrograph analysis; Design flood; Erosion; Reservoir sedimentation.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1 Analyze hydrologic cycle and precipitation to solve complex hydrology problems using appropriate techniques considering environment and sustainability besides communicating effectively in graphical form.
CO2 Analyze abstractions from Precipitation and runoff using appropriate tools and techniques for solving complex hydrology problems considering safety, environment and sustainability besides communicating effectively in graphical form.
CO3 Analyze groundwater hydrology to solve complex problems using appropriate tools and techniques following latest developments and considering safety, environment and sustainability besides communicating effectively in graphical form.
CO4 Analyze hydrographs using appropriate techniques to solve complex hydrology problems considering environment and sustainability besides communicating effectively in graphical form.
CO5 Design floods using appropriate techniques to solve flood routing problems following ethics and considering safety, environment and sustainability besides communicating effectively in graphical form.
CO6 Analyze erosion and reservoir sedimentation to solve complex problems using appropriate techniques and considering safety, environment and sustainability besides communicating effectively in graphical form.

II B.Tech. – II Semester
(19BT40102) **ENVIRONMENTAL ENGINEERING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PREREQUISITES: Environmental Science
COURSE DESCRIPTION: Water Sources, Quality and Quantity, Intakes; Water Treatment and Distribution Systems; Sewage Characteristics, Collection and Quantity; Sewage Treatment; Sewage Effluent, Sludge Treatment and Disposal.
COURSE OUTCOMES: On successful completion of the course, the students will be able to:
CO1 Analyze water sources, quality and quantity using different tools and techniques for solving water supply problems considering codes of practice, public health and safety, environment and sustainability.
CO2 Design water treatment and distribution systems using different methods to solve water supply problems by following current developments and considering codes of practice, public health and safety, environment and sustainability besides communicating graphically.
CO3 Design sewage collection systems for treatment and disposal to solve complex problems considering appropriate methods, code of practices, public health and safety, environment and sustainability.
CO4 Design sewage treatment and sludge digestion units to solve complex problems by following latest developments and considering code of practices, public health and safety, environment and sustainability besides communicating graphically.
CO5 Analyze sewage effluent, sludge treatment and disposal, house drainage plumbing systems in buildings using different tools and techniques considering codes of practice, health and safety, environment and sustainability besides communicating graphically.

II B. Tech. – II Semester
(19BT40103) **HYDRAULIC ENGINEERING**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Course on Fluid Mechanics
COURSE DESCRIPTION: Boundary layer theory; Open channel flow; Impact of jet on vanes; Hydraulic turbines; Pumps.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1 Analyze boundary layer problems to solve complex hydraulic engineering problems using appropriate techniques besides communicating effectively in graphical form..
CO2 Design open channels using appropriate tools and techniques for solving complex open channel problems considering safety, environment and sustainability besides communicating effectively in graphical form.
CO3 Analyze impact of jet on vanes to solve complex fluid flow problems using appropriate techniques considering safety besides communicating effectively in graphical form.
CO4 Design hydraulic turbines using appropriate techniques to solve hydraulic engineering problems considering safety, environment and sustainability besides communicating effectively in graphical form.
CO5 Design pumps to solve hydraulic engineering problems using appropriate techniques following latest developments and considering safety, environment and sustainability besides communicating effectively in graphical form.

II B. Tech. – II Semester
(19BT40104) **SOIL MECHANICS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES:-Courses on Engineering Mechanics, Engineering Geology Lab.
COURSE DESCRIPTION: Basic principles of soil mechanics and their application in engineering practice; Index properties; Engineering properties - Permeability and Seepage, Stress distribution and Compaction, Consolidation, Shear strength.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1 Analyze index properties of soil using appropriate tools and techniques to solve complex soil engineering problems by following the relevant codes of practice and through continuous learning ensuring cost effectiveness besides communicating effectively in graphical form.
CO2 Analyze permeability and seepage through soils using appropriate tools and techniques to solve complex soil engineering problems by following the relevant codes of practice and ensuring safety, environment and sustainability besides communicating effectively in graphical form.
CO3 Analyze stress distribution and compaction characteristics of soils using appropriate tools and techniques to solve complex soil engineering problems by following the relevant codes of practice and latest developments ensuring safety, environment and sustainability besides communicating effectively in graphical form.
CO4 Analyze consolidation characteristics of soils using appropriate tools and techniques to solve complex soil engineering problems by following the relevant codes of practice ensuring safety, environment and sustainability besides communicating effectively in graphical form.
CO5 Analyze shear strength characteristics of soils using appropriate tools and techniques to solve complex soil engineering problems by following the relevant codes of practice and ensuring safety, environment and sustainability besides communicating effectively in graphical form.

II B. Tech. – II Semester
(19BT40105) **STRUCTURAL ANALYSIS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	--	4

PRE-REQUISITES: Courses on Engineering Mechanics, Mechanics of Solids

COURSE DESCRIPTION: Deflection of beams; Energy method; Fixed beams; Clapeyron's theorem; Slope deflection method; Moment distribution method; Kani's method; Moving loads and influence lines; Plastic analysis.

COURSE OUTCOMES: On successful completion of this course, the students will be able to:

CO1 Analyze slope and deflection of beams and pin-jointed trusses to solve complex structural analysis problems using various methods besides communicating effectively in graphical form.

CO2 Analyze fixed beams using force method to solve complex structural analysis problems besides communicating effectively in graphical form.

CO3 Analyze continuous beams using various methods to solve complex structural analysis problems besides communicating effectively in graphical form.

CO4 Analyze determinate beams using the concept of moving loads and influence lines to solve complex structural analysis problems besides communicating effectively in graphical form.

CO5 Analyze beams using plastic analysis technique to solve complex structural failures ensuring safety besides communicating effectively in graphical form.

II B. Tech. – II Semester

(19BT4HS01) **BANKING AND INSURANCE**

(Open Elective-2)

(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --

COURSE DESCRIPTION: Scope, Objectives and Elements of cost Accounting; Cost Sheet and Tender quotations; Variance Analysis: Material variances, Labor variances; Meaning and Scope, Liquidity, Profitability Ratios: concept of Risk and Return on Investment.

COURSE OUTCOMES: *After successful completion of the course, students will be able to:*

CO1. Demonstrate knowledge in concepts and functions of Banking and Insurance, RBI, bank and customer relationship, types of accounts, types of loans and advances, types of insurance and risk.

CO2. Develop skills to provide solutions in electronic payment system, business models and insurance claims.

II B. Tech. – II Semester

(19BT4HS03) **COST ACCOUNTING AND FINANCIAL MANAGEMENT**

(Open Elective-2)

(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --

COURSE DESCRIPTION: Scope, Objectives and Elements ofcost Accounting; Cost Sheet and Tender quotations; Variance Analysis: Material variances, Labor variances; Meaning and Scope, Liquidity, Profitability Ratios: concept of Risk and Return on Investment.

COURSE OUTCOMES: *After successful completion of the course, students will be able to:*

CO1. Demonstrate knowledge in Costing, Material, Labor, Overheads, Cost control, risk and return, security analysis and portfolio management.

CO2. Design solutions for effective investment decisions, cost analysis, tenders, quotations, variance analysis, ratio analysis and capital budgeting techniques.

II B. Tech. - II Semester

(19BT4HS05) **GENDER AND ENVIRONMENT**

(Open Elective-2)

(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --

COURSE DESCRIPTION: Gender and the environment relationship, Gendered Roles in the family & community, Gender and sustainable development, Gender in environmental justice, Gender &environmental security.

COURSE OUTCOMES: *After successful completion of the course, students will be able to:*

CO1. Apply the knowledge of gender & environment connections, key issues and topics within global environmental politics in environmental decision-making.

CO2. Comprehend the concepts of gender and sustainable development through debates, and policy documents.

CO3. Analyze the concept of environmental security and justice by identifying the sources of insecurity.

II B. Tech. – II Semester

(19BT4HS07) **INDIAN ECONOMY**

(Open Elective-2)

(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --

COURSE DESCRIPTION: Introduction; Time Value of Money; Elementary Economic Analysis; Value Analysis/Value Engineering; Economic Planning.

COURSE OUTCOMES: *After successful completion of the course, students will be able to:*

CO1. Understand the basic concepts of economics, economic analysis, economic planning and strate.

CO2. Demonstrate knowledge in capital budgeting, evaluation of engineering projects, depreciation policy and familiarize with the concepts of value analysis vs value engineering.

II B. Tech. – II Semester

(19BT4HS09) **LIFE SKILLS**

(Open Elective-2)

(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --

COURSE DESCRIPTION: Positive attitude; Self-discovery-Interpersonal relationships; Cross-cultural communication; Core thinking-Problem solving and Decision making; Business presentations and Public speaking.

COURSE OUTCOMES: *After successful completion of the course, students will be able to:*

CO1. Gain knowledge in strategies involved in developing positive attitude, process of knowing oneself and managing effective interpersonal relationships.

CO2. Analyse problem solving strategies in Decision Making and SWOT analysis.

CO3. Communicate effectively with Engineering Community and Society by demonstrating presentation skills in professional arena.

II B. Tech. – II Semester

(19BT4HS11) **PROFESSIONAL ETHICS**

(Open Elective-2)

(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --

COURSE DESCRIPTION: Engineering Ethics; Professional Ideals and Virtues; Engineering as Social Experimentation; Responsibilities and Rights; Global Issues.

COURSE OUTCOMES: *After successful completion of the course, students will be able to:*

CO1. Demonstrate knowledge in Engineering Ethics, Responsibilities and Rights.

CO2. Analyze the concepts of Engineering in Social Experimentation and Global Issues.

CO3. Apply the nuances of professional ideals at work place and in social context.

II B. Tech. – II Semester

(19BT4HS13) **INDIAN TRADITION AND CULTURE**

(Open Elective-2)

(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --

COURSE DESCRIPTION: Basic traits of Indian Culture; Humanistic Reforms under Jainism and Buddhism; Culture in the medieval period; Socio Religious reforms in Indian Culture; Reform movements for harmonious relations.

COURSE OUTCOMES: *After successful completion of the course, students will be able to:*

CO1. Demonstrate the knowledge in Vedic culture, cultural aspects of Buddhism, Jainism and cultural conditions in the medieval period.

CO2. Understand the impact of socio religious reforms and movements on Indian tradition and culture to improve harmonious relations within society.

II B. Tech. - II Semester

(19BT40106) **DISASTER MITIGATION AND MANAGEMENT**

(Open Elective-2)

(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --

COURSE DESCRIPTION: Disasters; Earthquakes; Floods; Cyclones; Droughts; Landslides; Disaster management.

COURSE OUTCOMES: *After successful completion of the course, students will be able to:*

CO1. Analyze the vulnerability of an area to natural and man-made disasters/hazards as per the guidelines to solve complex problems using appropriate techniques ensuring safety, environment and sustainability.

CO2. Propose appropriate mitigation strategies for earthquake and tsunami impacts as per code of practice using suitable techniques ensuring safety, environment and sustainability besides communicating effectively in graphical form.

CO3. Analyze the causes and impacts of floods, cyclones and droughts using appropriate tools and techniques and suggest mitigation measures ensuring safety, environment and sustainability besides communicating effectively in graphical form.

CO4. Analyze the causes and impacts of landslides using appropriate tools and techniques and suggest mitigation measures ensuring safety, environment and sustainability.

CO5. Design disaster management strategies to solve pre, during and post disaster problems using appropriate tools and techniques following the relevant guidelines and latest developments ensuring safety, environment and sustainability besides communicating effectively in graphical form.

II B. Tech. - II Semester

(19BT40107) **SUSTAINABLE ENGINEERING**

(Open Elective-2)

(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --

COURSE DESCRIPTION: Principles of sustainability; Sustainability metrics and assessment tools; Sustainable engineering practices; Sustainable engineering applications; Sustainable urbanization and industrialization.

COURSE OUTCOMES: *After successful completion of the course, students will be able to:*

CO1. Analyze the principles of sustainability to solve complex environmental problems following relevant standards/protocols considering society, health, safety and environment.

CO2. Analyze sustainability metrics and assessment tools to solve complex environmental problems following relevant standards and emerging trends considering society, health, safety, environment and economics besides communicating effectively in graphical form.

CO3. Analyze sustainable engineering practices to solve complex environmental problems using appropriate tools and techniques following relevant standards considering society, health, safety, environment, economics and management besides communicating effectively in graphical form.

CO4. Design sustainable engineering applications to solve complex environmental problems using appropriate tools and techniques following relevant standards considering society, health, safety, environment, economics and management besides communicating effectively in graphical form.

CO5. Analyze sustainable urbanization and industrialization principles to solve complex environmental problems using appropriate tools and techniques following relevant standards considering society, health, safety, environment, economics and management besides communicating effectively in graphical form.

II B. Tech. - II Semester

(19BT40108) **CONTRACT LAWS AND REGULATIONS**

(Open Elective-2)

(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --

COURSE DESCRIPTION: Construction contracts; Tenders; Arbitration; Legal requirements; Labour regulations.

COURSE OUTCOMES: *After successful completion of the course, students will be able to:*

CO1. Develop construction contracts to solve complex contract related problems by following laws and regulations considering project schedule, cost, quality and risk.

CO2. Prepare tenders as per the specifications by following latest developments, laws and regulations to solve complex tender problems considering project schedule, cost, quality and risk.

CO3. Analyze arbitration problems to address the contract disputes following the laws and regulations in the context of society.

CO4. Analyze legal issues pertaining to contracts and tenders considering society.

CO5. Analyze labour regulations to address labour safety issues.

II B. Tech. - II Semester

(19BT40306) **GLOBAL STRATEGY AND TECHNOLOGY**

(Open Elective-2)

(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PREREQUISITES: --

COURSE DESCRIPTION: Introduction to strategic management; Strategic management process; Principles of good strategy; Globalization strategies; Research and Development strategies; Technology Management and Transfer; Elements of Transfer Process; Corporate Governance in the Indian scenario.

COURSE OUTCOMES: *After successful completion of the course, students will be able to:*

CO1. Demonstrate the knowledge on strategic management, its approaches, and tools through ethical decision making.

CO2. Analyze the globalization challenges for scrupulous selection of globalization strategies.

CO3. Apply the R&D strategies and trends to enhance the technological breakthroughs for new products and applications.

CO4. Demonstrate the knowledge on technology management and transfer that strengthen the economy and accelerate the application of technology and resources.

CO5. Analyze the challenges of corporate governance in Indian scenario for the effective development of value oriented organizations.

II B. Tech. - II Semester

(19BT40307) **MANAGEMENT SCIENCE**

(Open Elective-2)

(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --

COURSE DESCRIPTION: Concepts of Management; Concepts Related to ethics and social responsibility; Human Resource Management; Operations Management; Statistical Process Control; Inventory Management; Marketing; Project Management; Project Crashing.

COURSE OUTCOMES: *After successful completion of the course, students will be able to:*

CO1. Demonstrate the concepts of management, its functions and processes used in optimum resource utilization within the context of ethics and social responsibility.

CO2. Apply the concepts of HRM for selection and management of human resources.

CO3. Analyze different operations management problems using quality management tools to produce effective, efficient and adoptable products/services.

CO4. Identify different marketing strategies to maximize enterprise profitability and customer satisfaction within the realistic constraints.

CO5. Develop network models in time-cost tradeoff for effective project management.

II B. Tech. - II Semester

(19BT40504) **CYBER LAWS AND SECURITY**

(Open Elective-2)

(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --

COURSE DESCRIPTION: Evolution of Cyberspace, Jurisdiction in the borderless Cyberspace, E-Contracting, Models of E-Commerce, Modes of Electronic signatures, E-Money, Intellectual Property Rights, Cybercrimes, Privacy and data security.

COURSE OUTCOMES: *After successful completion of the course, students will be able to:*

CO1. Demonstrate knowledge on jurisdiction in cyberspace and the impact of cybercrime to protect privacy on the Internet.

CO2. Analyze the Indian cyber laws on E-Contracting, E-Commerce, E-signatures and E-money to promote digital law enforcement.

CO3. Apply the knowledge of digital rights in Indian context to protect intellectual properties in electronic world.

CO4. Practice ethics and cyber law regulations for leading electronic transactions on the Internet.

II B. Tech. – II Semester

(19BT50208) **INTELLECTUAL PROPERTY RIGHTS**
(Open Elective-2)
(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --
COURSE DESCRIPTION: Introduction to Intellectual Property; Trade Marks; Law of Copy Rights; Law of Patents; Trade Secrets; Unfair Competition; New Development of Intellectual Property.
COURSE OUTCOMES: *After successful completion of the course, students will be able to:*
CO1. Understand the concepts of intellectual property right and new amendments enforced in filling intellectual property right.
CO2. Understand the processes and principles of trade mark registration and apply them for registering trade mark.
CO4. Understand the process and principles of copy rights for registration and judicial consequences for violating laws of copyright/patents.
CO5. Understand the process and principles of trade secrets and judicial consequences for coping trade secrets.

II B. Tech. - II Semester
(19BT50409) **GREEN TECHNOLOGIES**
(Open Elective-2)
(Common to CE, ME, CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --
COURSE DESCRIPTION: Principles of green engineering; Green communications; Green energy; Green computing; Green construction; Green manufacturing.
COURSE OUTCOMES: *After successful completion of the course, students will be able to:*
CO1. Analyze energy efficient communication systems such as Telecommunication systems, ICT, Wireless networks and cellular networks by understanding the principles of green communications.
CO2. Understand the impact of conventional energy sources on environment and realize the significance and principles of green energy sources for sustainability.
CO3. Understand the environmental impacts of IT and approaches for Green IT.
CO4. Analyze concepts of sustainable green construction using appropriate tools and techniques following latest developments and considering safety and environment besides communicating effectively in graphical form.
CO5. Demonstrate the environmental impact of traditional manufacturing and explore the need for green manufacturing process promoting sustainability.

II B.Tech. - II Semester
(19BT40131) **ENVIRONMENTAL ENGINEERING LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PREREQUISITES: Course on Environmental Engineering.
COURSE DESCRIPTION: Experimental analysis of physical, chemical and biological parameters of water and wastewater; Analysis of an ambient air quality.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1. Evaluate water using various tools and techniques to solve complex water problems by following the standard procedures/norms and latest developments ensuring safety, environment and sustainability.
CO2. Evaluate wastewater using various tools and techniques to solve complex wastewater problems by following the standard procedures/norms and latest developments ensuring safety, environment and sustainability.
CO3. Perform individually or in a team besides communicating effectively in written, oral and graphical forms on water supply and wastewater engineering.

II B.Tech. – II Semester
(19BT40132) **FLUID MECHANICS AND HYDRAULIC MACHINERY LAB**
(Common to CE and ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: Courses on Fluid Mechanics, Hydraulic Engineering/Fluid Mechanics and Hydraulic Machinery.
COURSE DESCRIPTION: Calibration of flow meters; Verification of Bernoulli's equation; Performance of turbines and pumps; Losses through pipes.
COURSE OUTCOMES: On successful completion of this course, the students will able to:
CO1 Evaluate fluid flow characteristics using appropriate tools and techniques to solve fluid mechanics problems by following latest developments and ensuring safety.
CO2 Evaluate the performance and behaviour of hydraulic machinery using appropriate tools and techniques to solve hydraulic machinery problems by following latest developments and ensuring safety.
CO3 Perform individually or in a team besides communicating effectively in written, oral and graphical forms on fluid mechanics and hydraulic machinery.

II B.Tech.–II Semester
(19BT40133) **GEOTECHNICAL ENGINEERING LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	–	–	2	1

PREREQ
UISITES: Course on Soil Mechanics.
COURSE DESCRIPTION: Experiments on the determination of index properties and engineering properties of soil.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO1 Evaluate index properties of soil using appropriate tools and techniques to solve complex soil engineering problems by following the relevant codes of practice and through continuous learning ensuring safety and environment.
CO2 Evaluate engineering properties of soil using appropriate tools and techniques to solve complex soil engineering problems by following the relevant codes of practice and through continuous learning ensuring safety and environment.
CO3 Perform individually or in a team besides continuous learning and communicating effectively in written, oral and graphical forms on civil engineering materials and construction technology.

II B.Tech. II Semester
(19BT3MC01) **ENVIRONMENTAL SCIENCE**
(Mandatory Course)
(Common to CE, ME, CSE, CSSE, IT, CSE(AI), CSE(DS) and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	-	40	2	-	-	-

PRE-REQUISITES: -
COURSE DESCRIPTION: Natural resources; Ecosystems; Biodiversity; Environment pollution and control; Social issues and environment; Human population and environment.
COURSE OUTCOMES: On successful completion of this course, the students will be able to:
CO6 Analyze natural resources to solve complex environmental problems and natural resource management considering society, environment and sustainability.

CO7	Analyze ecosystems and biodiversity to solve complex environmental problems by following environmental ethics considering society, environment and sustainability besides communicating effectively in graphical form.
CO8	Analyze various types of pollution and their control measures to solve environmental problems through appropriate tools and techniques following latest developments considering society, ethics, environment and sustainability.
CO9	Analyze social issues and its impact on environment, environmental acts to solve complex environmental problems considering society, environment and sustainability besides communicating effectively in graphical form.
CO10	Analyze human population and its impact on environment to solve complex environmental problems through team work and using appropriate tools and techniques considering ethics, society, environment and sustainability.

Course Outcomes
(PG Programmes)

SREE VIDYANIKETHAN ENGINEERING COLLEGE
(AUTONOMOUS)
Sree Sainath Nagar, A.Rangampet – 517 102 (A.P.)

(AFFILIATED TO JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR, ANANTHAPURAMU)

Program: M.Tech. DIGITAL ELECTRONICS AND COMMUNICATION SYSTEMS

M.Tech. - I Semester
(19MT13801) ADVANCED DIGITAL SIGNAL PROCESSING
(Common to DECS & CMS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES:
Course on Digital Signal Processing at UG level
COURSE DESCRIPTION:
Digital filter banks; Parametric and Non-Parametric Power Spectrum Estimation methods; computationally efficient algorithms; Applications of DSP.
COURSE OBJECTIVES:
CEO1: To impart advanced knowledge in Digital Signal Processing and applications
CEO2: To develop skills in design, analysis, problem solving and research in Multirate Signal Processing, Linear prediction, Power Spectral Estimation and Communications.
COURSE OUTCOMES:
After successful completion of the course, student will be able to:
CO1: Analyze sampling rate conversion, various DSP algorithms and design digital Filter Banks to improve performance characteristics of digital systems in multidisciplinary environments like image processing, wireless communication, biomedical engineering, speech processing, video processing, etc
CO2: Realize, compare and estimate power spectrum using different Non-Parametric and Parametric Methods in the frequency analysis of systems.
CO3: Understand Linear Prediction, analyze Lattice Forward and Backward Predictors for Radar signal Processing and Remote sensing.
CO4: Apply signal processing techniques in fields such as communications, speech processing, Image and video processing.

M.Tech. - I Semester
(19MT13802*)* ADVANCED DIGITAL SYSTEM DESIGN

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES:
A Course on Switching Theory and Logic Design at UG Level.
COURSE DESCRIPTION:
ASM Charts; Fault Modelling; Fault Diagnosis; PLA minimization; cycles and hazards
COURSE OBJECTIVES:
To impart the knowledge in identifying various faults, test generation algorithms, PLD'S, BIST.
CEO1: To develop skills in analyzing, design of complex digital systems and solve different engineering problems.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
CO1: Design digital systems using ASM Charts, ROMs, PLAs, CPLDs and FPGAs and modeling them in HDL.
CO2: Classify Fault Models and diagnose the Combinational Circuits using Conventional Methods.
CO3: Use appropriate approaches to Perform Fault diagnosis of Sequential Circuits.
CO4: Model faults in Programmable Logic Arrays, apply appropriate methods to Minimize and test them.
CO5: Apply Appropriate Methods to reduce incompletely specified machines and overcome races, hazards and cycles.

M.Tech. - I Semester
(19MT13803) DIGITAL COMMUNICATION SYSTEMS
(Common to DECS & CMS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --
A Course on Digital Communications at UG Level**,** Review of random Variables and Processes
COURSE DESCRIPTION:
Band pass signals and systems; Digital modulation techniques; Design of optimum receivers; Generation and detection of spread spectrum signals.
COURSE OBJECTIVES:
CEO1: To impart knowledge on Characterizing and analyzing the Communication Signals and Systems, Digital modulation techniques and Communication over AWGN channels
CEO2: To design optimum Receivers for the Additive Gaussian Noise Channel and Solve the problems in Spread Spectrum Technique and Multichannel and Multicarrier Systems Digital Modulation Techniques;
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
CO1 : Demonstrate in-depth knowledge on response of systems for Band Pass, signal space and multidimensional representations of signals.
CO2 : Analyze various digital Modulation Techniques to improve the performance of digital communication systems.
CO3 : Analyze the performance of optimum receiver for Signals with Random Phase in AWGN Channel.
CO4 : Apply Spread Spectrum techniques in Anti jamming Application, Low-Detectability Signal Transmission and Code Division Multiple Access.
CO5 : Analyze the performance of Multichannel and Multicarrier systems.

M.Tech. - I Semester
(19MT15707) FPGA ARCHITECTURES
(Common to DECS & VLSI)
(Program Elective-1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES:
Courses on Digital Logic Design and VLSI Design at UG Level.
COURSE DESCRIPTION:
Evolution of Programmable Devices, Xilinx, Actel, Altera FPGAs, Logic Synthesis, Technology Mapping, Finite State Machines, Realizations of SM Charts, One Hot Method, System level Design, Device Applications-Fast Bus Controller, FIFO Controller & Intelligent I/O Subsystem
COURSE OBJECTIVES:
CEO1. To impart knowledge in architectures and applications of various families of CPLDs and FPGAs.
CEO2. To develop skills in design, analysis and problem solving for implementation and verification of functions in CPLDs/FPGAs.
CEO3. Apply knowledge and skills for performance analysis in the design of FSMs.
COURSE OUTCOMES:
After successful completion of the course, student will be able to:
CO1. Analyze the placement and routing architectures of different programmable gate arrays to

improve performance characteristics of digital systems

CO2. Realize, compare and estimate the technology mapping issues in CPLDs and FPGAs.

CO3. Understand state machine charts and its realizations to evaluate the performance of device applications.

CO4. Analyze various FSM architectures and system level design.

CO5. Understand various device applications used in communications, speech processing, Image and video processing.

M.Tech. – I/II Semester
(19MT13804) IMAGE & VIDEO PROCESSING
(Common to DECS & CMS)
(Program Elective-1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES:
A Course on Digital Communications & Digital Signal Processing at UG Level

COURSE OBJECTIVES:

CEO1: To impart knowledge in fundamentals that helps in developing various algorithms pertaining to Image and Video Processing.

CEO2: To attain skills required for analysis, design and problem solving by the use of techniques required for modeling of image and video processing.

CEO3: To inculcate attitude for providing solutions for societal use in the area of image and video processing.

COURSE OUTCOMES:
After completion of this course, student will be able to:

CO1: Apply sampling, quantization, transformation and filtering techniques on image & video.

CO2: Analyze Image enhancement, restoration, segmentation techniques for improving visual quality of image

CO3: Analyze compression techniques to reduce the storage capacity of image

CO4: Develop three dimensional motion models, motion estimation methods and filtering techniques in video processing.

M.Tech. - I Semester
(19MT13805) INFORMATION THEORY AND CODING TECHNIQUES
(Program Elective-1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES:
A Course on Digital Communications at UG Level

COURSE OBJECTIVES:

CEO1: To impart knowledge in Various aspects of Entropy, Channel capacity, source and Channel coding techniques, Performance evaluation of various source coding technique

CEO2: To develop skills in design, analysis and problem solving related to Channel Capacity and Channel coding techniques.

CEO3: Apply knowledge and skills for performance analysis of digital systems using Linear Block Codes, Convolution Codes, BCH codes, RS Codes etc.

COURSE OUTCOMES:
After successful completion of the course, student will be able to:

CO1: Analyze Differential Entropies, mutual information and lossless source codes to improve Error performance characteristics of digital systems in environments like wireless communication, Digital audio and video processing systems.

CO2: Analyze channel capacity using channel codind theorems in Gaussian channels.

CO3: Analyze various Channel Coding Techniques for Error Detection and correction in signal processing and communications.

M.Tech. - I Semester

(19MT15708) LOW POWER CMOS VLSI DESIGN

(Common to DECS & VLSI)

(Program Elective-2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES:

A Course on VLSI Design at UG Level

COURSE DESCRIPTION:

Need for low power VLSI chips, Sources of Power dissipation in MOS & CMOS Devices, Power Estimation, Synthesis of low power VLSI Circuits, Design of low power VLSI Circuits, Low power Memory Architectures, Energy recovery Circuits, Software design of low power VLSI Circuits.

COURSE OBJECTIVES:

CEO1: To impart advanced knowledge in low power CMOS Circuits.

CEO2: To develop skills in design, analysis and problem solving related to high performance and low power devices.

CEO3: Apply knowledge and skills pertaining to low voltage CMOS circuit design for for wide range of IC applications.

COURSE OUTCOMES:

After successful completion of the course, student will be able to:

CO1: Analyze the various power dissipation effects and estimation methods in CMOS VLSI Circuits to improve the performance characteristics of digital systems.

CO2: Understand the various design styles and synthesis of low power and low voltage CMOS VLSI circuits.

CO3: Analyze the various low power Static RAM architectures in design and development of Ultra Low power Integrated Circuits.

CO4: Apply energy recovery techniques to evaluate the performance of low power VLSI Circuits for scientific research in design and development of digital systems.

M.Tech. - I Semester

(19MT13806) ADAPTIVE SIGNAL PROCESSING

(Common to DECS & CMS)

(Program Elective-2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES:

A Course on Signal Processing at UG Level

COURSE DESCRIPTION:

Development of adaptive filter theory; Method of steepest descent;Least-Mean-Square Algorithm and recursive least square algorithm; Kalman filtering algorithm; order -recursive adaptive filters.

COURSE OBJECTIVES:

CEO1: To impart advanced knowledge in various adaptive algorithms for designing optimal filters.

CEO2: To analyze, design and implement adaptive filters using LMS, RLS and Kalman filtering algorithms for solving problems in the fields of signal processing, communications, Bio-Medical, Instrumentation and control engineering.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO1: Understand linear optimum and adaptive filters to determine mean square error.

CO2: Analyze Steepest-Descent Algorithm and apply to the wiener filters.

CO3: Solve problems in the error minimization using LMS and RLS Algorithms.

CO4: Develop kalman and non Linear adaptive filters in the fields of signal processing, communications, Bio-Medical, Instrumentation and control engineering for optimization.

CO5: Analyze adaptive forward and backward linear prediction.

M.Tech. - I Semester
(19MT13807) RF CIRCUIT DESIGN & MICROWAVE DEVICES

(Common to DECS & CMS)

(Program Elective-2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES:

Concept of Basic Electronics and Wave Theory at UG level

COURSE OBJECTIVES:

CEO1: To impart advanced knowledge in the fields of RF Circuits.

CEO2: To develop skills in analytical, problem solving, design and application skills in the broad area of RF circuit design.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO1: Understand and apply the basic concepts of RF Electronics, analyze transmission lines, matching and biasing networks, and RF components, Design RF devices in Wireless Communications.

CO2: Realize, compare, and estimate problems in RF Passive and Active components as well as smart antenna techniques in the field of RF Circuits.

CO3: Analyze RF circuits and demonstrates use of Smith Chart for high frequency circuit design.

CO4: Apply techniques like MF-UHF for designing high-power microstrip circuits, directional couplers, transformers, composite and multilayer inductors, filters, combiners/dividers, and RFID systems in the field of wireless communication systems.

CO5: Analyze noise in RF devices like Oscillators, and synthesizers.

M. Tech.-I Semester
(19MT10708) RESEARCH METHODOLOGY AND IPR

(Common to all M. Tech. Programs)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	2	-	-	2

PRE REQUISITES:

COURSE DESCRIPTION:

Overview of research; research problem and design; various research designs; Data collection methods; Statistical methods for research;Interpretation& drafting reports and Intellectual property rights.

COURSE OBJECTIVES:

CEO1. To impart knowledge on research methodology and subsequent process involved for successful accomplishment of the research.

CEO2. To impart knowledge on intellectual property rightsand subsequent process involved infiling patents and trade mark registration process.

CEO3. To inculcate attitude of reflective learning and contribute to the society through fruitful research.

COURSE OUTCOMES:

On successful completion of the course, student will be able to:

CO1. Apply the conceptual knowledge of research methodology to formulate the hypothesis, data collection and processing, analyzing the data using statistical methods, interpret the observations and communicating the novel findings through a research report.

CO2. Practice ethics and have responsibility towards society throughout the research process and indulge in continuous learning process.

CO3. Apply the conceptual knowledge of intellectual property rights for filing patents and trade mark registration process.

M.Tech. - I Semester
(19MT13831) ADVANCED DIGITAL SYSTEM DESIGN LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	4	2

PRE-REQUISITES: A Course on Digital Design at UG Level

COURSE OBJECTIVS:

CEO1: To acquire knowledge on Combinational, Sequential circuits, FPGA AND CPLD Devices.

CEO2: To develop Skills in design of various digital circuits.

CEO3: To work as a group effectively to design and conduct of experiments.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO1: Analyze, measure, interpret and validate the practical observations by applying the conceptual knowledge of digital sub systems.

CO2: Design different combinational and sequential digital circuits at different levels of abstractions for desired specifications.

CO3: Work individually and in groups to solve problems with effective communication.

M.Tech. - I Semester
(19MT13832) COMMUNICATIONS AND SIGNAL PROCESSING LAB
(Common to DECS & CMS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	4	2

PRE-REQUISITES:

Simulation Lab at UG Level

COURSE DESCRIPTION:

Design and simulation of communication systems - QPSK communication system over AWGN channel and Rayleigh fading channel; Generation of maximal and Gold code sequences; Simulation of Rayleigh Fading Channel Using Either Clarke's Model or Jake's Model for different Doppler Spreads; Performance Evaluation of RAKE Receiver over Slow Fading Channel.

COURSE OBJECTIVES:

CEO1: To design, develop and simulate various components of digital communications and adaptive algorithms.

CEO2: To apply Knowledge and Skills to implement engineering Principles in the fields of Communications and Signal processing.

COURSE OUTCOMES:

On successful completion of this course the students will be able to

CO1: Analyze, measure, interpret and validate the practical observations by applying the conceptual knowledge of communication, signal and Image processing.

CO2: Design IIR and FIR filters for desired specifications.

CO3: Work individually and in groups to solve problems with effective communication.

M. Tech. - I Semester
(19MT1AC01) TECHNICAL REPORT WRITING
(Audit Course)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	*2*	-	-	-

PRE-REQUISITES: -
COURSE DESCRIPTION:
Introduction; Process of writing; Style of writing; Referencing; Presentation.
COURSE OBJECTIVES:
CEO1: To impart the knowledge of structure and layout of Business and Technical Reports.
CEO2: To learn styles and techniques of description for effective reports.
CEO3: To develop the ability to understand & interpret the writing techniques for effective communication in written documents.
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1: Demonstrate knowledge of Technical Report Writing by examining kinds of reports and structure with scientific attitude.
CO2: Apply the techniques in preparing effective reports by examining Techniques of Description, Describing Machines and Mechanisms and Describing Processes.
CO3: Communicate effectively through writing technical reports by demonstrating the knowledge of Industry Reports, Survey Reports, Interpretive Report and Letter Report.

M.Tech. - II Semester
(19MT23801) ADVANCED WIRELESS COMMUNICATIONS
(Common to DECS & CMS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PREREQUISITES:
A Course on Digital Communications at UG Level.
COURSE DESCRIPTION:
Introduction to cellular wireless communication systems; Radio propagation in mobile environment; Equalization and Diversity techniques; Multiple access techniques; Introduction to wireless networking; Multicarrier modulation techniques.
COURSE OBJECTIVES:
CEO1 : To get introduction of cellular wireless communication and to analyze Radio propagation in mobile atmosphere
CEO2 : To design Equalization along with Diversity techniques and To Solve the problems several access techniques, wireless networking and Multicarrier modulation techniques.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
CO1 : Understand wireless cellular networks and standards, Frequency reuse concept, and solve for Capacity of Cellular Systems.
CO2 : Analyze Large Scale Path Loss, Small Scale Fading in wireless environment, solve engineering problems on power at the receiver in free space propagation.
CO3 : Design and solve engineering problems for analyzing Equalization and Diversity Techniques.
CO4 : Solve engineering problems and calculate with wide range of solutions in Multiple access protocols, Packet Radio and Reservation protocols and Traffic Routing in Wireless Networks,
CO5 : Apply appropriate techniques to engineering activities in MIMO and multicarrier modulation.

M.Tech. – I/II Semester
(19MT15706) VLSI DESIGN VERIFICATION AND TESTING
(Common to DECS & VLSI)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES:
A Courses on VLSI Design, Digital IC Applications at UG Level.
COURSE OBJECTIVES:
CEO1: To impart in-depth knowledge in generation of test vectors for digital systems.
CEO2: To analyze and test the various faults in digital system design and develop fault free applications.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
CO1: Analyze Modeling of Digital Circuits at various levels of abstraction and various types of logic Simulations.
CO2: Understand the various fault models, reduction techniques to apply for fault sampling and simulation.
CO3: Apply the automatic test generation techniques for testing Single Stuck at Faults and bridging faults in digital circuits.
CO4: Analyze the various testing approaches for testing digital circuits with minimal cost.
CO5: Analyze various architectures for Built-In Self Test.

M.Tech. - II Semester
(19MT25704) MEMORY TECHNOLOGIES
(Common to DECS & VLSI)
(Program Elective - 3)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES:
Courses on Digital Electronics and VLSI design at UG Level
COURSE DESCRIPTION:
Random access memory Technology; Non-Volatile memory designs; Reliability and Radiation effects of semiconductor memory; Packaging technologies, Fault modeling and Testing of memory.
COURSE OBJECTIVES:
CEO1: To impart advanced knowledge on various memory Technologies.
CEO2: To develop skills in design and analysis of different memory architectures and Packaging.
CEO3: Apply knowledge and skills to develop optimized memory design to solve real time problems.
COURSE OUTCOMES:
On successful completion of the course, the student will be able to
CO1: Analyze various Random Access Memory Technologies, Non-Volatile Memory Designs and Technologies for optimized memory design
CO2: Analyze the reliability and radiation issues of semiconductor memories for different memory Architectures.
CO3: Analyze advanced memory and high packaging technologies in optimization of memory designs.
CO4: Use the various memory fault models and appropriate testing Techniques to improve the performance of systems.

M.Tech. - II Semester

(19MT23802) MIMO SYSTEM
(Common to DECS & CMS)
(Program Elective-3)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES:
Concept of Basic Electronics and Wave Theory at UG level
COURSE OBJECTIVES:
CEO1: To impart advanced knowledge in the fields of MIMO.
CEO2: To develop analytical, problem solving, design and application skills in the broad area of MIMO System.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
CO1: Understand multi-antenna systems, channel modeling and effect of LOS and XPD on MIMO Capacity.
CO2: Analyze diversity and spatial multiplexing in MIMO systems.
CO3: Apply MIMO coding techniques in the field of wireless communication systems.

M.Tech. - II Semester
(19MT23803) SPEECH PROCESSING
(Common to DECS & CMS)
(Program Elective-3)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES:
Courses on Signals & Systems and Digital Signal Processing in UG
COURSE DESCRIPTION:
Acoustic theory of speech production; Models for speech signals and speech processing systems; Mathematical analysis of speech signals - homomorphic and LPC models; Speech and speaker recognition systems.
COURSE OBJECTIVES:
CEO1: To impart knowledge in understanding the concepts of Speech Processing in VLSI.
CEO2: To develop skills in analysis and problem solving using efficient algorithms for feasible and optimal solutions in Speech signal processing field.
CEO3: Apply knowledge and skills for rational analysis of speaker identification and verification systems.
COURSE OUTCOMES:
After completion of the course, the student will be able to
CO1: Understand the process of speech production mechanism and analyze the mathematical model of acoustic speech production system to develop digital model for speech signals.
CO2: Analyze various time domain models such as short time and autocorrelation methods to solve problems in estimating pitch period of speech signals with appropriate techniques.
CO3: Analyze complex Cepstrum of speech, pitch detection and formant estimation in Homomorphic Speech Processing.
CO4: Apply Cholesky Decomposition & Durbin's Recursive approaches to solve LPC Equations in Pitch detection and Formant analysis applications.
CO5: understand speaker verification system, speaker identification systems and Speech recognition systems.

M.Tech. - II Semester
(19MT26305) INTERNET OF THINGS

(Common to CNIS, CS, SE, DECS and CMS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES:
Courses on Computer Networks, Python Programming.
COURSE DESCRIPTION:
Concepts of Domain Specific IoTs, M2M and system management with Netconf-Yang, IoT privacy and security, IoT physical devices, Amazon Web Services for IoT and case studies illustrating IoT design.
COURSE OUTCOMES:
CO1: Understand the concepts of IoT, IoT protocols, privacy and security issues in IoT applications to analyze domain specific IoT's.
CO2: Design solutions through implementing IoT applications on raspberry pi, AWS and develop security solutions to strengthen IoT environment.

M.Tech. - II Semester
(19MT25702) PHYSICAL DESIGN AUTOMATION
(Common to DECS & VLSI)
(Program Elective-4)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES:
A Course on VLSI Design and Digital IC Design at UG Level.
COURSE DESCRIPTION:
Basics of VLSI design; Layout optimization; Simulation and synthesis; Physical design of FPGAs and MCMs.
COURSE OBJECTIVES:
CEO1: To impart advanced knowledge in Physical Design Automation for Backend Design and Tape out of ICs.
CEO2: To develop and apply skills in design, analysis and solving problems in layouts of Backend Design.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:

CO1: Analyze the various VLSI Design Methodologies and layout compaction in the development of layouts using Design automation tools, FPGA and MCM technologies to implement physical design cycle for the development of reconfigurable designs.

CO2: Apply algorithmic graph theory to reduce complexity in computations using VLSI Design Automation Tools and perform two level and high level logic synthesis to model hardware.

M.Tech. - II Semester
(19MT23804) SOFTWARE DEFINED RADIO
(Common to DECS & CMS)
(Program Elective-4)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PREREQUISITES:
A Course on Wireless Communication, Digital Signal Processing and Antennas at UG Level.

COURSE DESCRIPTION:
Principles of software defined radio; Multirate digital filter banks; Analysis and Synthesis of signals performance; Smart antennas with applications.

COURSE OBJECTIVES:
CEO1. To provide advanced knowledge in various aspects of Software Defined Radio.
CEO2. To impart analysis, problem solving, design, simulation, Interdisciplinary, Communication and application skills in Software Defined Radio.
CEO3. To imbibe ethical attitude towards environment and society.

COURSE OUTCOMES:
After successful completion of this course the students will be able to
CO1. Understand Radio frequency Implementation issues in software defined radios.
CO2. Design multirate digital filters for multirate signal processing for digital frequency converters in digital receivers.
CO3. Analyze the performance of direct digital synthesis systems in designing software defined radios.
CO4. Apply appropriate techniques for hardware implementation of smart antennas using software radio for better spectrum exploitation.
CO5. Analyze a Software defined Radio System/ Subsystem with object oriented representation for public needs.

M.Tech. - II Semester
(19MT23831) ADVANCED COMMUNICATIONS LAB
(Common to DECS & CMS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	4	2

PRE-REQUISITES:
Simulation lab at UG level

COURSE DESCRIPTION:
Simulation of communication systems over communication channels with and without line coding; Design and simulation of Bussgang Blind channel; Minimum Mean Square Error and zero force equalizer; Adaptive equalizers using LMS and RLS algorithms.

COURSE OBJECTIVES:
CEO1: To design, develop and simulate various components of communication System and adaptive equalizers.
CEO2: To apply knowledge and skills in implementation of engineering principles in the field of Communications.

COURSE OUTCOMES:
After successful completion of the course, students will be able to
CO1: Analyze , measure, interpret and validate the practical observations by applying the conceptual knowledge of digital communications and adaptive signal processing.
CO2: Design CDMA communication system over different channels with Various adaptive equalizers for desired specifications.
CO3: Work individually and in groups to solve problems with effective communication.

M.Tech. - II Semester
(19MT23832) VLSI DESIGN VERIFICATION AND TESTING LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	4	2

PREREQUISITES:

Course on VLSI Design Verification and Testing.

COURSE DESCRIPTION:

Modeling in HDL, Testing Single and Multiple Stuck at Faults, Testing Bridging Faults, Assessing Controllability and Observability, Test Vector Generation and Compression, BIST.

COURSE OBJECTIVES:

CEO1: To impart knowledge on modeling faults in combinational and sequential circuits.

CEO2: To develop and apply algorithms for testing the digital systems.

CEO3: To develop programming skills to solve problems in assessing fault coverage of developed designs.

COURSE OUTCOMES:

After successful completion of the course, students will be able to

CO1: Demonstrate hands-on experience on modeling faults for digital circuits and estimation of fault coverage and related parameters.

CO2: Develop test generation and test compression algorithms.

CO3: Apply developed algorithms to estimate required parameters for reducing the test time, storage requirements, etc.

CO4: Work individually and in groups to solve problems with effective communication.

M. Tech. – II Semester
(19MT2AC01) STATISTICS WITH R
(Audit Course)

(Common to All M. Tech. Programs)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	2	-	-	-

PRE-REQUISITES: A course on Statistics.

COURSE DESCRIPTION:

Concepts of R programming basics, Bivariate and multivariate data, Confidence intervals, Goodness of fit, Analysis of variance.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO1: Import, manage, manipulate, and structure data files using R programming.

CO2: Implement models for statistical analysis of a given dataset and visualize the results to identify trends, patterns and outliers in data.

M. Tech. - III Semester
(19MT33831) INTERNSHIP

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	100	100	-	-	-	2

PRE-REQUISITES: --

COURSE DESCRIPTION: Expose students to the industrial environment; Create competent professionals for the industry; sharpen the real time technical / managerial skills required at the job; Gain professional experience and understand engineer's responsibilities and ethics.

COURSE OUTCOMES:

On successful completion of the course, students will be able to

CO1: Develop problem solving skills, critical thinking skills though designing and developing solutions for complex problems.

CO2: Utilize appropriate modern tools and techniques for implementing the proposed solutions.

CO3: Discern various challenges in developing solutions for complex problems, design and conduct experiments to evaluate alternative solutions for the chosen engineering problems.

CO4: Function effectively as an individual and participate well as a team member to build professional network for growth in career.

CO5: Develop communication, enrich professional, interpersonal and technical skills pertaining to the internship experience.

CO6: Utilize real work experiences to explore their interests, career alternatives that will help with future education or employment through and develop professional skills and competencies to engage in lifelong learning.

M. Tech. - III Semester
(19MT33832) PROJECT WORK PHASE-I

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	-	10

PRE-REQUISITES: --
COURSE DESCRIPTION:
Identification of topic for the project work; Literature survey; Collection of preliminary data; Identification of implementation tools and methodologies; Performing critical study and analysis of the problem identified; submitting a Report.
COURSE OUTCOMES:
On successful completion of the course, the students will be able to
CO1: Apply contextual knowledge to identify specific domain in Digital electronics, Communication systems and allied areas of discipline.
CO2: Conduct literature review, analyze, cognize and comprehend the extracted information to recognize the current status of research pertinent to the chosen domain.
CO3: Select appropriate tools, techniques and resources for implementation of project work.
CO4: Function effectively as an individual to recognize the opportunities in the chosen domain of interest
CO5: Write and present a technical report/document to present the findings on the chosen problem.
CO6: Engage lifelong learning for development of technical competence in the field of Digital electronics and Communication systems.

M. Tech. - IV Semester
(19MT43831) PROJECT WORK PHASE-II

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
150	150	300	-	-	-	16

PRE-REQUISITES: --
COURSE DESCRIPTION:
Time and cost analysis; undertaking practical investigations of project work; implementation; analysis of results; validation and report writing.
COURSE OUTCOMES:
On successful completion of this course, the students will be able to
CO1: Design and develop Integrated Circuits/systems/platforms to undertake practical investigations of project work, analyze and interpret results.
CO2: Utilize appropriate tools, techniques and resources for implementation of project work.
CO3: Function effectively as an individual to recognize the opportunities in the chosen domain of interest
CO4: Write and present a technical report/document to present the findings on the chosen problem.
CO5: Engage lifelong learning for development of technical competence in the field of VLSI.

Program: M.Tech. VLSI

M. Tech. – I Semester
(19MT15701) ANALOG CMOS VLSI DESIGN

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES:
Courses on Semiconductor Devices and Circuits and VLSI design at UG Level.
COURSE DESCRIPTION:
MOS Device physics; Characteristics of amplifiers; Feedback circuits and operational amplifiers; Stability and frequency compensation of operational amplifiers; Nonlinear Analog circuits & other applications
COURSE OBJECTIVES:
CEO1: To provide advanced knowledge in Analog VLSI circuits.
CEO2: To impart analysis, problem solving, design and application skills in Analog IC Design.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:

CO1. Design Single Stage amplifiers, differential amplifiers, develop noise models of MOSFETs for high speed designs.
CO2. Design and Develop Feedback Amplifiers and Operational Amplifiers for linear circuits.
CO3. Apply stability and frequency compensation techniques to multistage systems and design band gap references.
CO4. Understand various Design Aspects of switched capacitor circuits, oscillators and PLL.

M. Tech. - I Semester
(19MT15702) DEVICE MODELING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES:
A Course on Semiconductor Devices and Circuits at UG Level
COURSE DESCRIPTION:
MOS Transistor; Small Dimension Effects; Ion Implanted Channels; MOS Transistor in Static and Dynamic operations and its Small signal Modeling.
COURSE OBJECTIVES:
CEO1: To impart advanced knowledge in various MOS Structures.
CEO2: To develop skills in design, analysis and problem solving related to regions of inversion and development of high performance MOS transistors.
CEO3: Apply knowledge and skills for performance analysis in the design of MOS Structures with respect to small dimension effects.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
CO1. Analyze the multi terminal MOS device, MOS transistor to improve performance characteristics of digital IC's.
CO2. Analyze small dimensional effects in MOS with Ion implanted Channels for VLSI systems.
CO3. Develop Quasi static Model and Non Quasi static Models for low, medium and high frequencies.

M. Tech. I - Semester
(19MT15703) DIGITAL CMOS VLSI DESIGN

Int. Marks	Ext. Marks	Total Marks		L	T	P	C
40	60	100		3	-	-	3

PRE-REQUISITES:
A Course on Digital IC Applications and VLSI Design at UG Level.
COURSE DESCRIPTION:
Introduction to MOS transistors; Characteristics of CMOS digital circuits; Transistor sizing; memory design; Design strategies; Design of subsystems.
COURSEOBJECTIVES:
CEO1: To impart in-depth knowledge in MOS transistor Integrated Circuits.
CEO2: To develop skills in design and development, analysis, problem solving and research in Digital Systems.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
CO1. Analyze the characteristics of CMOS Inverter and Design combinational and sequential logic circuits using various design styles.
CO2. Analyze timing issues to improve the performance of sequential logic circuits.
CO3. Design memories and sub systems using CMOS logic for high speed networks.
CO4. Understand design methodologies and tools at various levels of abstraction.

M. Tech. – I Semester
(19MT15704) COMPUTATIONAL METHODS IN MICROELECTRONICS
(Program Elective -1)

Int. Marks	Ext. Marks	Total Marks		L	T	P	C
40	60	100		3	-	-	3

PRE-REQUISITES:
A Course on Mathematics at UG Level.
COURSE DESCRIPTION:
Linear and Nonlinear Systems modeling; Approximation; Interpolation; Curve Fitting; Numerical Integration; Finite Difference Techniques; Initial Value problems; Energy Methods and Minimization; Finite Element Methods; Dynamic methods; Method of Characteristics; Finite Volume Methods; Grid Generation and Error Estimation; Device and Process Simulation; Layout and Yield estimation algorithms; Symbolic analysis and Synthesis of Analog ICs.
COURSE OBJECTIVES:
CEO1: To impart advanced knowledge in Computational Methods for CAD Tools Design.
CEO2: To develop skills in design, analysis and problem solving in high performance Tools Design.
CEO3: To apply knowledge and skills of Computational Methods for development of New Microelectronics CAD Tools.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:

CO1. Apply basic computational tools applied to Finite Difference Techniques, Initial Value Problems, Finite Element Methods to evaluate accurate performance parameters.
CO2. Classify the partial differential equations and use the Method of Characteristics and finite volume methods to perform investigations in engineering.
CO3. Apply Grid generation and refinement algorithms to reduce the error in estimation while evaluating the structures by using solutions of initial and final value problems in computational tools.
CO4. Analyze and apply device and process simulation to perform synthesis of Analog ICs at various levels of abstraction for improving yield.

M. Tech. – I Semester
(19MT15705) IC FABRICATION
(Program Elective – 1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES:
A Course on Engineering Physics, Chemistry, Material Science, VLSI Design at UG Level
COURSE DESCRIPTION:
Crystal Growth, Wafer Preparation, Epitaxy and Oxidation, Lithography and Reactive Plasma Etching, Deposition, Diffusion, Ion Implantation, Metallization, Analytical, Assembly and Packaging Techniques.
COURSE OBJECTIVES:
CEO1: To provide advanced knowledge in IC Fabrication Processes.
CEO2: To impart analytical skills on Wafer preparation, Lithography, Etching, Diffusion and Packaging.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
CO1. Analyze Wafer preparation methods, oxidation Techniques, Lithography, Etching techniques Deposition, Diffusion and Ion-Implantation for accurate integrated chip fabrication.
CO2. Select and Apply appropriate metallization choices to compensate problems in electrical interconnectivity in multi metal layer process Fabrication.
CO3. Apply various assembling and packaging techniques for obtaining the required functionality at higher level abstraction.

M. Tech. - I/II Semester
(19MT15706) VLSI DESIGN VERIFICATION AND TESTING
(Program Elecive-1)
(Common to VLSI & DECS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES:
A Courses on VLSI Design, Digital IC Applications at UG Level.
COURSE OBJECTIVES:
CEO1: To impart in-depth knowledge in generation of test vectors for digital systems.
CEO2: To analyze and test the various faults in digital system design and develop fault free applications.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
CO1. Analyze Modeling of Digital Circuits at various levels of abstraction and various types of logic Simulations.
CO2. Understand the various fault models, reduction techniques to apply for fault sampling and simulation.
CO3. Apply the automatic test generation techniques for testing Single Stuck at Faults and bridging faults in digital circuits.
CO4. Analyze the various testing approaches and Built-In Self Test architectures for testing digital circuits.

M. Tech.– I Semester
(19MT15707) FPGA ARCHITECTURES
(Program Elective-2)
(Common to VLSI & DECS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES:

Courses on Digital Logic Design and VLSI Design at UG Level.

COURSE DESCRIPTION:

Evolution of Programmable Devices, Xilinx, Actel, Altera FPGAs, Logic Synthesis, Technology Mapping, Finite State Machines, Realizations of SM Charts, One Hot Method, System level Design, Device Applications-Fast Bus Controller, FIFO Controller & Intelligent I/O Subsystem

COURSE OBJECTIVES:

CEO1: To impart knowledge in architectures and applications of various families of CPLDs and FPGAs.

CEO2: To develop skills in design, analysis and problem solving for implementation and verification of functions in CPLDs/FPGAs.

CEO3: Apply knowledge and skills for performance analysis in the design of FSMs.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO1. Analyze the architectures of programmable logic devices and technology mapping issues in CPLDs and FPGAs.

CO2. Analyze various Finite state machine charts and its architectures to evaluate the performance of VLSI systems.

CO3. Understand the applications of FPGA in communications, speech processing, Image and video processing.

M. Tech. - I Semester
(19MT15708) LOW POWER CMOS VLSI DESIGN
(Program Elective - 2)

(Common to VLSI & DECS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES:

A Course on VLSI Design at UG Level

COURSE DESCRIPTION:

Need for low power VLSI chips, Sources of Power dissipation in MOS & CMOS Devices, Power Estimation, Synthesis of low power VLSI Circuits, Design of low power VLSI Circuits, Low power Memory Architectures, Energy recovery Circuits, Software design of low power VLSI Circuits.

COURSE OBJECTIVES:

CEO1: To impart advanced knowledge in low power CMOS Circuits.

CEO2: To develop skills in design, analysis and problem solving related to high performance and low power devices.

CEO3: Apply knowledge and skills pertaining to low voltage CMOS circuit design for for wide range of IC applications.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO1. Analyze the various power dissipation effects and estimation methods in CMOS VLSI Circuits to improve the performance characteristics of digital systems.

CO2. Understand the various design styles and synthesis of low power and low voltage CMOS VLSI circuits.

CO3. Analyze the various low power Static RAM architectures in design and development of Ultra Low power Integrated Circuits.

CO4. Apply energy recovery techniques to evaluate the performance of low power VLSI Circuits for scientific research in design and development of digital systems.

M. Tech. - I Semester
(19MT15709) MIXED SIGNAL DESIGN
(Program Elective-2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES:
A Course on Analog Design at UG Level.
COURSE DESCRIPTION:
Switched capacitor circuits - analysis and application; Design and characterization of Phase locked loops; Data converters – types; Design for different sampling rates.
COURSE OBJECTIVES:
CEO1: To impart basic and advanced knowledge in Mixed signal design.
CEO2: To develop skills in design, analysis, problem solving and research in Switched capacitor circuits, phase locked loop and data converters
COURSE OUTCOMES:
After successful completion of the course, students will be able to:

CO1. Design switched capacitor circuits, phase locked loops and charge pump based PLL to improve Performance characteristics of mixed signal systems.
CO2. Design ADC and DAC to increase the Data Rate for signal processing and Communication applications.
CO3. Develop high speed modulators, interpolating & decimating filters for analog and digital communications.

M. Tech. - I Semester
(19MT10708) RESEARCH METHODOLOGY AND IPR
(Common to all M. Tech. Programs)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	2	-	-	2

PRE REQUISITES:
COURSE DESCRIPTION:

Overview of research; research problem and design; various research designs; Data collection methods; Statistical methods for research;Interpretation& drafting reports and Intellectual property rights.
COURSE OBJECTIVES:
CEO1: To impart knowledge on research methodology and subsequent process involved for successful accomplishment of the research.
CEO2: To impart knowledge on intellectual property rights and subsequent process involved in filing patents and trade mark registration process.
CEO3: To inculcate attitude of reflective learning and contribute to the society through fruitful research.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO4. Apply the conceptual knowledge of research methodology to formulate the hypothesis, data collection and processing, analyzing the data using statistical methods, interpret the observations and communicating the novel findings through a research report.
CO5. Practice ethics and have responsibility towards society throughout the research process and indulge in continuous learning process.
CO6. Apply the conceptual knowledge of intellectual property rights for filing patents and trade mark registration process.

M. Tech. – I Semester
(19MT15731) ANALOG CMOS VLSI DESIGN LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	4	2

PRE-REQUISITES:

A Course on electronic circuit analysis and VLSI Design at UG Level.

COURSE DESCRIPTION:

Single Stage CMOS Amplifiers, Cascode Amplifiers, Feedback Amplifiers, Operational Amplifiers, Gain Boosting and Frequency Compensation Techniques, Bandgap References, Switched Capacitor Circuits, Sampling Switches, Ring Oscillator, PLL.

COURSE OBJECTIVES:

CEO1: To impart knowledge on modeling Analog circuits.

CEO2: To develop and apply techniques for boosting gain and compensating frequency.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO1. Design and Develop Feedback Amplifiers and Operational Amplifiers.

CO2. Apply suitable compensation techniques to design CMOS circuits.

CO3. Analyze various Bandgap references to compensate the issues in design specifications.

CO4. Develop switched capacitor circuits for various filter designs.

CO5. Work individually and in groups to solve problems with effective communication.

M. Tech. – I Semester
(19MT15732) DIGITAL CMOS VLSI DESIGN LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	4	2

PRE-REQUISITES:

A Course on electronic circuit analysis and VLSI Design at UG Level.

COURSE DESCRIPTION:

Alternate CMOS combinational and sequential Logic Circuits, Clock Generation, Skew and Synchronization, Logical Effort, Memories, Adders, Multipliers, Shifters, ALU, Arithmetic Processor, Pipelining.

COURSE OBJECTIVES:

CEO1: To impart knowledge on modeling Digital CMOS circuits.

CEO2: To develop programming skills to solve problems in designing subsystems or processors.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO1. Analyze CMOS logic styles for combinational and sequential circuits.

CO2. Design and develop alternative subsystems for the design of a processor.

CO3. Design CMOS memories for high speed networks.

CO4. Work individually and in groups to solve problems with effective communication.

M. Tech. - I Semester
(19MT1AC01) TECHNICAL REPORT WRITING
(Audit Course)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	*2*	-	-	-

PRE-REQUISITES: -

COURSE DESCRIPTION:

Introduction; Process of writing; Style of writing; Referencing; Presentation.

COURSE OBJECTIVES:

CEO4: To impart the knowledge of structure and layout of Business and Technical Reports.

CEO5: To learn styles and techniques of description for effective reports.

CEO6: To develop the ability to understand & interpret the writing techniques for effective communication in written documents.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO1. Demonstrate knowledge of Technical Report Writing by examining kinds of reports and structure with scientific attitude.
CO2. Apply the techniques in preparing effective reports by examining Techniques of Description, Describing Machines and Mechanisms and Describing Processes.
CO3. Communicate effectively through writing technical reports by demonstrating the knowledge of Industry Reports, Survey Reports, Interpretive Report and Letter Report.

M. Tech. – II Semester
(19MT25701) NANO MATERIALS AND NANOTECHNOLOGY

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES:
Courses on Basic Engineering Physics, Basic Engineering Chemistry and Electronic Devices at UG Level.
COURSE DESCRIPTION:
Nanostructures – Classification and Peculiarities, Characterization and Properties of Nanomaterials, Micro Electro-Mechanical Systems (MEMS) & Nano Electro-Mechanical Systems (NEMS), Carbon Nanotubes (CNT) – Properties and Synthesis, Interdisciplinary Applications of Nanomaterials.
COURSE OBJECTIVES:
CEO1: To relate unique properties of nanomaterials to the reduce dimensionality of the material.
CEO2: To impart skills on nanostructures fabrication.
CEO3: To provide knowledge on nanomaterials and implication of health and safety related to nanomaterials.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
CO1. Understand the peculiarities of Nanostructured materials, their characterization and properties to solve structural, mechanical and electrical problems in manufacturing Nanostructures.
CO2. Use IC Fabrication techniques to manufacture Micro Electro-Mechanical Systems (MEMS) and Nano Electro-Mechanical Systems (NEMS).
CO3. Understand carbon nanotube properties and its synthesis for various applications.
CO4. Apply the properties of nanomaterials by fixing the boundaries in system development in multidisciplinary areas like Automobiles, Biomedical, Agriculture.

M. Tech. – II Semester
(19MT25702) PHYSICAL DESIGN AUTOMATION
(Common to VLSI & DECS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES:
A Course on VLSI Design and Digital IC Design at UG Level.
COURSE DESCRIPTION:
Basics of VLSI design; Layout optimization; Simulation and synthesis; Physical design of FPGAs and MCMs.
COURSE OBJECTIVES:
CEO1: To impart advanced knowledge in Physical Design Automation for Backend Design and Tape out of ICs.
CEO2: To develop and apply skills in design, analysis and solving problems in layouts of Backend Design.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
CO1. Understand the various VLSI Design Methodologies and layout compaction algorithms for the development of optimized designs.
CO2. Analyze various levels of simulation and logic synthesis to model hardware.

CO3. Apply Automation algorithms for physical design cycles of FPGAs and MCMs.

M. Tech. – II Semester
(19MT25703) CO DESIGN
(Program Elective - 3)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES:
Courses on Computer Architecture, Digital Design, Software Design, and Embedded Systems at UG Level.

COURSE DESCRIPTION:
Issues and Algorithms in CO- Design; Prototyping and its Emulation on Target Architectures; Compilation Techniques; Design Specification; Verification Tools for Embedded Processor Architectures; System- Level Languages with its Specification and Design.

COURSE OBJECTIVES:
CEO1: To impart advanced knowledge in complex computer system designs.
CEO2: To develop analysis, problem solving, design, simulation, interdisciplinary, communication and application skills in Hardware software co-design practices.

COURSE OUTCOMES:
After successful completion of the course, students will be able to:
CO1. Understand the issues in Co-design and analyze Co-Synthesis Algorithms for Co-Design Architectures.
CO2. Analyze Prototyping and emulation for specialized target architectures for system design.
CO3. Select appropriate architectures in designing data-dominated and control-dominated embedded systems.
CO4. Use compilation techniques and tools for embedded processor architectures with an understanding of practical considerations and perform verification of co-design computational models.
CO5. Apply language support for system level specification, co-simulation design and partitioning concepts in Cosyma and Lycos systems

M. Tech. - II Semester
(19MT25704) MEMORY TECHNOLOGIES
(Program Elective - 3)
(Common to VLSI & DECS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES:
Courses on Digital Electronics and VLSI design at UG Level

COURSE DESCRIPTION:
Random access memory Technology; Non-Volatile memory designs; Reliability and Radiation effects of semiconductor memory; Packaging technologies, Fault modeling and Testing of memory.

COURSE OBJECTIVES:
CEO1: To impart advanced knowledge on various memory Technologies.
CEO2: To develop skills in design and analysis of different memory architectures and Packaging.
CEO3: Apply knowledge and skills to develop optimized memory design to solve real time problems.

COURSE OUTCOMES:
On successful completion of the course, students will be able to
CO1. Understand various Random Access Memory Technologies, Non-Volatile Memory Designs and Technologies for optimized memory design.

CO2. Analyze the reliability and radiation issues of semiconductor memories for different memory Architectures.
CO3. Apply advanced memory and high packaging technologies in memory optimization.
CO4. Use the various memory fault models and appropriate testing Techniques to improve the performance of systems.

M. Tech. - II SEMESTER
(19MT25705) SYSTEM-ON-CHIP DESIGN
(Program Elective – 3)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES:
Courses on Embedded systems and VLSI design.
COURSE DESCRIPTION:
System on Chip Design Process; System level Design Issues; Test Strategies; Macro Design and Verification; Reusable Macros; System on Chip Verification; Communication Architectures for SoCs.
COURSE OBJECTIVES:
CEO1: To impart knowledge in understanding the concepts of Design, Verification and Communication Architectures for SoCs.
CEO2: To develop analytical, usage of techniques, research and design skills in evaluating and verifying designs for SoC architectures.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
CO1. Understand various SoC Design aspects and issues in low power and high speed implementations.
CO2. Analyze the Macro Design Process to solve issues in usage of hard macros and develop resusable macros for system integration.
CO3. Analyze verification methods at system level, block level and Hardware/Software Co-verification to reduce the test time.
CO4. Apply various communication architectures to design energy efficient systems.

M. Tech. – II Semester
(19MT25706) COMMUNICATION BUSES AND INTERFACES
(Program Elective – 4)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES:
A Course on Computer Organization and Microprocessor & Microcontrollers.
COURSE DESCRIPTION:
Serial Busses, RS232 – Limitations and Applications, CAN Protocol, USB – Types, Architecture, Serial Communication Protocol using Physical Medium.
COURSE OBJECTIVES:
CEO1: To impart advanced knowledge in design of Communication protocols and interfaces.
CEO2: To develop skills in design, analysis and problem solving for high speed data transfer among communication devices.
CEO3: To apply knowledge and skills of physical interconnects and standards for the development of new communication busses and physical interfaces.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
CO1. Understand the features of various serial protocols for high speed data communication between ICs in a Board.
CO2. Analyze the limitations of RS232 to solve the problems in various communicating devices.

CO3. Develop the architecture of Controller Area Network for Application layer communication.
CO4. Apply PCIe hardware Protocol for high speed communication between compatible devices.
CO5. Apply appropriate serial communication protocols and USB transfer types for high performance communication bus.

M. Tech. – II Semester
(19MT25707) NETWORK-ON-CHIP DESIGN
(Program Elective – 4)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES:
A Course on VLSI Design and parallel processing and Computing at UG Level
COURSE DESCRIPTION:
NOC –Architecture Design, Switching Technique ;Routing Algorithm ;Fault tolerance; Testing;3D NOC ;Optical NOC.
COURSE OBJECTIVES:
CEO1: To impart in-depth knowledge in Network on – chip Architecture and fault tolerance.
CEO2: To develop skills in design, analysis, problem solving and research in various routing algorithms.
CEO3: To apply knowledge and skills for development of applications in 3D Network On-chip Design.

COURSE OUTCOMES:
After successful completion of the course, students will be able to:
CO1. Understand Network on-chip topologies, routing strategies and architectures to improve Quality of Service in communication applications.
CO2. Develop routing algorithms to solve problems of congestion and flow in multicast routing for 2D and 3D Mesh Networks.
CO3. Apply Security and Monitoring Services to reduce the occurrence of dead and Live lock condition during data transmission and Fault tolerance.
CO4. Analyze three-Dimensional Integration of Network-On-Chip for the development of Optical and 3D Network-On-Chip Architectures.

M. Tech. – II Semester
(19MT25708) RF IC Design
(Program Elective - 4)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES:
A Course on Analog IC Design at UG Level/ PG Level.
COURSE DESCRIPTION:
Basics of RF IC Design, Assessment Parameters, Transceiver Architectures, Low Noise Amplifiers, Mixers, Oscillators, Phase Locked Loop, Power Amplifiers.
COURSE OBJECTIVES:
CEO1: To impart in-depth knowledge in developing transceivers as ICs operating at Radio Frequencies.
CEO2: To develop skills in design, analysis, problem solving and research in RFIC Design.
CEO3: To apply knowledge and skills for development of applications in RF systems.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
CO1. Understand the various parameters used as metrics in the evaluation of RF IC designs.
CO2. Analyze the effects of Nonlinearity and transceiver architectures for the development of RF circuits.
CO3. Design Low Noise Amplifiers ,mixers, oscillators, Phase Locked loops and Power Amplifiers to operate efficiently at wide range of RF frequencies.

M. Tech. – II Semester
(19MT25731) PHYSICAL DESIGN AUTOMATION LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	4	2

PRE-REQUISITES:
A Course on VLSI Design at UG Level.
COURSE DESCRIPTION:
Graph Algorithms, Partitioning Algorithms, Floorplanning Algorithms, Routing Algorithms.
COURSE OBJECTIVES:
CEO1: To impart knowledge on modeling Design automation algorithms.
CEO2: To develop programming skills to solve problems in designing algorithms for Optimizing Physical Designs.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
CO1. Demonstrate hands-on experience on modeling design automation algorithms by using the related EDA Tools.
CO2. Design and develop algorithms for optimizing physical designs.
CO3. Work individually and in groups to solve problems with effective communication.

M. Tech. – II Semester
(19MT25732) NANO MATERIALS AND NANOTECHNOLOGY LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	4	2

PRE-REQUISITES:
A Course on Circuit Level Design at UG Level.
COURSE DESCRIPTION:
Demonstration of Clean Room and Bench, Substrate Cleaning, Device Fabrication and Characterization, Verification of Device Characteristics in MATLAB and COMSOL, Visualization and Analysis of Carbon Allotropes.
COURSE OBJECTIVES:
CEO1: To impart knowledge on Design and Characterization of Nanoelectronic Devices.
CEO2: To design, fabricate and characterize Nanoelectronic devices.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
CO1. Demonstrate hands-on experience on Clean Room, Substrate Preparation, Device fabrication and Characterization.
CO2. Design and develop nano devices for different applications in fields like electronics, biomedical, agriculture, etc.
CO3. Develop alternative nanostructures for the design of interdisciplinary applications.
CO4. Work individually and in groups to solve problems with effective communication.

M. Tech. – II Semester
(19MT2AC01) STATISTICS WITH R
(Audit Course)
(Common to All M. Tech. Programs)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	2	-	-	-

PRE-REQUISITES: A course on Statistics.
COURSE DESCRIPTION:

Concepts of R programming basics, Bivariate and multivariate data, Confidence intervals, Goodness of fit, Analysis of variance.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO1. Import, manage, manipulate, and structure data files using R programming.

CO2. Implement models for statistical analysis of a given dataset and visualize the results to identify trends, patterns and outliers in data.

M. Tech. - III Semester
(19MT35731) INTERNSHIP

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	100	100	-	-	-	2

PRE-REQUISITES: --

COURSE DESCRIPTION: Expose students to the industrial environment; Create competent professionals for the industry; sharpen the real time technical / managerial skills required at the job; Gain professional experience and understand engineer's responsibilities and ethics.

COURSE OUTCOMES:

On successful completion of the course, students will be able to

CO1. Develop problem solving skills, critical thinking skills though designing and developing solutions for complex problems.

CO2. Utilize appropriate modern tools and techniques for implementing the proposed solutions.

CO3. Discern various challenges in developing solutions for complex problems, design and conduct experiments to evaluate alternative solutions for the chosen engineering problems.

CO4. Function effectively as an individual and participate well as a team member to build professional network for growth in career.

CO5. Develop communication, enrich professional, interpersonal and technical skills pertaining to the internship experience.

CO6. Utilize real work experiences to explore their interests, career alternatives that will help with future education or employment through and develop professional skills and competencies to engage in lifelong learning.

M. Tech. - III Semester
(19MT35732) PROJECT WORK PHASE-I

Int. Marks	**Ext. Marks**	**Total Marks**	**L**	**T**	**P**	**C**
50	**50**	**100**	**-**	**-**	**-**	**10**

PRE-REQUISITES: --

COURSE DESCRIPTION:

Identification of topic for the project work; Literature survey; Collection of preliminary data; Identification of implementation tools and methodologies; Performing critical study and analysis of the problem identified; submitting a Report.

COURSE OUTCOMES:

On successful completion of the course, students will be able to

CO1. Apply contextual knowledge to identify specific domain in VLSI and allied areas of discipline.

CO2. Conduct literature review, analyze, cognize and comprehend the extracted information to recognize the current status of research pertinent to the chosen domain.

CO3. Select appropriate tools, techniques and resources for implementation of project work.

CO4. Function effectively as an individual to recognize the opportunities in the chosen domain of interest

CO5. Write and present a technical report/document to present the findings on the chosen problem.

CO6. Engage lifelong learning for development of technical competence in the field of VLSI.

M. Tech. - IV Semester
(19MT45731) PROJECT WORK PHASE-II

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
150	150	300	-	-	-	16

PRE-REQUISITES: --

COURSE DESCRIPTION:

Time and cost analysis; undertaking practical investigations of project work; implementation; analysis of results; validation and report writing.

COURSE OUTCOMES:

On successful completion of the course, students will be able to

CO1. Design and develop Integrated Circuits/systems/platforms to undertake practical investigations of project work, analyze and interpret results.

CO2. Utilize appropriate tools, techniques and resources for implementation of project work.

CO3. Function effectively as an individual to recognize the opportunities in the chosen domain of interest

CO4. Write and present a technical report/document to present the findings on the chosen problem.

CO5. Engage lifelong learning for development of technical competence in the field of VLSI.

Program: M.Tech. COMMUNICATION SYSTEMS

M. Tech. - I Semester

(19MT13803) DIGITAL COMMUNICATION SYSTEMS

(Common to CMS & DECS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --

A Course on Digital Communications at UG Level**,** Review of random Variables and Processes

COURSE DESCRIPTION:

Band pass signals and systems; Digital modulation techniques; Design of optimum receivers; Generation and detection of spread spectrum signals.

COURSE OBJECTIVES:

CEO3: To impart knowledge on Characterizing and analyzing the Communication Signals and Systems, Digital modulation techniques and Communication over AWGN channels

CEO4: To design optimum Receivers for the Additive Gaussian Noise Channel and Solve the problems in Spread Spectrum Technique and Multichannel and Multicarrier Systems Digital Modulation Techniques;

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO1 : Demonstrate in-depth knowledge on response of systems for Band Pass, signal space and multidimensional representations of signals.

CO2 : Analyze various digital Modulation Techniques to improve the performance of digital communication systems.

CO3 : Analyze the performance of optimum receiver for Signals with Random Phase in AWGN Channel.

CO4 : Apply Spread Spectrum techniques in Anti jamming Application, Low-Detectability Signal Transmission and Code Division Multiple Access.

CO5 : Analyze the performance of Multichannel and Multicarrier systems.

M. Tech. - I Semester

(19MT13807) RF CIRCUIT DESIGN AND MICROWAVE DEVICES

(Common to CMS & DECS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES:

Concept of Basic Electronics and Wave Theory at UG level

COURSE OBJECTIVES:

CEO3: To impart advanced knowledge in the fields of RF Circuits.

CEO4: To develop skills in analytical, problem solving, design and application skills in the broad area of RF circuit design.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO1: Understand and apply the basic concepts of RF Electronics, analyze transmission lines, matching and biasing networks, and RF components, Design RF devices in Wireless Communications.

CO2: Realize, compare, and estimate problems in RF Passive and Active components as well as smart antenna techniques in the field of RF Circuits.

CO3: Analyze RF circuits and demonstrates use of Smith Chart for high frequency circuit design.

CO4: Apply techniques like MF-UHF for designing high-power microstrip circuits, directional couplers, transformers, composite and multilayer inductors, filters, combiners/dividers, and RFID systems in the field of wireless communication systems.

CO5: Analyze noise in RF devices like Oscillators, and synthesizers.

M. Tech. – I Semester
(19MT16101) DETECTION AND ESTIMATION OF SIGNALS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	*3*	-	-	*3*

PRE-REQUISITES:
A Course on Probability and Stochastic Processes at UG Level**.**

COURSE DESCRIPTION:
Decision criteria for single and multiple observations; Estimation techniques; Properties of estimators; parameter Estimation.

COURSE OBJECTIVES:

CEO1: To gain advanced knowledge in detection and estimation of signals in the Presence of noise.

CEO2: To analyze, design, implement optimum filters and receivers in the fields of Communications and Radar systems.

COURSE OUTCOMES:
On successful completion of this course the students will be able to

CO1: Analyze various decision criteria to solve problems in evaluating probability of errors and develop optimum receivers.

CO2: Apply different Estimation techniques to obtain optimum solutions.

CO3: Analyze state estimation and statistical parameters to determine the performance of Communications and Radar Systems.

M. Tech. - I Semester
(19MT13801) ADVANCED DIGITAL SIGNAL PROCESSING
(Common to CMS & DECS)
(Program Elective-1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES:
Course on Digital Signal Processing at UG level

COURSE DESCRIPTION:
Digital filter banks; Parametric and Non-Parametric Power Spectrum Estimation methods; computationally efficient algorithms; Applications of DSP.

COURSE OBJECTIVES:

CEO3: To impart advanced knowledge in Digital Signal Processing and applications

CEO4: To develop skills in design, analysis, problem solving and research in Multirate Signal Processing, Linear prediction, Power Spectral Estimation and Communications.

COURSE OUTCOMES:
After successful completion of the course, student will be able to:

CO1: Analyze sampling rate conversion, various DSP algorithms and design digital Filter Banks to improve performance characteristics of digital systems in multidisciplinary environments like image processing, wireless communication, biomedical engineering, speech processing, video processing, etc

CO2: Realize, compare and estimate power spectrum using different Non-Parametric and Parametric Methods in the frequency analysis of systems.

CO3: Understand Linear Prediction, analyze Lattice Forward and Backward Predictors for Radar signal processing and Remote sensing.

CO4: Apply signal processing techniques in fields such as communications, speech processing, Image and video processing.

M. Tech. - I Semester
(19MT16102) DIGITAL SATELLITE COMMUNICATIONS
(Program Elective-1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: A Course on Satellite Communications at UG level
COURSE DESCRIPTION:
Orbital mechanics and satellite sub-systems; Non-geostationary satellite systems; Demand assignment multiple access techniques and packet communications; VSAT & MSAT Networks, DBS satellite TV and GPS.
COURSE OBJECTIVES:
To impart knowledge in various satellite orbits, satellite sub-systems, LEO and NGSO satellites, VSAT and MSAT networks, Direct Broadcast Satellite Television systems and Global Positioning System.
CEO4: To develop skills in design, analysis, problem solving and research in orbital mechanics, satellite link design, NGSO satellites, digital satellite networks such as Demand Assignment Multiple Access (DAMA) and Aloha networks.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
CO1: Analyze various satellite orbits and satellite sub-systems to solve problems in orbital motion of satellites and satellite subsystems.
CO2: Analyze various LEO, GEO & NGSO constellation satellites and their design aspects for various satellite applications
CO3: Apply efficient techniques such as Erlang's formula, DA-TDMA techniques to evaluate the performance of digital satellite networks such as Demand Assignment Multiple Access (DAMA) and Aloha networks.
CO4: Analyze VSAT and MSAT networks and its configurations.
CO5: Analyze Direct Broadcast Satellite Television systems and GPS Position Location Principles, Recent communication satellites launched by NASA/ISRO.

M. Tech. -I Semester
(19MT16103) WIRELESS SENSOR NETWORKS
(Program Elective-1)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES:
A Course on Computer Networks and Wireless Communication and Networks at UG Level.
COURSE DESCRIPTION:
WSN architecture, types, Quality measures of wireless channels, various MAC protocols, Sensor deployment and routing related protocols, congestion control and cross layer architectures in WSNs.
COURSE OBJECTIVES:
CEO1: To impart knowledge in various layers of OSI model and cross layer design with respect to Wireless Sensor Networks.
CEO2: To develop skills in design, analysis and problem solving related to the field of WSNs.
CEO3: Apply knowledge and skills for performance analysis of WSNs.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
CO1: Analyze the problems in wireless sensor networks, ad-hoc networks and nodes mobility.

CO2: Analyze wave propagation effects and noise, channel models, modulation and demodulation issues for conducting research related to physical layer of wireless sensor network.
CO3: Develop the MAC and link layer protocols to provide the solutions for energy usage and compare the performance with existing approach.
CO4: Build the minimum path routing protocols and data aggregation schemes pertaining to network layer in order to solve the energy utilization problems.
CO5: Apply sensing models and cross layer approaches to solve the coverage issue and measure the performance of WSNs.

M. Tech. – I Semester
(19MT13806) ADAPTIVE SIGNAL PROCESSING
(Common to CMS & DECS)
(Program Elective - 2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES:
A Course on Signal Processing at UG Level
COURSE DESCRIPTION:
Development of adaptive filter theory; Method of steepest descent;Least-Mean-Square Algorithm and recursive least square algorithm; Kalman filtering algorithm; order -recursive adaptive filters.
COURSE OBJECTIVES:
CEO3: To impart advanced knowledge in various adaptive algorithms for designing optimal filters.
CEO4: To analyze, design and implement adaptive filters using LMS, RLS and Kalman filtering algorithms for solving problems in the fields of signal processing, communications, Bio-Medical, Instrumentation and control engineering.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
CO1: Understand linear optimum and adaptive filters to determine mean square error.
CO2: Analyze Steepest-Descent Algorithm and apply to the wiener filters.
CO3: Solve problems in the error minimization using LMS and RLS Algorithms.
CO4: Develop kalman and non Linear adaptive filters in the fields of signal processing, communications, Bio-Medical, Instrumentation and control engineering for optimization.
CO5: Analyze adaptive forward and backward linear prediction.

M. Tech. - I Semester
(19MT16104) OPTICAL NETWORKS
(Program Elective-2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: A Course on Satellite Communications at UG level
COURSE OBJECTIVES:
CEO1: To impart knowledge in Characteristics of Optical fiber, Fiber design considerations. Losses in Cable design advanced fiber optic components Modulation and demodulation techniques, Access networks and Network Control and Management.
CEO2: To develop skills in design, analysis and problem solving related to Optical Fibers, Optical Cables and Optical Networks.
CEO3: Apply knowledge and skills for performance analysis of Optical fibers, cables, Optical Modulation and Demodulation and Optical Networks.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
CO1: Design various types of optical fibers to reduce the effect of impairments like noises, fiber losses, dispersion and Scattering.
CO2: Analyze the fiber design objectives, various cable structures, Connector alignment techniques and other fiber optic components for communication and networking.

CO3: Analyze the performance of various Optical modulation and Demodulation Techniques.
CO4: Apply appropriate techniques to evaluate the performance of Optical networks such as Enhanced HFC, Fiber to the curb (FTTC), PON, GPON and AON.

M. Tech. - I Semester
(19MT16105) SMART ANTENNAS
(Program Elective-2)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES:
A Course on Antennas and Wave Propagation at UG Level
COURSE OBJECTIVES:
CEO1: To provide advanced knowledge in design of smart antennas, estimation of Direction of arrival and beam forming techniques.
CEO2: To impart analysis, problem solving, and application skills in smart antennas.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:

CO1: Understand Smart antenna architecture and configurations, Beam forming fundamentals, Space time processing, Methods of DOA, Mutual coupling, and capacity & data rates in MIMO systems.

CO2: Analyze design issues for DOA estimation, beam forming and adaptive signal processing algorithms of smart antennas.

CO3: Realize, compare and estimate optimum beam formers like SNR, SINR, MMSE, diversity for Rayleigh-Fading channel and Trellis Coded Modulation to smart antennas in the field of communication.

CO4: Analyze various DOA algorithms in Smart Antennas for wireless applications.

CO5: Apply beam-forming techniques to design smart antennas in the field of wireless communication, Bio medical, Military, Radar, Air traffic, and Satellite.

M. Tech. - I Semester
(19MT10708) RESEARCH METHODOLOGY AND IPR
(Common to all M. Tech. Programs)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	*2*	-	-	*2*

PRE REQUISITES:
COURSE DESCRIPTION:
Overview of research; research problem and design; various research designs; Data collection methods; Statistical methods for research;Interpretation& drafting reports and Intellectual property rights.
COURSE OBJECTIVES:
CEO1. To impart knowledge on research methodology and subsequent process involved for successful accomplishment of the research.
CEO2. To impart knowledge on intellectual property rightsand subsequent process involved infiling patents and trade mark registration process.
CEO3. To inculcate attitude of reflective learning and contribute to the society through fruitful research.

COURSE OUTCOMES:

On successful completion of the course, student will be able to:

CO1. Apply the conceptual knowledge of research methodology to formulate the hypothesis, data collection and processing, analyzing the data using statistical methods, interpret the observations and communicating the novel findings through a research report.

CO2. Practice ethics and have responsibility towards society throughout the research process and indulge in continuous learning process.

CO3. Apply the conceptual knowledge of intellectual property rights for filing patents and trade mark registration process.

M. Tech. – I Semester
(19MT13832) COMMUNICATIONS AND SIGNAL PROCESSING LAB

(Common to CMS & DECS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	4	2

PRE-REQUISITES:

Simulation Lab at UG Level

COURSE DESCRIPTION:

Design and simulation of communication systems - QPSK communication system over AWGN channel and Rayleigh fading channel; Generation of maximal and Gold code sequences; Simulation of Rayleigh Fading Channel Using Either Clarke's Model or Jake's Model for different Doppler Spreads; Performance Evaluation of RAKE Receiver over Slow Fading Channel.

COURSE OBJECTIVES:

CEO1: To design, develop and simulate various components of digital communications and adaptive algorithms.

CEO2: To apply Knowledge and Skills to implement engineering Principles in the fields of Communications and Signal processing.

COURSE OUTCOMES:

On successful completion of this course the students will be able to

CO1: Analyze, measure, interpret and validate the practical observations by applying the conceptual knowledge of communication, signal and Image processing.

CO2: Design IIR and FIR filters for desired specifications.

CO3: Work individually and in groups to solve problems with effective communication.

M. Tech. – I Semester
(19MT16131) RF CIRCUIT DESIGN AND MICROWAVE DEVICES LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	4	2

PRE-REQUISITES:

Name of the Pre-requisite Course(s) Antennas, Microwaves and Optical Communication lab at UG level

COURSE OBJECTIVES:

CEO1: To design, develop and simulate various circuits at Radio frequency and Optical Communication Systems.

CEO2: To apply Knowledge and Skills to implement engineering Principles in the field of RF, Microwave and Optical Communications.

COURSE OUTCOMES:

On successful completion of this course, the students will be able to:

CO1: Analyze , measure, interpret and validate the practical observations by applying the conceptual knowledge of Antennas and transmission lines.

CO2: Design different antennas for RF, Microwave and Optical communications and measure the parameters using antenna set up.

CO3: Work individually and in teams collaboratively in implementing mini projects.

M. Tech. - I Semester
(19MT1AC01) TECHNICAL REPORT WRITING
(Audit Course)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	*2*	-	-	-

PRE-REQUISITES: -
COURSE DESCRIPTION:
Introduction; Process of writing; Style of writing; Referencing; Presentation.
COURSE OBJECTIVES:
CEO1: To impart the knowledge of structure and layout of Business and Technical Reports.
CEO2: To learn styles and \techniques of description for effective reports.
CEO3: To develop the ability to understand & interpret the writing techniques for effective communication in written documents.
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1: Demonstrate knowledge of Technical Report Writing by examining kinds of reports and structure with scientific attitude.
CO2: Apply the techniques in preparing effective reports by examining Techniques of Description, Describing Machines and Mechanisms and Describing Processes.
CO3: Communicate effectively through writing technical reports by demonstrating the knowledge of Industry Reports, Survey Reports, Interpretive Report and Letter Report.

M. Tech. - II Semester
(19MT23801) ADVANCED WIRELESS COMMUNICATIONS
(Common to CMS & DECS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PREREQUISITES:
A Course on Digital Communications at UG Level.
COURSE DESCRIPTION:
Introduction to cellular wireless communication systems; Radio propagation in mobile environment; Equalization and Diversity techniques; Multiple access techniques; Introduction to wireless networking; Multicarrier modulation techniques.
COURSE OBJECTIVES:
CEO1 : To get introduction of cellular wireless communication and to analyze Radio propagation in mobile atmosphere
CEO2 : To design Equalization along with Diversity techniques and To Solve the problems several access techniques, wireless networking and Multicarrier modulation techniques.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
CO1 : Understand wireless cellular networks and standards, Frequency reuse concept, and solve for Capacity of Cellular Systems.
CO2 : Analyze Large Scale Path Loss, Small Scale Fading in wireless environment, solve engineering problems on power at the receiver in free space propagation.
CO3 : Design and solve engineering problems for analyzing Equalization and Diversity Techniques.
CO4 : Solve engineering problems and calculate with wide range of solutions in Multiple access protocols, Packet Radio and Reservation protocols and Traffic Routing in Wireless Networks,
CO5 : Apply appropriate techniques to engineering activities in MIMO and multicarrier modulation.

M. Tech. – I/II Semester

(19MT13804) IMAGE AND VIDEO PROCESSING

(Common to CMS & DECS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES:

A Course on Digital Communications & Digital Signal Processing at UG Level

COURSE OBJECTIVES:

CEO1: To impart knowledge in fundamentals that helps in developing various algorithms pertaining to Image and Video Processing.

CEO2: To attain skills required for analysis, design and problem solving by the use of techniques required for modeling of image and video processing.

CEO3: To inculcate attitude for providing solutions for societal use in the area of image and video processing.

COURSE OUTCOMES:

After completion of this course, student will be able to:

CO1: Apply sampling, quantization, transformation and filtering techniques on image & video.

CO2: Analyze Image enhancement, restoration, segmentation techniques for improving visual quality of image

CO3: Analyze compression techniques to reduce the storage capacity of image

CO4: Develop three dimensional motion models, motion estimation methods and filtering techniques in video processing.

M. Tech. – II Semester

(19MT23802) MIMO SYSTEM

(Common to CMS & DECS)

(Program Elective - 3)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES:

Concept of Basic Electronics and Wave Theory at UG level

COURSE OBJECTIVES:

CEO1: To impart advanced knowledge in the fields of MIMO.

CEO2: To develop analytical, problem solving, design and application skills in the broad area of MIMO System.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO1: Understand multi-antenna systems , channel modeling and effect of LOS and XPD on MIMO Capacity.

CO2: Analyze diversity and spatial multiplexing in MIMO systems.

CO3: Apply MIMO coding techniques in the field of wireless communication systems.

M. Tech. - II Semester

(19MT23803) SPEECH PROCESSING

(Common to CMS & DECS)

(Program Elective - 3)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES:

Courses on Signals & Systems and Digital Signal Processing in UG

COURSE DESCRIPTION:

Acoustic theory of speech production; Models for speech signals and speech processing systems; Mathematical analysis of speech signals - homomorphic and LPC models; Speech and speaker recognition systems.

COURSE OBJECTIVES:

CEO1: To impart knowledge in understanding the concepts of Speech Processing in VLSI.

CEO2: To develop skills in analysis and problem solving using efficient algorithms for feasible and optimal solutions in Speech signal processing field.

CEO3: Apply knowledge and skills for rational analysis of speaker identification and verification systems.

COURSE OUTCOMES:

After the completion of the course, the student will be able to

CO1: Understand the process of speech production mechanism and analyze the mathematical model of acoustic speech production system to develop digital model for speech signals.

CO2: Analyze various time domain models such as short time and autocorrelation methods to solve problems in estimating pitch period of speech signals with appropriate techniques.

CO3: Analyze complex Cepstrum of speech, pitch detection and formant estimation in Homomorphic Speech Processing.

CO4: Apply Cholesky Decomposition & Durbin's Recursive approaches to solve LPC Equations in Pitch detection and Formant analysis applications.

CO5: Understand speaker verification system, speaker identification systems and Speech recognition systems.

M. Tech. - II Semester
(19MT26101) ADVANCED COMMUNICATION NETWORKS
(Program Elective-3)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES:

A Course on Computer Networks and Wireless Communications and Networks at UG Level

COURSE DESCRIPTION:

Advanced communication networks and its architectures; Protocols & Network security; Mobile adhoc networks.

COURSE OBJECTIVES:

CEO1: To provide advanced knowledge in advanced networks, architectures, protocols and security.

CEO2: To impart analysis, problem solving, and application skills in advanced computer networks.

COURSE OUTCOMES:

After completion of the course, students should be able to:

CO1. Analyze Reference architecture models like OSI, TCP/IP, Wired and Wireless LANs in various applications and Compare Datalink protocols.

CO2. Understand Network layer Protocols, Switching in Networks, ATM and its signaling.

CO3. Understand the differences between Network, Transport and Application layer protocols.

CO4. Analyze ciphers and predict the received data from ciphers and Encrypted data using various cryptographic protocols.

CO5. Analyze various Ad-hoc networks and Wireless sensor networks.

M. Tech. - II Semester
(19MT23804) SOFTWARE DEFINED RADIO
(Common to CMS & DECS)

(Program Elective-4)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PREREQUISITES:

A Course on Wireless Communication, Digital Signal Processing and Antennas at UG Level.

COURSE DESCRIPTION:

Principles of software defined radio; Multirate digital filter banks; Analysis and Synthesis of signals performance; Smart antennas with applications.

COURSE OBJECTIVES:

CEO4. To provide advanced knowledge in various aspects of Software Defined Radio.

CEO5. To impart analysis, problem solving, design, simulation, Interdisciplinary, Communication and application skills in Software Defined Radio.

CEO6. To imbibe ethical attitude towards environment and society.

COURSE OUTCOMES:

After successful completion of this course the students will be able to

CO1: Understand Radio frequency Implementation issues in software defined radios.

CO2: Design multirate digital filters for multirate signal processing for digital frequency converters in digital receivers.

CO3: Analyze the performance of direct digital synthesis systems in designing software defined radios.

CO4: Apply appropriate techniques for hardware implementation of smart antennas using software radio for better spectrum exploitation.

CO5: Analyze a Software defined Radio System/ Subsystem with object oriented representation for public needs.

M. Tech. – II Semester
(19MT26305) INTERNET OF THINGS
(Common to CNIS, CS, SE, DECS and CMS)

Internal Marks	External Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES:

Courses on Computer Networks, Python Programming.

COURSE DESCRIPTION:

Concepts of Domain Specific IoTs, M2M and system management with Netconf-Yang, IoT privacy and security, IoT physical devices, Amazon Web Services for IoT and case studies illustrating IoT design.

COURSE OUTCOMES:

CO1: Understand the concepts of IoT, IoT protocols, privacy and security issues in IoT applications to analyze domain specific IoT's.

CO2: Design solutions through implementing IoT applications on raspberry pi, AWS and develop security solutions to strengthen IoT environment.

M. Tech. - II Semester
(19MT26102) PATTERN RECOGNITION
(Program Elective – 4)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES:

A course on Digital Image processing.

COURSE DESCRIPTION:

Importance of pattern recognition; Baye's Decision Theory; Linear and non linear classifiers; Feature selection based on statistical hypothesis testing; Feature Generation; KL Transform; SVD; ICA; Clustering of features and clustering algorithms.

COURSE OBJECTIVES:

CEO1: To impart Knowledge in fundamentals that helps to develop various algorithms to classify the patterns of the objects.

CEO2: To develop skills in analysis, formulating, problem solving of Features, clustering categories of objects in digital image processing.

COURSE OUTCOMES:

On successful completion of this course the students will be able to

CO1: Understand the importance of pattern recognition, classifiers, supervised & unsupervised and analyze the bayes classifier to solve the unknown probability density function between the patterns.

CO2: Analyze the linear classifier algorithms such as LMS to determine minimum mean square error between the pattern classes using various approaches.

CO3: Analyze the Non-linear classifier algorithms such as back propagation algorithms to determine cost function and to seperate the pattern classes using various approaches.

CO4: Understand the concepts of feature selection and feature generation. Analyze feature selection & generation techniques to determine the features from the image using various techniques.

CO5: Understand the concepts of feature Clustering, Proximity Measures and analyze Clustering Algorithms Such as Sequential Clustering Algorithms, A Modification of BSAS, A Two-Threshold Sequential Scheme. Apply the appropriate techniques to cluster the features of the image.

M. Tech. – II SEMESTER
(19MT23831) ADVANCED COMMUNICATIONS LAB
(Common to CMS & DECS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	4	2

PRE-REQUISITES:
Simulation lab at UG level
COURSE DESCRIPTION:
Simulation of communication systems over communication channels with and without line coding; Design and simulation of Bussgang Blind channel; Minimum Mean Square Error and zero force equalizer; Adaptive equalizers using LMS and RLS algorithms.
COURSE OBJECTIVES:
CEO1: To design, develop and simulate various components of communication System and adaptive equalizers.
CEO2: To apply knowledge and skills in implementation of engineering principles in the field of Communications.
COURSE OUTCOMES:
After successful completion of the course, students will be able to
CO1: Analyze , measure, interpret and validate the practical observations by applying the conceptual knowledge of digital communications and adaptive signal processing.
CO2: Design CDMA communication system over different channels with Various adaptive equalizers for desired specifications.
CO3: Work individually and in groups to solve problems with effective communication.

M. Tech. – II Semester
(19MT26131) IMAGE AND VIDEO PROCESSING LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	4	2

PRE-REQUISITES:
Courses on Signal and Image Processing
COURSE DESCRIPTION:
Fundamentals of images, image transforms, enhancement, restoration, image compression and coding and video processing.
COURSEOBJECTIVES:
CEO1: To perform various operations on different types of images and videos.
CEO2: To analyze Images using Image processing techniques like Enhancement, Restoration, compression, segmentation and object recognition.
CEO3: To imbibe attitude for lifelong learning for continuous professional growth.
COURSE OUTCOMES:
On successful completion of this course, the students will be able to:
CO1: Apply sampling, quantization, transformation and filtering techniques on image & video.

CO2: Analyze Image enhancement, restoration, segmentation and compression techniques for improving visual quality of image
CO3: Apply transformation techniques on images and video to extract the information embedded in them.
CO4: Work individually and in teams collaboratively in implementing case studies.

M. Tech. – II Semester
(19MT2AC01) STATISTICS WITH R
(Audit Course)
(Common to All M. Tech. Programs)

Internal Marks	External Marks	Total Marks	L	T	P	C
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PRE-REQUISITES:
A course on Statistics.
COURSE DESCRIPTION:
Concepts of R programming basics, Bivariate and multivariate data, Confidence intervals, Goodness of fit, Analysis of variance.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
CO1: Import, manage, manipulate, and structure data files using R programming.
CO2: Implement models for statistical analysis of a given dataset and visualize the results to identify trends, patterns and outliers in data.

M. Tech. - III Semester
(19MT36131) INTERNSHIP

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	100	100	-	-	-	2

PRE-REQUISITES: --
COURSE DESCRIPTION:
Expose students to the industrial environment; Create competent professionals for the industry; sharpen the real time technical / managerial skills required at the job; Gain professional experience and understand engineer’s responsibilities and ethics.
COURSE OUTCOMES:
On successful completion of the course, students will be able to
CO1: Develop problem solving skills, critical thinking skills though designing and developing solutions for complex problems.
CO2: Utilize appropriate modern tools and techniques for implementing the proposed solutions.
CO3: Discern various challenges in developing solutions for complex problems, design and conduct experiments to evaluate alternative solutions for the chosen engineering problems.
CO4: Function effectively as an individual and participate well as a team member to build professional network for growth in career.
CO5: Develop communication, enrich professional, interpersonal and technical skills pertaining to the internship experience.
CO6: Utilize real work experiences to explore their interests, career alternatives that will help with future education or employment through and develop professional skills and competencies to engage in lifelong learning.

M. Tech. - III Semester
(19MT36132) PROJECT WORK PHASE-I

Int. Marks	Ext. Marks	Total Marks	L	T	P	C

50	50	100	-	-	-	10

PRE-REQUISITES: --

COURSE DESCRIPTION:

Identification of topic for the project work; Literature survey; Collection of preliminary data; Identification of implementation tools and methodologies; Performing critical study and analysis of the problem identified; submitting a Report.

COURSE OUTCOMES:

On successful completion of the course, the students will be able to

CO1: Apply contextual knowledge to identify specific domain in Communication systems, signal processing and allied areas of discipline.

CO2: Conduct literature review, analyze, cognize and comprehend the extracted information to recognize the current status of research pertinent to the chosen domain.

CO3: Select appropriate tools, techniques and resources for implementation of project work.

CO4: Function effectively as an individual to recognize the opportunities in the chosen domain of interest

CO5: Write and present a technical report/document to present the findings on the chosen problem.

CO6: Engage lifelong learning for development of technical competence in the field of signal processing and Communication systems.

M. Tech. - IV Semester

(19MT46131) PROJECT WORK PHASE-II

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
150	150	300	-	-	-	16

PRE-REQUISITES: --

COURSE DESCRIPTION:

Time and cost analysis; undertaking practical investigations of project work; implementation; analysis of results; validation and report writing.

COURSE OUTCOMES:

On successful completion of this course, the students will be able to

CO1: Design and develop Integrated Circuits/systems/platforms to undertake practical investigations of project work, analyze and interpret results.

CO2: Utilize appropriate tools, techniques and resources for implementation of project work.

CO3: Function effectively as an individual to recognize the opportunities in the chosen domain of interest

CO4: Write and present a technical report/document to present the findings on the chosen problem.

CO5: Engage lifelong learning for development of technical competence in the field of VLSI.

Program: M.Tech. ELECTRICAL POWER SYSTEMS

M. Tech. - I Semester
(19MT10701) HIGH VOLTAGE ENGINEERING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Electromagnetic fields, Electrical Circuits and power syetsm at UG level.
COURSE DESCREPTION: Electrostatic fields and control; Breakdown phenomena of insulation; Generation of high voltages; Measurement of high voltage & current and Testing of high voltage apparatus.
COURSE OUTCOMES: On successful completion of the course, student will be able to

CO1. Apply the conceptual knowledge of High Voltage to analyze electric fields, their control and behavior of dielectrics in the presence of fields.
CO2. Analyze the circuits for generation and measurement of High Voltages, current and impulse.
CO3. Realize the philosophy of testing and development procedures for testing of various High Voltage equipment.

M. Tech. - I Semester
(19MT10702) POWER ELECTRONICS FOR POWER SYSTEMS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Power Electronics Course at UG Level
COURSE DESCREPTION: Power Switch Control Circuits; Multi pulse Controlled Rectifiers; AC Voltage Controllers and Cyclo converters; Analysis of DC-DC and Resonant Converters; Analysis of DC-DC and Resonant Converters
COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate in-depth knowledge and analyze the operation of power semiconductor devices as controlled switches.
CO2. Demonstrate in-depth knowledge in operation, analysis and performance evaluation of ac-dc, ac-ac, dc-dc and dc-ac converters.
CO3. Apply the knowledge to select appropriate voltage control techniques to improve the performance of power converter modules, develop desired topology and to initiate research ideas.

M. Tech. - I Semester
(19MT10703) POWER SYSTEM SECURITY AND STATE ESTIMATION

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Power system analysis, Power system operation and Control at UG level

COURSE DESCRIPTION: Power system network matrices; Balanced and unbalanced short circuit analysis; AC and DC Load flow studies; Power system security; Power system state estimation.

COURSE OUTCOMES: on successful completion of the course, student will be able to

CO1. Develop mathematical models of the power system for various power system studies.

CO2. Apply knowledge of power system network matrices to solve various faults in power system.

CO3. Apply knowledge of power system network matrices to evaluate the security of the power system.

CO4. Apply knowledge of power system network matrices to estimate the state of power system.

M.Tech. - I Semester

(19MT18304) CONTROL SYSTEM DESIGN

(Program Elective - 1)

(Common to EPS and PED)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Control systems in UG Level

COURSE DESCRIPTION: Design of compensators and controllers; Controllability and observability of a system; Control systems design using state space; Nonlinear systems.

COURSEOUTCOMES: On successful completion of the course, students will be able to

CO1. Apply the knowledge of Lag, Lead and Lead-Lag compensators to analyze and design the systems in frequency and time domains for the given specifications.

CO2. Demonstrate the knowledge of PD, PI &PID Controllers to develop a suitable controller based on the required time and frequency domain specifications and analyze their performance.

CO3. Apply appropriate methods to solve linear and non-linear systems using state space approach.

CO4. Identify the attributes for analyzing the given non-linear systems.

M. Tech. – I Semester

(19MT18305) INTELLIGENT CONTROLLERS

(Program Elective – 1)

(Common to EPS and PED)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Engineering Mathematics and Contol systems at UG level.

COURSE DESCRIPTION: Neural Networks; Fuzzy Logic Systems; Genetic Algorithms; Differential Evaluation; Hybrid Intelligent Systems; Swarm intelligence; Applications.

COURSE OUTCOMES: On successful completion of the course, student will be able to

CO1. Apply the conceptual knowledge of neural networks and fuzzy logic controllers, evolutionary algorithms in hybrid intelligent controllers to analyze and develop the suitable controller for solving engineering problems.

CO2. Analyze the conceptual knowledge of neural networks and fuzzy logic controllers and various evolutionary algorithms to provide optimal solutions.

M.Tech. – I Semester
(19MT18306) MICROCONTROLLER AND APPLICATIONS
(Program Elective - 1)
(Common to EPS and PED)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Digital logic design, Microprocessors at UG level.
COURSE DESCRIPTION: PIC Microcontroller: Architecture, Peripherals, Programming, Interfacing and Applications.
COURSEOUTCOMES: On successful completion of the course, students will be able to
CO1. Demonstrate the knowledge of PIC Microcontroller and its internals and use appropriate tools to program it for the control of systems.
CO2. Interface the peripherals and control them by programming the PIC microcontroller through MPLAB, PIC 'C' Compiler etc.,

M. Tech. – I Semester
(19MT10704) HIGH VOLTAGE DC TRANSMISSION
(Program Elective - 1)
(Common to EPS and PED)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Power Electronics and Power Systems at UG level
COURSE DESCRIPTION: HVDC Transmission: Capabilities, Applications and planning; Analysis and control of power converter; Harmonics and Filters; Types of Multi-Terminal DC Systems and control; Faults and Protection.
COURSE OUTCOMES: on successful completion of the course, student will be able to
CO1. Demonstrate the knowledge on HVDC transmission systems, MTDC systems and to analyze and control static power converters.
CO2. Analyze harmonics, filters, faults and protection schemes in HVDC Transmission system.
CO3. Design and develop various types of filters to suppress harmonics in HVDC systems.

M. Tech. – I Semester
(19MT18307) ELECTROMAGNETIC FIELD COMPUTATION AND MODELING
(Program Elective-2)
(Common to EPS and PED)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Electromagnetic fields and Electrical Machines at UG level.
COURSE DESCRIPTION: Review of basic field theory; Basic solution methods for field equations; Formulation of finite element method; Computation of basic quantities using FEM packages; Design applications.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Apply the knowledge of Electromagnetic fields to analyze various electrical field problems using analytical and numerical methods.
CO2. Demonstrate the knowledge in computation of electrical parameters using Finite Element Method.
CO3. Provide solutions to design electrical equipment.

M. Tech. - I Semester
(19MT10705) DIGITAL SIGNAL PROCESSING
(Program Elective – 2)
(Common to EPS and PED)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Engineering Mathematics and Signal & Systems.
COURSE DESCRIPTION: Discrete-time signals and systems; Discrete Fourier series, Discrete Fourier Transforms (DFT) and Fast Fourier Transform (FFT) algorithms for the analysis of discrete time sequences; design and realization of Digital IIR and FIR filters; implementation of Park's and Clark's transformation using LF240X processor; DSP based implementation of DC-DC buck-boost converters.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Demonstrate knowledge of digital signals and systems to analyze DFT and FFT techniques.
CO2. Apply the knowledge of analog and digital filters to design and realize IIR and FIR filters using different techniques.
CO3. Apply DSP controllers for buck-boost converter, control of motors and further extend to real time application.

M.Tech. – I Semester
(19MT10706) POWER QUALITY
(Program Elective - 2)
(Common to EPS and PED)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Power Electronics, Electric Machines at UG level
COURSE DESCRIPTION: Power Quality concepts; harmonics and power quality standards and monitoring; power quality enhancement using custom power devices; power quality issues in distributed generation.
COURSE OUTCOMES: on successful completion of the course, student will be able to

CO1. Apply the conceptual knowledge of power quality and it's standards to analyze, monitor and mitigate various power quality issues.
CO2. Apply the knowledge of filters to mitigate harmonic distortion due to industrial and commercial loads.
CO3. Apply the conceptual knowledge of various custom power devices to enhance power quality for specific applications.
CO4. Demonstrate the conceptual knowledge of distributed generation to analyze the power quality issues in power systems.

M.Tech. - I Semester
(19MT10707) SMART GRIDS
(Program Elective - 2)
(Common to EPS and PED)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Power Systems and at UG level.
COURSE DESCRIPTION: Concept of smart grid; various information and communication technologies for Smart Grid; Smart metering; Demand side integration; Energy management systems.
COURSE OUTCOMES: After successful completion of the course, student will be able to
CO1. Apply the conceptual knowledge of smart grid and communication technologies to analyze fault levels and to estimate the state of the system.
CO2. Apply
- Modern techniques to integrate renewable energy sources to power system.
- Information security tools for secured operation of smart grid.

M. Tech. - I Semester
(19MT10708) RESEARCH METHODOLOGY AND IPR
(Common to all M. Tech. Programs)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	2	-	-	2

PRE REQUISITES:
COURSE DESCRIPTION: Overview of research; research problem and design; various research designs; Data collection methods; Statistical methods for research; Interpretation & drafting reports and Intellectual property rights.
COURSE OUTCOMES: On successful completion of the course, student will be able to:
CO1. Apply the conceptual knowledge of research methodology to formulate the hypothesis, data collection and processing, analyzing the data using statistical methods, interpret the observations and communicating the novel findings through a research report.
CO2. Practice ethics and have responsibility towards society throughout the research process and indulge in continuous learning process.

CO3. Apply the conceptual knowledge of intellectual property rights for filing patents and trade mark registration process.

M. Tech. – I Semester
(19MT10731) HIGH VOLTAGE ENGINEERING LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	4	2

PRE-REQUISITES: High Voltage Engineering at PG level.
COURSEDESCREPTION: Practical investigations on Breakdown mechanisms in dielectrics materials; Generation & measurement of high DC, AC, impulse voltages and testing high voltage apparatus.
COURSE OUTCOMES: On successful completion of the course, student will be able to
CO1. Apply the conceptual knowledge of High Voltage to analyze behavior of dielectrics in the presence of fields practically and relate the physical observation to validate the underlying theoretical concepts.
CO2. Analyze the circuits for generation and measurements of High Voltages, current and impulse through experimental procedures.
CO3. Realize the philosophy of testing and develop procedures to test a High Voltage equipment.
CO4. Apply ethics and norms of the engineering practice while exercising experimental investigations.
CO5. Function effectively as an individual to accomplish the given task effectively.
CO6. Communicate effectively in verbal and written forms.

M. Tech. - I Semester
(19MT10732) POWER SYSTEM ANALYSIS - I LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	4	2

PRE-REQUISITES: Power system security and state estimation at PG level and Power electronics, Control systems at UG level
COURSE DESCRIPTION: Simulation investigations on various advanced power system operation and control networks and Power electronics converters.
COURSE OUTCOMES: On successful completion of the course, student will be able to
CO1. Apply the conceptual knowledge to analyze and evaluate the performance and behavior of power electronics converters and power system network during normal & adverse conditions using domain specific tools.
CO2. Realize the philosophy of simulating, testing and develop procedures to test the various standard power systems networks and power electronic circuits in industry and society.
CO3. Apply ethics and norms of the engineering practice while exercising experimental investigations.
CO4. Function effectively as an individual to accomplish the given task effectively.
CO5. Communicate effectively in verbal and written forms

M. Tech. - I Semester

(19MT1AC01) TECHNICAL REPORT WRITING

(Audit Course)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	2	-	-	-

PRE-REQUISITES : -
COURSE DESCRIPTION: Introduction; Process of writing; Style of writing; Referencing; Presentation.

COURSE OUTCOMES: On successful completion of the course, student will be able to

CO1: Demonstrate knowledge of Technical Report Writing by examining kinds of reports and structure with scientific attitude.

CO2: Apply the techniques in preparing effective reports by examining Techniques of Description, Describing Machines and Mechanisms and Describing Processes.

CO3: Communicate effectively through writing technical reports by demonstrating the knowledge of Industry Reports, Survey Reports, Interpretive Report and Letter Report.

M. Tech. – II Semester
(19MT20701) POWER SYSTEM MODELING AND CONTROL

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Electrical machines, control systems, power system analysis at UG level and Power system security and state estimation PG level.
COURSE DESCRIPTION: Introduction to the synchronous machine classical model; state space models of synchronous machine; Methods of Excitation systems and modeling ; Effect of excitation on stability; Analysis of Voltage stability.
COURSE OUTCOMES: After successful completion of the course, student will be able to

CO1. Demonstrate in depth knowledge in analyzing and evaluating the performance of regulated and unregulated single machine connected to infinite bus system with one time lag.

CO2. Use appropriate transformation techniques to model synchronous machine.

CO3. Represent the excitation systems, apply and analyze various control schemes to them.

CO4. Apply various control strategies to analyze the performance of excitation system stability.

CO5. Demonstrate knowledge on voltage and rotor angle stability, use various advance control techniques for analyzing the single machine connected to infinite bus system.

M. Tech. - II Semester
(19MT20702) STATIC AND DIGITAL PROTECTION OF POWER SYSTEM

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Power systems and Microprocessors at UG level.

COURSE DESCRIPTION: Introduction to Static and Digital Relays; Comparators; Static Over Current and Differential Relays; Static Distance Relays;Microprocessor Based Protective

Relays.

COURSE OUTCOMES: On successful completion of the course, student will be able to

CO1. Demonstrate knowledge on static and digital relays to analyze different protection schemes.

CO2. Apply the knowledge of various components of static relay to design an appropriate protection scheme for power system.

CO3. Apply the knowledge of numerical relays to design and analyze microprocessor based relay for power system protection.

M. Tech. – II Semester
(19MT28305) SOLAR ENERGY CONVERSION SYSTEMS

(Program Elective - 3)
(Common to EPS and PED)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Power Electronics and control systems UG level.

COURSE DESCRIPTION: Solar energy conversion system; Types of photovoltaic systems – Stand-alone, hybrid and grid connected systems; Energy storage systems; Applications.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge on solar cell and analyze the behavior of solar cells for different irradiations.

CO2. Apply the knowledge of solar modules, energy storage system and mptt to design the stand-alone and grid connected pv systems for various real time applications.

M. Tech. - II Semester
(19MT20703) EHVAC TRANSMISSION

(Program Elective – 3)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PREREQUISITE(S): Power Systems at UG level

COURSE DESCRIPTION: Concept of EHVAC transmission; analysis and design of EHVAC lines; effects of EHVAC; Corona Effects; voltage control and compensation.

COURSE OUTCOMES: On successful completion of the course, student will be able to

CO1. Demonstrate knowledge, analyze and evaluate the various configurations of EHVAC transmission lines parameters and line losses.

CO2. Demonstrate knowledge in computing the voltage gradient of conductors and electric fields.

CO3. Demonstrate knowledge in computing the corona effects, power losses and analyze the audible & radio interference in EHVAC transmission lines.

CO4. Demonstrate knowledge in evaluating the electrostatic fields and safety measures for human, animals, and plants.

CO5. Demonstrate knowledge, skills to analyze and evaluate the various voltage control techniques and compensation techniques in EHVAC transmission lines.

M. Tech. - II Semester
(19MT20704) POWER SYSTEM AUTOMATION

(Program Elective –3)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Power system at UG level.
COURSE DESCRIPTION: Power system operation and control, Substation and Energy management systems (EMS) for control centers, Distribution automation.
COURSE OUTCOMES: On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on real time operation and control of power system
CO2. Examine operational technical issues in power system, substation and distribution systems to provide feasible solutions, substation and distribution systems.
CO3. Demonstrate knowledge on various models of restructuring power system and analyze various forecasting methods for pricing and operation of deregulated power system.

M.Tech. – II Semester
(19MT20705) REACTIVE POWER COMPENSATION AND MANAGEMENT
(Program Elective - 3)

Internal Marks	External Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PREREQUISITE(S): Power systems and control systems at UG level
COURSE DESCRIPTION: Reactive Power compensation:Ideal compensator; Line and load compensation ; Compensating devices; Reactive power coordination; Quality of power supply; Distribution side management; Reactive power management in domestic and industrial sectors.
COURSE OUTCOMES: On successful completion of the course, student will be able to

CO1. Apply the conceptual knowledge on reactive power compensation techniques, demand side management and power quality issues in steady state and transient state at domestic and industrial sectors.
CO2. Apply the knowledge of various compensators to analyze, design and solve various reactive power problems in domestic and industrial sectors.
CO3. Demonstrate knowledge on reactive power coordination, power tariffs, to select location and appropriate size of capacitor.
CO4. Apply ethics in quality of supply and norms of reactive power compensation and management.

M. Tech. – II Semester
(19MT28309) WIND ENERGY CONVERSION SYSTEMS
(Program Elective - 4)
(Common to EPS and PED)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PREREQUISITE(S): Power Electronics, control systems in UG level.

COURSE DESCRIPTION: Fundamentals of wind energy and its measurement; wind turbine design and basic aerodynamics principles; need of usage of wind generators; wind turbine control, monitor and implementation in the wind farm and site selection; power quality issues and mitigation methods of wind power integration in the power system.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. demonstrate knowledge on various components, types, characteristics and measurements of wind turbines.
CO2. apply the knowledge of aerodynamics forces to analyze wind turbine blade rotation.
CO3. use the knowledge of various design procedures and converters for designing modern wind turbines and to integrate.
CO4. demonstrate knowledge on various types of control and monitoring techniques used in WECS.
CO5. demonstrate knowledge on power quality problems in WECS and apply suitable mitigation techniques/ custom power devices to improve the power quality.

M. Tech. – II Semester
(19MT20706) FLEXIBLE AC TRANSMISSION SYSTEM

(Program Elective – 4)
(Common to EPS and PED)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Power Electronics and Power Systems at UG level.

COURSE DESCRIPTION: Need for flexible AC transmission systems; objectives of shunt and series compensations, phase angle regulators; FACTS controllers: shunt, series and combined; coordination of various FACTS controllers.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Apply the conceptual knowledge of compensation techniques and appropriate conventional and FACTS devices for active and reactive power flows in parallel and meshed systems.
CO2. Analyze the active and reactive power flow, transient stability enhancement, power oscillation damping and optimal operation through various FACTS devices/controllers and their coordination.

M. Tech. – II Semester
(19MT20707) POWER SYSTEM DEREGULATION

(Program Elective – 4)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Power system analysis at UG level

COURSE DESCRIPTION: Features of Restructured Power systems; Market models; Information and transmission services; Electricity pricing and forecasting; Ancillary services management.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Apply the conceptual knowledge of deregulation for various market models, electricity pricing, forecasting methods and ancillary service management in competitive market.
CO2. Analyze market models to provide power exchange, regulate congestion in tie-lines and design various forecasting methods for pricing, planning and operation of deregulated power systems.

M. Tech. – II Semester
(19MT20708) POWER SYSTEM PLANNING AND RELIABILITY
(Program Elective – 4)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Power systems at UG level.
COURSE DESCRIPTION: Load forecasting; Fundamentals of Reliability Engineering; Evaluation of Power system operating capacity reserve; Evaluation of Frequency and Duration Techniques; Reliability Analysis of Interconnected Systems; Power Distribution System Reliability Analysis.
COURSE OUTCOMES: After successful completion of the course, student will be able to
CO1. Demonstrate the conceptual knowledge of forecasting and apply load forecasting techniques to predict load demand under normal and adverse weather conditions.
CO2. Use conceptual knowledge of probability techniques in analyzing, designing and evaluating the various network configurations.
CO3. Apply conceptual knowledge of probability techniques for solving power system reliability indices.
CO4. Apply conceptual knowledge of capacity outage probability table for solving interconnected power system reliability problems.
CO5. Apply conceptual knowledge of reliability networks in solving power distribution system reliability problems.

M. Tech. - II Semester
(19MT20731) POWER SYSTEM ANALYSIS – II LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	4	2

PRE-REQUISITES: Power systems analysis, Power system operation and control at UG level and Power system modeling and control at PG level.

COURSE DESCRIPTION: Simulation investigations on various advanced power system operation and control networks and Power electronics converters.

COURSE OUTCOMES: On successful completion of the course, student will be able to
CO1. Apply the conceptual knowledge to analyze and evaluate the performance and behavior of power electronics converters and power system network during normal & adverse conditions using domain specific tools.
CO2. Realize the philosophy of simulating, testing and develop procedures to test the various standard power systems networks and power electronic circuits in industry and society.
CO3. Apply ethics and norms of the engineering practice while exercising experimental investigations.
CO4. Function effectively as an individual to accomplish the given task effectively.
CO5. Communicate effectively in verbal and written forms.

M. Tech. – II Semester
(19MT20732) POWER SYSTEMS AND PROTECTION LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	4	2

PRE-REQUISITES: Static and Digital protection of power system at PG level
COURSE DESCRIPTION: Experimental investigations on Three and Two winding transformers, synchronous machine, Relay testing, fault analysis, power angle characteristics, measurement of power quality.
COURSE OUTCOMES: On successful completion of the course, student will be able to
CO1. Apply the conceptual knowledge of various Protective relay testings and analyze their performance characteristics.
CO2. Apply the conceptual knowledge to measure and analyze various sequence parameter of transformers, synchronous machines,.
CO3. Apply conceptual knowledge to measure and analyze various types of faults and harmonics.
CO4. Function effectively as an individual and as a member in a team to accomplish the given task effectively.
CO5. Prepare laboratory reports that clearly communicate experimental information.
CO6. Function effectively as an as a member in a team to solve various problems.

M. Tech. – II Semester
(19MT2AC01) STATISTICS WITH R
(Audit Course)
(Common to All M. Tech. Programs)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	2	-	-	-

PRE-REQUISITES: A course on Statistics.
COURSE DESCRIPTION: Concepts of R programming basics, Bivariate and multivariate data, Confidence intervals, Goodness of fit, Analysis of variance.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Import, manage, manipulate, and structure data files using R programming.
CO2. Implement models for statistical analysis of a given dataset and visualize the results to identify trends, patterns and outliers in data.

M. Tech. – III Semester
(19MT30731) INTERNSHIP

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	100	100	-	-	-	2

PRE-REQUISITES: --
COURSE DESCRIPTION: Aequaint students with the industrial environment; Create competent professionals for the industry; Gain professional experience and understand engineer's responsibilities and ethics.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Develop problem solving skills, critical thinking skills though designing and developing

solutions for complex problems.

CO2. Utilize appropriate modern tools and techniques for implementing the proposed solutions.

CO3. Discern various challenges in developing solutions for complex problems, design and conduct experiments to evaluate alternative solutions for the chosen engineering problems.

CO4. Function effectively as an individual and participate well as a team member to build professional network for growth in career.

CO5. Develop communication, enrich professional, interpersonal and technical skills pertaining to the internship experience.

CO6. Understand the industry/organization customs and practices that will help to develop a solid work ethic and professional demeanor, as well as a commitment to ethical conduct and social responsibility.

CO7. Utilize real work experiences to explore their interests, career alternatives that will help with future education or employment through and develop professional skills and competencies to engage in lifelong learning.

M. Tech. – III Semester
(19MT30732) PROJECT WORK PHASE - I

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	-	10

PRE-REQUISITES: --

COURSE DESCRIPTION: Identification of topic for the project work, Literature survey, Collection of preliminary data, Critical study and analysis of the topic identified, Time and cost analysis.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Apply contextual knowledge to identify a domain of interest and a specific problem in core and allied areas of discipline.

CO2. Conduct a systematic literature review, analyze, cognize and comprehend the extracted information to recognize the current status of research pertinent to the chosen problem.

CO3. Discern various issues, challenges and identify alternative solutions for the chosen engineering problems.

CO4. Function effectively as an individual to recognize the opportunities in the chosen domain of interest and engage in independent learning.

CO5. Write and present a substantial technical report/document to present the findings on the chosen problem.

CO6. Acquire intellectual integrity through understanding the need for ethics in research, profession and its impact on the society.

M. Tech. – IV Semester
(19MT40731) PROJECT WORK PHASE - II

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
150	150	300	-	-	-	16

PREREQUISITES: Project Work Phase – I

COURSE DESCRIPTION: Identification of topic for the project work; Literature survey; Collection of preliminary data; Identification of implementation tools and methodologies; Performing critical study and analysis of the topic identified; Time and cost analysis;

Implementation of the project work; Writing of thesis and presentation.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Investigate, conceptualize and design optimal solutions for the chosen engineering problems.

CO2. Utilize appropriate modern tools and techniques for implementing the proposed solution.

CO3. Design and conduct experiments, visualize, analyze and interpret results to test and evaluate the proposed solution.

CO4. Function effectively as an individual to recognize the opportunities in the chosen domain of interest and engage in independent learning.

CO5. Write and present a substantial technical report/document to present the findings on the chosen problem.

CO6. Acquire intellectual integrity through understanding the need for ethics in research, profession and its impact on the society.

CO7. Engage in lifelong learning for development of technical competence in the advanced fields of Power Systems to contribute to the development of scientific/technological knowledge.

Program: M.Tech. POWER ELECTRONICS AND DRIVES

M. Tech.– I Semester
(19MT18301) DYNAMICS OF ELECTRICAL MACHINES

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Courses on DC Machines, Transformers, Induction Machines & Synchronous Machines at UG level.
COURSE DESCRIPTION: Modelling and analysis of DC, induction and synchronous machines in stationary and rotating reference frames.
COURSEOUTCOMES: On successful completion of the course, students will be able to
CO1. Demonstrate the potential knowledge of magnetically coupled circuits, model and analyze the performance of AC machines.
CO2. Apply the knowledge of two pole DC machines and use appropriate technique to model different types DC Machines mathematically.
CO3. Apply appropriate transformation technique to obtain reference frame variables, analyze and design induction machine and synchronous machine.

M. Tech. – I Semester
(19MT18302) POWER ELECTRONIC CONVERTERS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Courses on Engineering Mathematics, Electrical circuits, Power Electronics at UG Level.
COURSE DESCRIPTION: Single phase and three phase converters - Types, operation of controlled and uncontrolled converters; Inverters – Types, operation of Single and Three Phase Voltage Source Inverters; Current Source Inverters; DC-DC Converters andAC Voltage Controllers.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Demonstrate the knowledge of AC–DC Converters of various configurations to model and apply appropriate control technique to analyze their performance subjected to various loads.
CO2. Apply the knowledge of various types of inverter topology and analyze the performance parameters subjected to various control techniques to provide feasible solutions.
CO3. Apply the knowledge of DC-DC converters & AC voltage Controllers and analyze their performance subjected to different load conditions.

M. Tech. – I Semester
(19MT18303) POWER SEMICONDUCTOR DEVICES AND MODELING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Courses on Electronic Devices and Power Electronics at UG Level.

COURSE DESCRIPTION: Construction, types, switching, operating characteristics and applications of power semiconductor devices; Design of firing, protective circuits and heat sinks for various power semiconductor devices.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Apply the knowledge of various power switching devices to model and analyze their performance parameters & characteristics when used for various power converters.

CO2. Demonstrate the operation, analyze the performance characteristics and there by suggest suitable special power devices for power converters.

CO3. Apply the knowledge of firing and protection circuits to model and design power converters.

M. Tech. – I Semester

(19MT10704) HIGH VOLTAGE DC TRANSMISSION

(Program Elective-1)

(Common to EPS and PED)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Power Electronics and Power Systems at UG level

COURSE DESCRIPTION:HVDC Transmission: Capabilities, Applications and planning; Analysis and control of power converter; Harmonics and Filters; Types of Multi-Terminal DC Systems and control; Faults and Protection.

COURSE OUTCOMES: On successful completion of the course, student will be able to

CO1. Demonstrate the knowledge on HVDC transmission systems, MTDC systems and to analyze and control static power converters.

CO2. Analyze harmonics, filters, faults and protection schemes in HVDC Transmission system.

CO3. Design and develop various types of filters to suppress harmonics in HVDC systems.

M.Tech. - I Semester

(19MT18304) CONTROL SYSTEM DESIGN

(Program Elective - 1)

(Common to EPS and PED)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Course on Control systems in UG Level.

COURSE DESCRIPTION: Design of compensators and controllers; Controllability and observability of a system; Control systems design using state space; Nonlinear systems.

COURSEOUTCOMES: On successful completion of the course, students will be able to

CO1. Apply the knowledge of Lag, Lead and Lead-Lag compensators to analyze and design the systems in frequency and time domains for the given specifications.

CO2. Demonstrate the knowledge of PD, PI &PID Controllers to develop a suitable controller based on the required time and frequency domain specifications and analyze their performance.

CO3. Apply appropriate methods to solve linear and non-linear systems using state space approach.

CO4. Identify the attributes for analyzing the given non-linear systems.

M. Tech. – I Semester
(19MT18305) INTELLIGENT CONTROLLERS
(Program Elective – 1)
(Common to EPS and PED)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Engineering Mathematics, Electrical Machines, Power Systems at UG level.
COURSE DESCRIPTION: Neural Networks; Fuzzy Logic Systems; Genetic Algorithms; Differential Evaluation; Hybrid Intelligent Systems; Swarm intelligence; Applications.
COURSE OUTCOMES: On successful completion of the course, student will be able to
CO3. Apply the conceptual knowledge of neural networks and fuzzy logic controllers, evolutionary algorithms in hybrid intelligent controllers to analyze and develop the suitable controller for solving engineering problems.
CO4. Analyze the conceptual knowledge of neural networks and fuzzy logic controllers and various evolutionary algorithms to provide optimal solutions.

M.Tech. – I Semester
(19MT18306) MICROCONTROLLER AND APPLICATIONS
(Program Elective - 1)
(Common to EPS and PED)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Digital logic design, Microprocessors and Microcontrollers at UG level.
COURSE DESCRIPTION:PIC Microcontroller: Architecture, Peripherals, Programming, Interfacing and Applications.
COURSEOUTCOMES: On successful completion of the course, students will be able to
CO1. Demonstrate the knowledge of PIC Microcontroller and its internals and use appropriate tools to program it for the control of systems.
CO2. Interface the peripherals and control them by programing the PIC microcontroller through MPLAB, PIC 'C' Compiler etc.,

M. Tech. - I Semester
(19MT10705) DIGITAL SIGNAL PROCESSING
(Program Elective – 2)
(Common to EPS and PED)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Laplace transforms, Z-transforms, Fourier Transforms, Signal and Systems.
COURSE DESCRIPTION: Discrete-time signals and systems; Discrete Fourier series, Discrete Fourier Transforms (DFT) and Fast Fourier Transform (FFT) algorithms for the analysis of discrete time sequences; design and realization of Digital IIR and FIR filters;

implementation of Park's and Clark's transformation using LF240X processor; DSP based implementation of DC-DC buck-boost converters.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge of digital signals and systems to analyze DFT and FFT techniques.

CO2. Apply the knowledge of analog and digital filters to design and realize IIR and FIR filters using different techniques.

CO3. Apply DSP controllers for buck-boost converter, control of motors and further extend to real time application.

M.Tech. – I Semester
(19MT10706) POWER QUALITY
(Program Elective – 2)
(Common to EPS and PED)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Power electronics, Electric Machines, Electronic Devices and Circuits at UG level and high power converters at PG level.

COURSE DESCRIPTION: Power Quality concepts; harmonics and power quality standards and monitoring; power quality enhancement using custom power devices; power quality issues in distributed generation.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Apply the conceptual knowledge of power quality and it's standards to analyze, monitor and mitigate various power quality issues.

CO2. Apply the knowledge of filters to mitigate harmonic distortion due to industrial and commercial loads.

CO3. Apply the conceptual knowledge of various custom power devices to enhance power quality for specific applications.

CO4. Demonstrate the conceptual knowledge of distributed generation to analyze the power quality issues in power systems.

M.Tech. - I Semester
(19MT10707) SMART GRIDS
(Program Elective - 2)
(Common to EPS and PED)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Power Systems at UG level.

COURSE DESCRIPTION: Concept of smart grid; various information and communication technologies for smart Grid; Smart metering; Demand side integration; Energy management systems.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Apply the conceptual knowledge of smart grid and communication technologies to analyze fault levels and to estimate the state of the system.

CO2.Apply

- modern techniques to integrate renewable energy sources to power system.
- information security tools for secured operation of smart grid.

M. Tech. –I Semester
(19MT18307) ELECTROMAGNETIC FIELD COMPUTATION AND MODELING
(Program Elective-2)
(Common to EPS and PED)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Electromagnetic fields, Electrical Machines at UG level.
COURSE DESCRIPTION: Review of basic field theory; Basic solution methods for field equations; Formulation of finite element method; Computation of basic quantities using FEM packages; Design applications.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Apply the knowledge of Electromagnetic fields to analyze various electrical field problems using analytical and numerical methods.
CO2. Demonstrate the knowledge in Computation of electrical parameters using Finite Element Method.
CO3. Provide solutions to design electrical equipment.

M. Tech.-I Semester
(19MT10708) RESEARCH METHODOLOGY and IPR
(Common to all M. Tech. Programs)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	2	-	-	2

PRE REQUISITES: Engineering Mathematics at UG level.
COURSE DESCRIPTION: Overview of research; research problem and design; various research designs; Data collection methods; Statistical methods for research; Interpretation& drafting reports and Intellectual property rights.
COURSE OUTCOMES: On successful completion of the course, student will be able to:
CO7. Apply the conceptual knowledge of research methodology to formulate the hypothesis, data collection and processing, analyzing the data using statistical methods, interpret the observations and communicating the novel findings through a research report.
CO8. Practice ethics and have responsibility towards society throughout the research process and indulge in continuous learning process.
CO9. Apply the conceptual knowledge of intellectual property rights for filing patents and trade mark registration process.

M. Tech. – I Semester
(19MT18331)POWER ELECTRONICS DESIGN LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	4	2

PRE-REQUISITES: Courses on Electronic Devices, Power Electronics at UG Level
COURSE DESCRIPTION: Design and development of various power converters.
COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Identify appropriate devices, domain specific tools and techniques to develop and control power electronic converters.
CO2. Analyze and evaluate the performance of Power converters by practicing professional code of ethics.
CO3. Prepare laboratory reports that clearly communicate experimental information.
CO4. Function effectively as an individual to solve various problems.

M. Tech. – I Semester
(19MT18332)POWER ELECTRONICS SIMULATION LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	4	2

PRE-REQUISITES: Courses on Electronic Devices, Power Electronics at UG Level.
COURSE DESCRIPTION: Design and simulation of various power converters.
COURSEOUTCOMES: On successful completion of the course, students will be able to
CO1. Identify appropriate devices, domain specific tools and techniques to develop and control power electronic converters.
CO2. Analyze and evaluate the performance of Power converters by practicing professional code of ethics.
CO3. Prepare laboratory reports that clearly communicate experimental information.
CO4. Function effectively as an individual to solve various problems.

M. Tech. - I Semester
(19MT1AC01) TECHNICAL REPORT WRITING
(Audit Course)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	2	-	-	-

PRE-REQUISITES: -
COURSE DESCRIPTION: Introduction; Process of writing; Style of writing; Referencing; Presentation.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Demonstrate knowledge of Technical Report Writing by examining kinds of reports and structure with scientific attitude.
CO2. Apply the techniques in preparing effective reports by examining Techniques of Description, Describing Machines and Mechanisms and Describing Processes.
CO3. Communicate effectively through writing technical reports by demonstrating the knowledge of Industry Reports, Survey Reports, Interpretive Report and Letter Report.

M. Tech. – II Semester
(19MT28301)DIGITAL CONTROL OF POWER ELECTRONICS AND DRIVE SYSTEMS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Courses on Power Electronics, Power Semiconductor Drives at UG Level.

COURSE DESCREPTION: Peripherals; Memory addressing modes; DSP based control of dc-dc converters; DSP based control of matrix converters; DSP based control of PMBLDC and SRM drives.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Apply the knowledge of various addressing modes of LF2407 processor and its instruction set to develop simple and complex programs to control power electronic circuits.

CO2. Apply the knowledge of Space vector modulation technique to control inverter fed AC drives and to implement them in real time using LF2407.

CO3. Design and develop controller for PMBLDC and SRM drives using LF2407.

M. Tech. – II Semester
(19MT28302) ELECTRICAL DRIVES

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Courses on Power Electronic Converters, Modelling & Analysis of Electrical Machines.

COURSE DESCRIPTION: Performance characteristics and parameters of single phase, three phase converters fed DC motor; Chopper control of DC drives; Open loop and closed loop speed control of induction motor; Induction motor drive, torque control, field oriented control; Synchronous motor drive; synchronous motor control.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge on various electrical drives.

CO2. Use the knowledge of converter/chopper fed DC drives of various configurations to analyze and select appropriate power circuit configuration for obtaining the better torque-speed characteristics.

CO3. Apply the knowledge of various types of induction motor drives and analyze their performance characteristics with the effects of various control strategies

CO4. Apply the knowledge of synchronous motor drive and analyze the performance parameters subjected to various control techniques.

CO5. Design and develop electrical drives to solve engineering problems pertaining to drives in real time applications.

M. Tech. – II Semester
(19MT28303) ADVANCED POWER ELECTRONIC CIRCUITS
(Program Elective – 3)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Courses on Power Electronic Converters, Power Semiconductor Devices.

COURSE DESCRIPTION: Improved DC-DC Converters – Types and operation; Voltage-Lift DC-DC Converters; Super-Lift Converters; Ultra-Lift DC-DC Converter; Multilevel and Soft-Switching DC-AC Inverters – Types, operation and applications; Improved AC-AC Converters Inverters.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Apply the knowledge of various types of improved AC-DC Converters and use appropriate control technique to model and analyze with different configurations subjected to various loads.

CO2. Describe the operation of voltage-lift, super-lift & ultra-lift DC-DC converter and analyze their performance factors with the effects of various control techniques.

CO3. Demonstrate the knowledge of various types of multilevel and soft-switching DC-AC inverter topology and analyze the performance parameters with various control techniques.
CO4. Understand the knowledge of different types of improved AC-AC converters and use appropriate control techniques to model and analyze with different configurations.

M. Tech. – II Semester
(19MT28304) MULTILEVEL INVERTERS
(Program Elective – 3)

Int. Marks	Ext. Marks	Total Marks		L	T	P	C
40	60	100		3	-	-	3

PRE-REQUISITES: Courses on Power Electronic Converters and Power Semiconductor Devices & Modeling.
COURSE DESCRIPTION: Symmetric and Asymmetric multilevel inverter; Diode Clamped Multilevel Converter – Types and operation; Flying Capacitor Multilevel Converter: Types and operation; Cascaded Asymmetric Multilevel Converter: Types and operation; Application of Multilevel Inverter fed Drive.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Demonstrate the knowledge of multilevel and control techniques to design a three level inverter.
CO2. Demonstrate the knowledge of various topologies of multilevel inverter and use appropriate control technique to model and evaluate their performance parameters.
CO3. Select appropriate multilevel inverter and control techniques to provide feasible solutions.

M. Tech. – II Semester
(19MT28305) SOLAR ENERGY CONVERSION SYSTEMS
(Program Elective-3)
(Common to EPS and PED)

Int. Marks	Ext. Marks	Total Marks		L	T	P	C
40	60	100		3	-	-	3

PRE-REQUISITES: Courses on Power Electronic Converters.
COURSE DESCRIPTION: Solar energy conversion system; Types of photovoltaic systems – Stand-alone, hybrid and grid connected systems; Energy storage systems; Applications.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1.Demonstrate knowledge on solar cell and analyze the behavior of solar cells for different irradiations.
CO2.Apply the knowledge of solar modules, energy storage system and MPTT to design the stand-alone and grid connected PV systems for various real time applications.

M. Tech. – II Semester
(19MT28306) SPECIAL ELECTRICAL MACHINES
(Program Elective - 3)

Int. Marks	Ext. Marks	Total Marks		L	T	P	C
40	60	100		3	-	-	3

PRE-REQUISITES: Courses on Electrical Machines, Control Systems, power electronics at UG level.

COURSE DESCREPTION: Constructional features, operating principles, characteristics and control of synchronous reluctance motor, stepping motor, switched reluctance motor, permanent magnet synchronous motor, permanent magnet brushless DC motor.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate potential knowledge on construction and characteristics of synchronous reluctance motors.

CO2. Analyze and design appropriate power circuit configuration for stepper motor drive of various configurations to obtain better performance characteristics.

CO3. Demonstrate potential knowledge on construction of switched reluctance motors and design controllers for SRM using Microprocessor.

CO4. Apply the knowledge on construction of permanent magnet synchronous motors and analyze their performance characteristics with the effects of various control strategies.

CO5. Apply the knowledge of various types of permanent magnet brushless DC motor drives to develop chip based controllers.

M. Tech. – II Semester

(19MT20706) FLEXIBLE AC TRANSMISSION SYSTEM

(Program Elective – 4)

(Common to EPS and PED)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Power Electronics and Power Systems at UG level.

COURSE DESCRIPTION: Need for flexible AC transmission systems; objectives of shunt and series compensations, phase angle regulators; FACTS controllers: shunt, series and combined; coordination of various FACTS controllers.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO3. Apply the conceptual knowledge of compensation techniques and appropriate conventional and FACTS devices for active and reactive power flows in parallel and meshed systems.

CO4. Analyze the active and reactive power flow, transient stability enhancement, power oscillation damping and optimal operation through various FACTS devices/controllers and their coordination.

M. Tech. – II Semester

(19MT28307) HYBRID ELECTRIC VEHICLES

(Program Elective –4)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Courses on Power Electronics, Special Electrical Machines, Power Semiconductor Drives at UG Level

COURSE DESCRIPTION: Transportation vehicles and their impact in society; Concept and configurations of Electric Vehicles (EV); Principle, Types and operation of Hybrid-Electric Vehicles (HEVs); Power Electronic converters in HEVs; Different motor drives & energy storage technologies in EVs and HEVs.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge on fundamental concepts of Electric Vehicles (EVs) and Hybrid-Electric Vehicles (HEVs) and apply the appropriate power converter & energy storage techniques to analyze and design EVs and HEVs for various applications.

CO2. Apply the knowledge of various types of AC & DC motor drives and analyze their performance characteristics with the effects of various control strategies.

M. Tech. – II Semester

(19MT28308) SWITCHED MODE POWER SUPPLIES AND UPS

(Program Elective - 4)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Courses on Power Electronic Converters, Power Semiconductor Devices & Modeling.

COURSE DESCRIPTION:DC-DC Converters and Switching Mode Power Converters; Resonant Converters – Types and operating waveforms; ZCS and ZVS Resonant converters; Power conditioners, UPS and Filters – ON and OFF line operation.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate the knowledge of various switch mode DC–DC Converters and use appropriate control technique to design and analyze with different modes of operation.

CO2. Understand the knowledge of resonant converter and use appropriate control technique to model and evaluate their performance parameters.

CO3. Demonstrate the knowledge of power conditioners, UPS and filters to design and analyze for different operating conditions.

M. Tech. – II Semester

(19MT28309) WIND ENERGY CONVERSION SYSTEMS

(Program Elective-4)

(Common to EPS and PED)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PREREQUISITE(S): Courses on Power Electronics, control systems in UG level.

COURSE DESCRIPTION: Fundamentals of wind energy and its measurement; wind turbine design and basic aerodynamics principles; need of usage of wind generators; wind turbine control, monitor and implementation in the wind farm and site selection; power quality issues and mitigation methods of wind power integration in the power system.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge on various components, types, characteristics and measurements of wind turbines.

CO2. Apply the knowledge of aerodynamics forces to analyze wind turbine blade rotation.

CO3. Use the knowledge of various design procedures and converters for designing modern wind turbines and to integrate.

CO4. Demonstrate knowledge on various types of control and monitoring techniques used in WECS.

CO5. Demonstrate knowledge on power quality problems in WECS and apply suitable mitigation techniques/ custom power devices to improve the power quality.

M. Tech. – II Semester
(19MT28331)ELECTRICAL DRIVES LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	4	2

PRE-REQUISITES: Courses on Power converters.
COURSE DESCRIPTION: Design and development of various AC and DC drives.
COURSEOUTCOMES: On successful completion of the course, students will be able to
CO1. Identify appropriate devices, domain specific tools and techniques to develop and control power electronic converters fed drive.
CO2. Analyze and evaluate the performance of Power converters fed drive by practicing professional code of ethics.
CO3. Prepare laboratory reports that clearly communicate experimental information.
CO4. Function effectively as an individual to solve various problems.

M. Tech. – II Semester
(19MT28332)ELECTRICAL DRIVES SIMULATION LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	4	2

PRE-REQUISITES: Courses on Power converters.
COURSE DESCRIPTION: Design and simulation of various AC and DC drives.
COURSEOUTCOMES: On successful completion of the course, students will be able to
CO1. Identify appropriate devices, domain specific tools and techniques to develop and control power electronic converters fed drive.
CO2. Analyze and evaluate the performance of Power converters fed drive by practicing professional code of ethics.
CO3. Prepare laboratory reports that clearly communicate experimental information.
CO4. Function effectively as an individual to solve various problems.

M. Tech. – II Semester
(19MT2AC01) STATISTICS WITH R
(Audit Course)
(Common to All M. Tech. Programs)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	2	-	-	-

PRE-REQUISITES: A course on Statistics.
COURSE DESCRIPTION: Concepts of R programming basics, Bivariate and multivariate data, Confidence intervals, Goodness of fit, Analysis of variance.
COURSE OUTCOMES: On successful completion of the course, students will be able to
CO1. Import, manage, manipulate, and structure data files using R programming.
CO2. Implement models for statistical analysis of a given dataset and visualize the results to identify trends, patterns and outliers in data.

M. Tech. – III Semester

(19MT38331)INTERNSHIP

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	100	100	-	-	-	2

PRE-REQUISITES: -

COURSE DESCRIPTION: Acquaint students with the industrial environment; Create competent professionals for the industry; Gain professional experience and understand engineer's responsibilities and ethics.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Develop problem solving skills, critical thinking skills though designing and developing solutions for complex problems.
CO2. Utilize appropriate modern tools and techniques for implementing the proposed solutions.
CO3. Discern various challenges in developing solutions for complex problems, design and conduct experiments to evaluate alternative solutions for the chosen engineering problems.
CO4. Function effectively as an individual and participate well as a team member to build professional network for growth in career.
CO5. Develop communication, enrich professional, interpersonal and technical skills pertaining to the internship experience.
CO6. Understand the industry/organization customs and practices that will help to develop a solid work ethic and professional demeanor, as well as a commitment to ethical conduct and social responsibility.
CO7. Utilize real work experiences to explore their interests, career alternatives that will help with future education or employment through and develop professional skills and competencies to engage in lifelong learning.

M. Tech. – III Semester

(19MT38332)PROJECT WORK PHASE-I

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	-	10

PREREQUISITES: -

COURSE DESCRIPTION: Identification of topic for the project work, Literature survey, Collection of preliminary data, Critical study and analysis of the topic identified, Time and cost analysis.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Apply contextual knowledge to identify a domain of interest and a specific problem in core and allied areas of discipline.
CO2. Conduct a systematic literature review, analyze, cognize and comprehend the extracted information to recognize the current status of research pertinent to the chosen problem.
CO3. Discern various issues, challenges and identify alternative solutions for the chosen engineering problems.
CO4. Function effectively as an individual to recognize the opportunities in the chosen domain of interest and engage in independent learning.
CO5. Write and present a substantial technical report/document to present the findings on the chosen problem.
CO6. Acquire intellectual integrity through understanding the need for ethics in research, profession and its impact on the society.

M. Tech. – IV Semester
(19MT48331)PROJECT WORK PHASE-II

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
150	150	300	-	-	-	16

PREREQUISITES: Project Work Phase-I

COURSE DESCRIPTION: Identification of topic for the project work; Literature survey; Collection of preliminary data; Identification of implementation tools and methodologies; Performing critical study and analysis of the topic identified; Time and cost analysis; Implementation of the project work; Writing of thesis and presentation.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Investigate, conceptualize and design optimal solutions for the chosen engineering problems.
CO2. Utilize appropriate modern tools and techniques for implementing the proposed solution.
CO3. Design and conduct experiments, visualize, analyze and interpret results to test and evaluate the proposed solution.
CO4. Function effectively as an individual to recognize the opportunities in the chosen domain of interest and engage in independent learning.
CO5. Write and present a substantial technical report/document to present the findings on the chosen problem.
CO6. Acquire intellectual integrity through understanding the need for ethics in research, profession and its impact on the society.
CO7. Engage in lifelong learning for development of technical competence in the advanced fields of Power electronics and drives to contribute to the development of scientific/technological knowledge.

Program: M.Tech. COMPUTER SCIENCE

M. Tech. (CS)- I Semester
(19MT10501) ADVANCED ALGORITHMS
(Common to CS and CNIS)

Internal Marks	External Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: A course on Design and Analysis of Algorithms.
COURSE DESCRIPTION:
Introduction to algorithm design techniques; Divide and conquer, greedy methods and dynamic programming; Backtracking, branch and bound techniques and NP-completeness; Methods of advanced graph theory; approximation algorithms and number theoretic algorithms; max flow and string matching algorithms and randomizing algorithms.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Perceive and apply the concepts of different algorithmic techniques to find solutions for a specific problem.
CO2. Design solutions for societal problems by applying the concepts from dynamic programming, backtracking.

M. Tech. (CS) – I Semester
(19MT10502) ADVANCED DATA STRUCTURES
(Common to CS and CNIS)

Internal Marks	External Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Courses on Computer Programming andData Structures.
COURSE DESCRIPTION:
Introduction to elementary data structures including stacks, queues, and lists, analysis of algorithms and recurrences, Trees and Graphs, Skip lists, Computational Geometry, Heap and Hash tables.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Develop appropriate data structures for efficient storage and retrieval of data.
CO2. Choose appropriate data structures, understand the ADT/libraries, and use it to solve a specific problem.

M. Tech. (CS) - I Semester
(19MT10503)MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE
(Common to CS and CNIS)

Internal Marks	External Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: A course on Multivariable Calculus and Differential Equations.
COURSE DESCRIPTION:
Mathematical Logic, Predicate calculus, Set theory, Relations, functions, Algebraic Structures, Combinations and Permutations, Recurrence Relations, Graph Theory and its Applications.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Understand and apply the fundamental concepts of mathematical logicto solve engineering problems.
CO2. Formulate problems and solve using recurrence relations and graph theory.

M. Tech. (CS) – I Semester
(19MT26302) WIRELESS SENSOR NETWORKS
(Program Elective – 1)

Internal Marks	External Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: A Course on Computer Networks.
COURSE DESCRIPTION:

Introduction to wireless sensor networks; Medium access control protocol design; Various routing protocols for wireless sensor networks; Security issues and requirements in wireless sensor Networks; Advanced concepts in wireless sensor networks.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Analyze and apply the concepts of wireless sensor networks to evaluate network architectures for improving the performance of the networks.

CO2. Evaluate varying routing protocols for wireless sensor networks to overcome the problems of transmission.

M. Tech. (CS)- I Semester

(19MT10504) ARTIFICIAL INTELLIGENCE

(Program Elective -1)

(Common to CS and CNIS)

Internal Marks	External Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Courses on Mathematical Foundations of Computer Science and Data Structures.

COURSE DESCRIPTION:

Artificial intelligence concepts, Intelligent agents, Problem solving agents, Logical agents, Knowledge representation and processing, Probabilistic learning, Natural language processing.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Apply knowledge of artificial intelligence techniques to develop an intelligent system for a given problem.

CO2. Design and develop solutions for natural language processing applications.

M. Tech. (CS)– I Semester

(19MT10505) DATA WAREHOUSING AND DATA MINING

(Program Elective – 1)

(Common to CS and CNIS)

Internal Marks	External Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: A Course on Database Management Systems.

COURSE DESCRIPTION:

Introduction to Data warehousing and OLAP with its operations, Need for data pre-processing and pre-processing techniques, Functionalities of Data mining, Classification, Association pattern mining, Cluster analysis, Trends in Data mining.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Identify the key concepts of data warehousing and design data ware houses to support OLAP applications.

CO2. Analyze and preprocess various datasets to improve the quality of data in the process of knowledge discovery.

CO3. Choose and apply appropriate data mining techniques for the given datasets to generate patterns, visualize and analyze patterns to discover actionable knowledge.

M. Tech. (CS) – I Semester

(19MT10506) IMAGE PROCESSING

(Program Elective – 1)

Internal Marks	External Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: -NIL-

COURSE DESCRIPTION:

Fundamentals of image processing, Intensity transformation functions, Spatial filters, Filtering in the frequency domain, Image restoration, Filtering techniques for image restoration, Coding techniques for image compression , Image segmentation, color image processing methods, Feature extraction and image pattern classification.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Select and apply appropriate digital image processing techniques to prepare digital images for processing.

CO2. Develop algorithms to process digital images in real-time applications and apply appropriate techniques to solve complex problems in the field of image processing.

M. Tech. (CS) – I Semester
(19MT16303) CLOUD COMPUTING
(Program Elective – 2)
(Common to CNIS, CS and SE)

Internal Marks	External Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Courses on Computer Networks and Operating Systems.
COURSE DESCRIPTION:
Characteristics and taxonomy of virtualization techniques, Cloud services,Cloud architecture- NIST and other models, communication protocols, and applications,Cloud programming concepts- concurrent programming, task programming, data intensive computing,; Trends and industrial platforms.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Create virtual environments to deploy cloud services by using the concepts of virtualization and cloud computing.
CO2. Analyze and deploy cloud architectures for providing cloud services to cater needs of diverse applications.

M. Tech. (CS) – I Semester
(19MT10507)BIG DATA ANALYTICS
(Program Elective – 2)

Internal Marks	External Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Courses on Data structures, Statistics.
COURSE DESCRIPTION:
Big Data Analytics, Architecture, Pre-processing, Hadoop Distributed File System, NoSQL Database, MongoDB, MapReduce, Hive, Spark, Stream mining, Graph analytics.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Analyze the key issues in big data management and its associated applications using Hadoop Ecosystem.
CO2. Design and develop real world applications with data storage and retrieval using big data technologies like Hadoop, MapReduce and Hive.

M. Tech. (CS) – I Semester
(19MT10508)HIGH PERFORMANCE COMPUTING
(Program Elective – 2)

Internal Marks	External Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Courses on Microprocessors and Computer Architecture.
COURSE DESCRIPTION:
Parallel computing, Parallel architectures, Message passing, Communication abstraction, Parallel programming-Principles, Decomposition techniques, Models, Communication operations; Design issues in HPC- Principles, Building blocks, Message passing interface; Synchronization and related algorithms, Advanced tools, techniques and applications.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge on parallel processing concepts and apply various parallel programming models to design a parallel processor.
CO2. Design large scale parallel programs on tightly coupled parallel systems using the message passing paradigm.

M. Tech. (CS) – I Semester
(19MT10509) MACHINE LEARNING
(Program Elective – 2)
(Common to CS,CNIS and SE)

Internal Marks	External Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES:A course on statistics.
COURSE DESCRIPTION:
Concepts of supervised, unsupervised and reinforcement learning, Bayesian decision theory, Learning rules from data, Performance evaluation of classification algorithms, Ensemblelearners, Elements of Reinforcement Learning.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Understand, select and apply appropriate machine learning strategies of supervised, unsupervised and reinforcement learning for solving a given problem.
CO2. Evaluate the performance of machine learning algorithms and select optimal models to suit needs of a given problem.
CO3. Redesign existing machine learning algorithms to improve efficiency of classification models.

M. Tech. (CS) – I Semester
(19MT10708) RESEARCH METHODOLOGY AND IPR
(Common to all M. Tech. Programs)

Internal Marks	External Marks	Total Marks	L	T	P	C
40	60	100	2	-	-	2

PRE-REQUISITES: NIL
COURSE DESCRIPTION:
Overview of research, Research problem and design, Various research designs, Data collection methods, Statistical methods for research, Interpretation and drafting reports, Intellectual property rights.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Apply the conceptual knowledge of research methodology to formulate the hypothesis, data collection and processing, analyzing the data using statistical methods, interpret the observations and communicating the novel findings through a research report.
CO2. Practice ethics and have responsibility towards society throughout the research process and indulge in continuous learning process.
CO3. Apply the conceptual knowledge of intellectual property rights for filing patents and trade mark registration process.

M. Tech. (CS)– I Semester
(19MT10531) ADVANCED ALGORITHMS LAB
(Common to CS and CNIS)

Internal Marks	External Marks	Total Marks	L	T	P	C
50	50	100	-	-	4	2

PRE-REQUISITES:A Course on Computer Programming.
COURSE DESCRIPTION:
Hands on practice on algorithmic design techniques -Divide and conquer, Greedy methods Dynamic programming, Backtracking, Sum of subset problem, Vertex cover problem, Flow networks, String matching algorithms and Randomized algorithms.

COUSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Implement various algorithmic techniquesgreedy method, dynamic programming, backtracking, advanced graph theory and analyze the comparison of different techniques.
CO2. Design algorithms to solve real world computing problems and evaluate their efficiency.
CO3. Write, present technical report/document effectively.
CO4. Function effectively as an individual and as a member in team to implement mini-project.

M. Tech. (CS)– I Semester
(19MT10532) ADVANCED DATA STRUCTURES LAB
(Common to CS and CNIS)

Internal Marks	External Marks	Total Marks	L	T	P	C
50	50	100	-	-	4	2

PRE-REQUISITES: A Course on Computer Programming.
COURSE DESCRIPTION:
Hands on practice on Linked Lists, Stacks and Queues, Binary search tree, AVL tree, Red black tree, Splay tree,KD tree, Priority search tree and Hashing.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Implement linear and non linear data structures like stacks, queues, linked lists, trees, graphs and hash functions to simulate by organizing the data in memory.
CO2. Design and develop appropriate algorithms to store and retrieve the data.
CO3. Write, present technical report/document effectively.
CO4. Function effectively as an individual and as a member in teamto implement mini-project.

M. Tech. (CS) – I Semester
(19MT1AC01) TECHNICAL REPORT WRITING
(Audit Course)
(Common to all M. Tech. Programs)

Internal Marks	External Marks	Total Marks	L	T	P	C
--	--	--	2	-	-	-

PRE-REQUISITES: NIL
COURSE DESCRIPTION:
Introduction, Process of writing, Style of writing, Referencing, Presentation.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Demonstrate knowledge of Technical Report Writing by examining kinds of reports and structure with scientific attitude.
CO2. Apply the techniques in preparing effective reports by examining Techniques of Description, Describing Machines and Mechanisms and Describing Processes.
CO3. Communicate effectively through writing technical reports by demonstrating the knowledge of Industry Reports, Survey Reports, Interpretive Report and Letter Report.

M. Tech. (CS)– II Semester
(19MT20501) DATA SCIENCE
(Common to CS and SE)

Internal Marks	External Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Courses on Data Warehousing and Data Mining, Probability and Statistics.
COURSE DESCRIPTION:
Introduction to Data science, Using python for data science, Exploratory data analysis - Probability and distributions; Predictive modeling - Time series analysis; Data extraction - Feature selection, Single value decomposition, Principal component analysis; Data visualization - Using visualization for data science, Visualization tools.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Analyze data by recognizing data science process and develop simple applications using relevant python libraries.
CO2. Investigate and evaluate various predictive models to contribute tools/techniques to applications of diverse domains.
CO3. Design and develop predictive models for a given problem to support forecasting.

M. Tech. (CS) – II Semester
(19MT20502) WEB TECHNOLOGIES

Internal Marks	External Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES:A Course on Object Oriented Programming.

COURSE DESCRIPTION:

Concepts of HTML5 and CSS3 for web page creating and styling; JavaScript and JQuery for client-side scripting; PHP and MySQL; Node.js; AJAX.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Design and develop dynamic and interactive web pages.

CO2. Create database connectivity from web applications to database to implement data definition and data manipulation operations.

CO3. Build web based applications to provide smart solutions to real-world problems.

M. Tech. (CS) – II Semester

(19MT26305) INTERNET OF THINGS

(Program Elective - 3)

(Common to CNIS, CS, SE, DECS and CMS)

Internal Marks	External Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Courses on Computer Networks, Python Programming.

COURSE DESCRIPTION:

Concepts of Domain Specific IoTs, M2M and system management with Netconf-Yang, IoT privacy and security, IoT physical devices, Amazon Web Services for IoT and case studies illustrating IoT design.

COURSE OUTCOMES:

CO1. Understand the concepts of IoT, IoT protocols, privacy and security issues in IoT applications to analyze domain specific IoT's.

CO2. Design solutions through implementing IoT applications on raspberry pi, AWS and develop security solutions to strengthen IoT environment.

M. Tech. (CS) – II Semester

(19MT20503) ARTIFICIAL NEURAL NETWORKS AND DEEP LEARNING

(Program Elective – 3)

(Common to CS,CNIS and SE)

Internal Marks	External Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES:A course on Machine Learning.

COURSE DESCRIPTION:

Representation of neural network, Learning rule, Training algorithm, Activation functions, Convolution neural network and its variants, Long term dependencies in sequence-to-sequence classification, Regularization for deep learning, hyper parameter selection, Applications of deep learning.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Apply conceptual knowledge to analyze various approaches for learning with deep neural networks.

CO2. Select appropriate libraries for using deep learning algorithms to implement various types of learning tasks in diverse domains.

CO3. Select optimal model parameters for different deep learning techniques using optimization techniques.

M. Tech. (CS)– II Semester

(19MT20504) COMPUTER VISION

(Program Elective – 3)

Internal Marks	External Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Courses on Image Processing, Machine Learning.

COURSE DESCRIPTION:

Fundamental of computer vision including filtering, image clustering, classification and scene understanding procedures; Practical integration of machine vision systems, and the related applications.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on image processing techniques and analyze filtering, thresholding methods to solve segmentation techniques which elucidate the image segmentation, edge detection procedures.

CO2. Design solutions for image analysis problems by clustering and classification techniques to develop novel techniques and efficient algorithms for image classification.

M. Tech. (CS)– II Semester
(19MT20505) DATA PREPARATION AND ANALYSIS
(Program Elective - 3)

Internal Marks	External Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES:A Course on Probability and Statistics.
COURSE DESCRIPTION: Introduction, Sources of data, Types of variables, Hypothesis tests,Understanding relationships, Exploratory data mining and data cleaning - EDM in higher dimensions, Data driven approach; Partitions and piecewise models, Divide and conquer, Data cubes, Nonlinear partitions, Data quality techniques and algorithms.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:

CO1. Prepare data and recognize the characteristics of data to perform business analytics in decision making process.

CO2. Use appropriate techniques including data profiling and normalization to improve the quality of data.

CO3. Interpret and recognize various patterns in data using visualization techniques.

M. Tech. (CS) – II Semester
(19MT20506) CYBER SECURITY
(Program Elective – 4)

Internal Marks	External Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: A course on Computer Networks.
COURSE DESCRIPTION: Cybercrime, Cyberoffenses, Tools and Methods used in Cybercrime, Cyber security vulnerabilities and safeguards, IT audit, Proxy servers and anonymizers, Phishing, Password cracking, Keyloggers and Spywares, Virus and Worms, Steganography, Cyber forensics.
COURSE OUTCOMES:

CO1. Apply the conceptual knowledge of cyber security to analyze the threats for protecting the computational assets.

CO2. Apply various standards and cyber laws to enhance cyber security in development process and infrastructure protection and design appropriate security solutions and policies to strengthen computers and digital information.

M. Tech. (CS)- II Semester
(19MT20507) RECOMMENDER SYSTEMS
(Program Elective-4)

Internal Marks	External Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Courses on Data Warehousing and Data Mining, Machine Learning, Database Management Systems, Algorithm Design.
COURSE DESCRIPTION:
Recommender system overview, Overview of information retrieval models, Search and filtering techniques, Content based filtering, Similarity based and classification algorithms, Collaborative filtering, Evaluating recommender systems.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:

CO1. Understand and analyze the need of recommender systems by comparing with classical decision support systems.

CO2. Evaluate and model recommender systems to apply appropriate recommender systems into real-world and simple web applications.

M. Tech. (CS) – II Semester
(19MT20508) SOFT COMPUTING

(Program Elective - 4)
(Common to CS and CNIS)

Internal Marks	External Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Courses on Mathematical Foundations of Computer Science, Machine Learning.
COURSE DESCRIPTION:
Introduction to neural networks, Applications and scope of neural networks, Basic models of artificial neural networks, Supervised and unsupervised learning networks, Associative memory networks, Fuzzy logic and fuzzy sets, Genetic algorithms, Hybrid soft computing techniques and its applications.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Review the feasibility of applying a soft computing methodology for a particular problem.
CO2. Analyze architectures of neural networks, genetic algorithms, hop field networks, and hybrid soft computing techniques to solve combinatorial optimization problems using genetic algorithms.
CO3. Develop hybrid algorithms using soft computing techniques by integrating ANN and genetic algorithms.

M. Tech. (CS) – II Semester
(19MT20509) VIRTUAL REALITY AND AUGMENTED REALITY
(Program Elective-4)

Internal Marks	External Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Courses on Artificial Intelligence, Image Processing.
COURSE DESCRIPTION:
Virtual Reality - Devices, Interfaces, Architectures, Rendering Principles, Modeling and Management; Augmented Reality – Environment, Devices, Communication techniques; Applications of Virtual Reality and Augmented Reality.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Acquire the knowledge in the basic concepts of virtual reality and augmented reality and understand the contemporary applications.
CO2. Analyze various virtual reality architectures for developing virtual reality based applications.
CO3. Explore the augmented reality environment essentials to evaluate and select appropriate augmented reality based user-machine communication techniques.

M. Tech. (CS)– II Semester
(19MT20531) DATA SCIENCE LAB

Internal Marks	External Marks	Total Marks	L	T	P	C
50	50	100	-	-	4	2

PRE-REQUISITES: Courses on Data Warehousing and Data Mining, Probability and Statistics.

COURSE DESCRIPTION:
Hands on experience on applications of data science using Python - Linear regression, Logistic regression, Gaussian Distribution, Naïve Bayes' classification, Support vector machine, Principal component analysis, Decision Tree, Time series analysis, Data visualization.

COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Design and develop probability and statistical models to interpret data using relevant python libraries such as SciPy and StatsModel.
CO2. Apply dimensionality reduction techniques on appropriate online dataset and perform time series analysis importing Scikitlearn.
CO3. Build data visualization using charts, plots and histograms to identify trends, patterns and outliers in data importing Matplotlib.
CO4. Write, present technical report/document effectively.
CO5. Function effectively as an individual and as a member in teamsto implement mini-project.

M. Tech. (CS) – II Semester
(19MT20532) WEB TECHNOLOGIES LAB

Internal Marks	External Marks	Total Marks	L	T	P	C
50	50	100	-	-	4	2

PRE-REQUISITES: A course on Object Oriented Programming.
COURSE DESCRIPTION:
Hands on practice on development of web applications using HTML tags, CSS Selectors, Java Script, JQuery, XML, PHP and MYSQL, node.js, AJAX.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Design interactive web applications using HTML, CSS, JavaScript, JQuery, XML, AJAX, node.js, PHP and MySQL.
CO2. Develop dynamic web applications based using AJAX,Node.js and JavaScript programming language.
CO3. Write, present technical report/document effectively.
CO4. Function effectively as an individual and as a member in teamsto implement mini-project.

M. Tech. (CS) – II Semester
(19MT2AC01) STATISTICS WITH R
(Audit Course)
(Common to All M. Tech. Programs)

Internal Marks	External Marks	Total Marks	L	T	P	C
--	--	--	2	-	-	-

PRE-REQUISITES: A course on Statistics.
COURSE DESCRIPTION:
Concepts of R programming basics, Bivariate and multivariate data, Confidence intervals, Goodness of fit, Analysis of variance.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Import, manage, manipulate, and structure data files using R programming.
CO2. Implement modelsfor statistical analysis of a given dataset and visualize the results to identify trends, patterns and outliers in data.

M. Tech. (CS)- III Semester
(19MT30531) INTERNSHIP

Internal Marks	External Marks	Total Marks	L	T	P	C
--	100	100	-	-	-	2

PRE-REQUISITES: --
COURSE DESCRIPTION:
Expose students to the industrial environment, Create competent professionals for the industry, Gain professional experience, Develop communication skillsand understand engineer's responsibilities and ethics.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Discern various challenges in developing solutions for complex problems, utilize appropriate modern tools and techniques to provide solutions for the chosen engineering problems.
CO2. Develop problem solving skills, critical thinking skills through designing and developing solutions for complex problems.
CO3. Discern various challenges in developing solutions for complex problems, design and conduct experiments to evaluate alternative solutions for the chosen engineering problems.
CO4. Develop communication, enrich professional and interpersonal skills pertaining to the internship experience.
CO5. Function effectively as an individual and participate well as a team member to build professional network for growth in career.
CO6. Utilize real work experiences to explore their interests, career alternatives that will help with future education or employment through and develop professional skills and competencies to engage in lifelong learning.

M. Tech. (CS) - III Semester
(19MT30532) PROJECT WORK PHASE – I

Internal Marks	External Marks	Total Marks	L	T	P	C
50	50	100	-	-	-	10

PRE-REQUISITES: --

COURSE DESCRIPTION:

Identify ofa domain of interest and a specific problem, Conduct literature review, Collect preliminary data, Conduct a critical study and analysis of the chosen problem, Identify appropriate modern tools/techniques, Write thesis and present.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Apply contextual knowledge to identify a domain of interest and a specific problem in core and allied areas of disciplineand discern various issues, challenges to identify alternative methodologies, tools for implementinga solution for the chosen problem.

CO2. Conduct a systematic literature review, analyze, cognize and comprehend the extracted information for recognizing the current status of research pertinent to the chosen problem.

CO3. Write and present technical report/document to report the findings on the chosen problem.

CO4. Function effectively as an individual to recognize the opportunities in the chosen domain of interest and engage in independent learning.

CO5. Recognize the need to engage in lifelong learning for development of technical competence in the advanced fields of computer science to contribute to the development of scientific/ technological knowledge.

M. Tech. (CS) - IV Semester
(19MT40531) PROJECT WORK PHASE – II

Internal Marks	External Marks	Total Marks	L	T	P	C
150	150	300	-	-	-	16

PRE-REQUISITES: --

COURSE DESCRIPTION:

Design and develop solutions for the proposed system, Useappropriate modern tools/techniques, Implement the proposed system, Execute practical investigations, Conductcritical analysis and interpretation of results, Test and evaluate the proposed system, Write thesis and present.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Investigate, conceptualize and design optimal solution for the chosen problem.

CO2. Utilize appropriate modern tools/techniques to implement the proposed system.

CO3. Design and conduct investigations and experiments to test and evaluate the proposed system.

CO4. Write and present technical report/document to report the findings on the chosen problem.

CO5. Function effectively as an individual to recognize the opportunities in the chosen domain of interest and engage in independent learning.

CO6. Recognize the need to engage in lifelong learning for development of technical competence in the advanced fields of computer science to contribute to the development of scientific/ technological knowledge.

Program: M.Tech. COMPUTER NETWORKS AND INFORMATION SECURITY

M. Tech. (CNIS)- I Semester
(19MT10501) ADVANCED ALGORITHMS
(Common to CS and CNIS)

Internal Marks	External Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: A course on Design and Analysis of Algorithms.
COURSE DESCRIPTION:
Introduction to algorithm design techniques; Divide and conquer, greedy methods and dynamic programming; Backtracking, branch and bound techniques and NP-completeness; Methods of advanced graph theory; approximation algorithms and number theoretic algorithms; max flow and string matching algorithms and randomizing algorithms.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Perceive and apply the concepts of different algorithmic techniques to find solutions for a specific problem.
CO2. Design solutions for societal problems by applying the concepts from dynamic programming, backtracking.

M. Tech. (CNIS) – I Semester
(19MT10502) ADVANCED DATA STRUCTURES
(Common to CS and CNIS)

Internal Marks	External Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Courses on Computer Programming and Data Structures.
COURSE DESCRIPTION:
Introduction to elementary data structures including stacks, queues, and lists, analysis of algorithms and recurrences, Trees and Graphs, Skip lists, Computational Geometry, Heap and Hash tables.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Develop appropriate data structures for efficient storage and retrieval of data.
CO2. Choose appropriate data structures, understand the ADT/libraries, and use it to solve a specific problem.

M. Tech. (CNIS) - I Semester
(19MT10503)MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE
(Common to CS and CNIS)

Internal Marks	External Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: A course on Multivariable Calculus and Differential Equations.
COURSE DESCRIPTION:
Mathematical Logic, Predicate calculus, Set theory, Relations, functions, Algebraic Structures, Combinations and Permutations, Recurrence Relations, Graph Theory and its Applications.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Understand and apply the fundamental concepts of mathematical logicto solve engineering problems.
CO2. Formulate problems and solve using recurrence relations and graph theory.

M. Tech. (CNIS)- I Semester
(19MT10504) ARTIFICIAL INTELLIGENCE
(Program Elective -1)
(Common to CS and CNIS)

Internal Marks	External Marks	Total Marks	L	T	P	C

40	60	100	3	-	-	3

PRE-REQUISITES: Courses on Mathematical Foundations of Computer Science and Data Structures.
COURSE DESCRIPTION:
Artificial intelligence concepts, Intelligent agents, Problem solving agents, Logical agents, Knowledge representation and processing, Probabilistic learning, Natural language processing.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Apply knowledge of artificial intelligence techniques to develop an intelligent system for a given problem.
CO2. Design and develop solutions for natural language processing applications.

M. Tech. (CNIS)– I Semester
(19MT10505) DATA WAREHOUSING AND DATA MINING
(Program Elective – 1)
(Common to CS and CNIS)

Internal Marks	External Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: A Course on Database Management Systems.
COURSE DESCRIPTION:
Introduction to Data warehousing and OLAP with its operations, Need for data pre-processing and pre-processing techniques, Functionalities of Data mining, Classification, Association pattern mining, Cluster analysis, Trends in Data mining.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Identify the key concepts of data warehousing and design data warehouses to support OLAP applications.
CO2. Analyze and preprocess various datasets to improve the quality of data in the process of knowledge discovery.
CO3. Choose and apply appropriate data mining techniques for the given datasets to generate patterns, visualize and analyze patterns to discover actionable knowledge.

M. Tech. (CNIS) - I Semester
(19MT16301) ADVANCED COMPUTER NETWORKS
(Program Elective -1)

Internal Marks	External Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: A course on Computer Networks.
COURSE DESCRIPTION:
Computer Networks and Protocols, Data Link Layer, LAN and Network Routing, Transport Layer and Internet Protocols, Wireless and Optical Networks, MANETs and Wireless Sensor Networks.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Apply contextual knowledge of principles of computer networks, network topologies, routing mechanisms to analyze the problems related to network protocols and algorithms in computer networks.
CO2. Evaluate solutions pertaining to advanced networking technologies to solve engineering problems.

M. Tech. (CNIS) – I Semester
(19MT16302) NETWORK INTRUSION DETECTION SYSTEMS
(Program Elective - 1)

Internal Marks	External Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Courses on Computer Networks and Network Security.
COURSE DESCRIPTION: Introduction to network anomalies, An overview of machine learning methods, Detecting anomalies in network data, Feature selection, Approaches to network anomaly detection, Evaluation methods, Tools and systems.
COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Understand the machine learning methods and feature selection to analyze and detect network anomalies.

CO2. Use various tools and systems for attack detection in computer networks.

M. Tech. (CNIS) – I Semester
(19MT10509) MACHINE LEARNING

(Program Elective – 2)

(Common to CS, CNIS and SE)

Internal Marks	External Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: A course on statistics.

COURSE DESCRIPTION:

Concepts of supervised, unsupervised and reinforcement learning, Bayesian decision theory, Learning rules from data, Performance evaluation of classification algorithms, Ensemble learners, Elements of Reinforcement Learning.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Understand, select and apply appropriate machine learning strategies of supervised, unsupervised and reinforcement learning for solving a given problem.

CO2. Evaluate the performance of machine learning algorithms and select optimal models to suit needs of a given problem.

CO3. Redesign existing machine learning algorithms to improve efficiency of classification models.

M. Tech. (CNIS) – I Semester
(19MT16303) CLOUD COMPUTING

(Program Elective – 2)

(Common to CNIS, CS and SE)

Internal Marks	External Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Courses on Computer Networks and Operating Systems.

COURSE DESCRIPTION:

Characteristics and taxonomy of virtualization techniques, Cloud services, Cloud architecture - NIST and other models, communication protocols, and applications, Cloud programming concepts - concurrent programming, task programming, data intensive computing,;Trends and industrial platforms.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Create virtual environments to deploy cloud services by using the concepts of virtualization and cloud computing.

CO2. Analyze and deploy cloud architectures for providing cloud services to cater needs of diverse applications.

M. Tech. (CNIS) – I Semester
(19MT16304) DIGITAL FORENSICS

(Program Elective – 2)

Internal Marks	External Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: A Course on Information Security.

COURSE DESCRIPTION: Concepts of computer forensic technologies and cybercrime; Evidence collection and data seizure; Initial response and forensic duplication; Forensic data analysis and validation; Processing crimes and incident scenes; Mobile device forensics, Network forensics and E-mail investigations.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Understand Computer forensics technology, forensic evidence, data recovery, initial response and forensic duplication, tools and Analyze forensic data related to provide solutions for a wide range of forensic problems.

CO2. Apply appropriate forensic techniques and tools to capture the evidence and investigate cyber crimes in order to evaluate the effectiveness to optimize the efficiency and quality of digital forensics investigations.

CO3. Interpret and appropriately apply the laws and procedures associated with identifying, acquiring, examining and presenting digital evidence.

M. Tech. (CNIS) – I Semester
(19MT16305) MALWARE AND RISK ANALYSIS
(Program Elective - 2)

Internal Marks	External Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: A Course on Computer Networks.

COURSE DESCRIPTION:

Study of methods for identifying malwares in a system or network, Advanced static and dynamic malware analysis, Risk management and identification, Methods to maintain information by applying risk management policies, Threat vulnerability and assessment, Risk evaluation.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Analyze and apply the techniques of static and dynamic methods to identify and classify malwares.

CO2. Evaluate the threats and vulnerability of risk using risk evaluation procedures in order to protect information.

M. Tech. (CNIS) – I Semester
(19MT10708) RESEARCH METHODOLOGY AND IPR
(Common to all M. Tech. Programs)

Internal Marks	External Marks	Total Marks	L	T	P	C
40	60	100	2	-	-	2

PRE-REQUISITES: NIL

COURSE DESCRIPTION:

Overview of research, Research problem and design, Various research designs, Data collection methods, Statistical methods for research, Interpretation and drafting reports, Intellectual property rights.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Apply the conceptual knowledge of research methodology to formulate the hypothesis, data collection and processing, analyzing the data using statistical methods, interpret the observations and communicating the novel findings through a research report.

CO2. Practice ethics and have responsibility towards society throughout the research process and indulge in continuous learning process.

CO3. Apply the conceptual knowledge of intellectual property rights for filing patents and trade mark registration process.

M. Tech. (CNIS)– I Semester
(19MT10531) ADVANCED ALGORITHMS LAB
(Common to CS and CNIS)

Internal Marks	External Marks	Total Marks	L	T	P	C
50	50	100	-	-	4	2

PRE-REQUISITES: A Course on Computer Programming.

COURSE DESCRIPTION:

Hands on practice on algorithmic design techniques - Divide and conquer, Greedy methods Dynamic programming, Backtracking, Sum of subset problem, Vertex cover problem, Flow networks, String matching algorithms and Randomized algorithms.

CURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Implement various algorithmic techniques greedy method, dynamic programming, backtracking, advanced graph theory and analyze the comparison of different techniques.

CO2. Design algorithms to solve real world computing problems and evaluate their efficiency.

CO3. Write, present technical report/document effectively.

CO4. Function effectively as an individual and as a member in teamto implement mini-project.

M. Tech. (CNIS)– I Semester
(19MT10532) ADVANCED DATA STRUCTURES LAB
(Common to CS andCNIS)

Internal Marks	External Marks	Total Marks	L	T	P	C
50	50	100	-	-	4	2

PRE-REQUISITES: A Course on Computer Programming.

COURSE DESCRIPTION:

Hands on practice on Linked Lists, Stacks and Queues, Binary search tree, AVL tree, Red black tree, Splay tree, KD tree, Priority search tree and Hashing.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Implement linear and non linear data structures like stacks, queues, linked lists, trees, graphs and hash functions to simulate by organizing the data in memory.

CO2. Design and develop appropriate algorithms to store and retrieve the data.

CO3. Write, present technical report/document effectively.

CO4. Function effectively as an individual and as a member in teamto implement mini-project.

M. Tech. (CNIS) – I Semester
(19MT1AC01) TECHNICAL REPORT WRITING
(Audit Course)

(Common to all M. Tech. Programs)

Internal Marks	External Marks	Total Marks	L	T	P	C
--	--	--	2	-	-	-

PRE-REQUISITES: NIL

COURSE DESCRIPTION:

Introduction, Process of writing, Style of writing, Referencing, Presentation.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge of Technical Report Writing by examining kinds of reports and structure with scientific attitude.

CO2. Apply the techniques in preparing effective reports by examining Techniques of Description, Describing Machines and Mechanisms and Describing Processes.

CO3. Communicate effectively through writing technical reports by demonstrating the knowledge of Industry Reports, Survey Reports, Interpretive Report and Letter Report.

M. Tech. (CNIS) – II Semester
(19MT26301) CRYPTOGRAPHY AND NETWORK SECURITY

Internal Marks	External Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Course on Computer Networks.

COURSE DESCRIPTION:

Concepts of Security models, Cryptographic algorithms, Public key and private key encryption and decryption, Hash algorithms, Intrusion Detection and prevention, IP security, Web security, Analysis of security principles in Internet and system security.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Cognize the concepts of cryptography and network security to identify potential threats in computer networks.

CO2. Develop solutions to solve security related issues in computer network applications.

CO3. Apply the appropriate cryptographic techniques and security algorithms in the area of information security to maintain security services.

M. Tech. (CNIS) – II Semester
(19MT26302) WIRELESS SENSOR NETWORKS

Internal Marks	External Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: A Course on Computer Networks.

COURSE DESCRIPTION:

Introduction to wireless sensor networks; Medium access control protocol design; Various routing protocols for wireless sensor networks; Security issues and requirements in wireless sensor Networks; Advanced concepts in wireless sensor networks.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Analyze and apply the concepts of wireless sensor networks to evaluate network architectures for improving the performance of the networks.

CO2. Evaluate varying routing protocols for wireless sensor networks to overcome the problems of transmission.

M. Tech. (CNIS) – II Semester
(19MT20503) ARTIFICIAL NEURAL NETWORKS AND DEEP LEARNING

(Program Elective – 3)

(Common to CS,CNIS and SE)

Internal Marks	External Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: A course on Machine Learning.

COURSE DESCRIPTION:

Representation of neural network, Learning rule, Training algorithm, Activation functions, Convolution neural network and its variants, Long term dependencies in sequence-to-sequence classification, Regularization for deep learning, hyper parameter selection, Applications of deep learning.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Apply conceptual knowledge to analyze various approaches for learning with deep neural networks.

CO2. Select appropriate libraries for using deep learning algorithms to implement various types of learning tasks in diverse domains.

CO3. Select optimal model parameters for different deep learning techniques using optimization techniques.

M. Tech. (CNIS) – II Semester
(19MT26303) DATABASE SECURITY

(Program Elective – 3)

Internal Marks	External Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: A course on Database Management Systems.

COURSE DESCRIPTION:

Study of principles and practices of database security in modern businesses and industries, Password policies, Privileges, Database auditing, Views and virtual private databases, Security implementation and database reliability.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Demonstrate knowledge of database security issues to analyze risks and vulnerabilities in an operating system from a database perspective.

CO2. Design good password policies and secure database system architecture and implement audit/access controls and virtual private databases using views, roles, and application context.

CO3. Use SQL server for creating database user administration roles and conduct database auditing for security and reliability.

M. Tech. (CNIS) – II Semester
(19MT26304) GPU COMPUTING

(Program Elective – 3)

Internal Marks	External Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: A course on Computer Architecture.

COURSE DESCRIPTION:

Parallelism and supercomputing, Multi-CPU and Multi-GPU solutions, Memory handling – Caches, Constant memory; Optimizing an application – Memory considerations, Transfers, Designing GPU-based systems, Parallel programming issues and challenges.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Acquire the concepts and principles of parallelism with GPUs, memory handling in a Multi-CPU/Multi-GPU environment and analyze the methods for optimizing computing applications.

CO2. Analyze problems to identify the bottlenecks in parallel programming and to design robust and efficient systems equipped with modern GPUs.

CO3. Apply memory techniques to solve memory issues in Multi-GPU environment for optimizing computing applications.

M. Tech. (CNIS) – II Semester
(19MT26305) INTERNET OF THINGS

(Program Elective - 3)

(Common to CNIS, CS, SE, DECS and CMS)

Internal Marks	External Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Courses on Computer Networks, Python Programming.

COURSE DESCRIPTION:

Concepts of Domain Specific IoTs, M2M and system management with Netconf-Yang, IoT privacy and security, IoT physical devices, Amazon Web Services for IoT and case studies illustrating IoT design.

COURSE OUTCOMES:

CO1. Understand the concepts of IoT, IoT protocols, privacy and security issues in IoT applications to analyze domain specific IoT's.

CO2. Design solutions through implementing IoT applications on raspberry pi, AWS and develop security solutions to strengthen IoT environment.

M. Tech. (CNIS) – II Semester
(19MT20508) SOFT COMPUTING

(Program Elective - 4)

(Common to CS and CNIS)

Internal Marks	External Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Courses on Mathematical Foundations of Computer Science, Machine Learning.

COURSE DESCRIPTION:

Introduction to neural networks, Applications and scope of neural networks, Basic models of artificial neural networks, Supervised and unsupervised learning networks, Associative memory networks, Fuzzy logic and fuzzy sets, Genetic algorithms, Hybrid soft computing techniques and its applications.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Review the feasibility of applying a soft computing methodology for a particular problem.

CO2. Analyze architectures of neural networks, genetic algorithms, hop field networks, and hybrid soft computing techniques to solve combinatorial optimization problems using genetic algorithms.

CO3. Develop hybrid algorithms using soft computing techniques by integrating ANN and genetic algorithms.

M. Tech. (CNIS) – II Semester
(19MT26306) BLOCKCHAIN TECHNOLOGIES

(Program Elective – 4)

Internal Marks	External Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Courses Data Structures & Algorithms, Network Security and Cryptography.

COURSE DESCRIPTION: Introduction to Blockchain Technologies and its decentralization concepts, Smart Contracts, Ethereum, Hyperledger, Alternative Blockchains, Emerging Trends, Challenges and Scope of Research.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Cognize the concepts of distributed systems, decentralization and Blockchains and analyze the ecosystem of Blockchains.

CO2. Evaluate different distributed Blockchain platforms and devise suitable platforms for scalable and secured applications.

M. Tech. (CNIS) – II Semester
(19MT26307) SECURE SOFTWARE DESIGN AND ENTERPRISE COMPUTING
(Program Elective – 4)

Internal Marks	External Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Courses on Cryptography and Network Security, Software Engineering.

COURSE DESCRIPTION:
Importance of design secure software's for enterprises, Approaches to design, develop, test and deploy the secure software systems to satisfy the goals of enterprise computing, Operating and maintaining secure software.

COURSE OUTCOMES:
On successful completion of the course, students will be able to:

CO1. Create a security process by identifying the roles of security team for an enterprise.

CO2. Analyze and design the enterprise software to enhance the security features based on code reuse, coding resources, reviews and security tiers.

CO3. Design and develop operation and maintenance procedures of secure software according to enterprise security policies.

M. Tech. (CNIS) – II Semester
(19MT26308) SOFTWARE DEFINED NETWORKS
(Program Elective – 4)

Internal Marks	External Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: A Course on Computer Networks.

COURSE DESCRIPTION:
Evolution of switches and control planes, SDN operations, Devices and controllers, Open flow basics, Network functions virtualizations, P2P overlay networks, SDN applications.

COURSE OUTCOMES:
On successful completion of the course, students will be able to:

CO1. Design sustainable software defined network by comparing different architecture and open flow specifications.

CO2. Apply network function virtualization using hypervisor and cloud computing technology for network automation and orchestration.

CO3. Create proactive and reactive software defined network applications using tools like floodlight controller, daylight controller, Cisco XNC controller and Hewlett-Packard controller.

M. Tech. (CNIS) – II Semester
(19MT26331) CRYPTOGRAPHY AND NETWORK SECURITY LAB

Internal Marks	External Marks	Total Marks	L	T	P	C
50	50	100	-	-	4	2

PRE-REQUISITES: A Course on Computer Programming.

COURSE DESCRIPTION:
Practical implementation on Mono-alphabetic Ciphers, Poly-alphabetic Ciphers, DES, RSA, Diffie-Hellman Key Exchange mechanism, SHA-1 algorithm, MD5 algorithm, Digital Signature Standards and Intrusion Detection Systems.

COURSE OUTCOMES:
On successful completion of the course, students will be able to:

CO1. Implement mono-alphabetic, poly-alphabetic ciphers, symmetric and public key encryption algorithms, secure hash functions, digital signature standards and intrusion detection systems.

CO2. Analyze the symmetric key encryption and public key encryption algorithms and evaluate their efficiency for different applications.

CO3. Write, present technical report/document effectively.

CO4. Function effectively as an individual and as a member in teamto implement mini-project.

M. Tech. (CNIS) – II Semester
(19MT26332) WIRELESS SENSOR NETWORKS LAB

Internal Marks	External Marks	Total Marks	L	T	P	C
50	50	100	-	-	4	2

PRE-REQUISITES:
COURSE DESCRIPTION:
Hands on Practice on Schedule-based, Random-based, Content-based and Cluster-based MAC Protocols, Split horizon of Routing Information Protocol, Position-based Geographic Routing Protocol, AODV Protocol in ADHOC.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Design and compute protocols for network requirements.
CO2. Apply latest tools and technologies for designing applications in various networking protocols.
CO3. Write, present technical report/document effectively.
CO4. Function effectively as an individual and as a member in teamto implement mini-project.

M. Tech. (CNIS) – II Semester
(19MT2AC01) STATISTICS WITH R
(Audit Course)
(Common to All M. Tech. Programs)

Internal Marks	External Marks	Total Marks	L	T	P	C
--	--	--	2	-	-	-

PRE-REQUISITES: A course on Statistics.
COURSE DESCRIPTION:
Concepts of R programming basics, Bivariate and multivariate data, Confidence intervals, Goodness of fit, Analysis of variance.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Import, manage, manipulate, and structure data files using R programming.
CO2. Implement models for statistical analysis of a given dataset and visualize the results to identify trends, patterns and outliers in data.

M. Tech. (CNIS)- III Semester
(19MT36331) INTERNSHIP

Internal Marks	External Marks	Total Marks	L	T	P	C
--	100	100	-	-	-	2

PRE-REQUISITES: --
COURSE DESCRIPTION:
Expose students to the industrial environment, Create competent professionals for the industry, Gain professional experience, Develop communication skills and understand engineer's responsibilities and ethics.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Discern various challenges in developing solutions for complex problems, utilize appropriate modern tools and techniques to provide solutions for the chosen engineering problems.
CO2. Develop problem solving skills, critical thinking skills through designing and developing solutions for complex problems.
CO3. Discern various challenges in developing solutions for complex problems, design and conduct experiments to evaluate alternative solutions for the chosen engineering problems.
CO4. Develop communication, enrich professional and interpersonal skills pertaining to the internship experience.
CO5. Function effectively as an individual and participate well as a team member to build professional network for growth in career.
CO6. Utilize real work experiences to explore their interests, career alternatives that will help with future education or employment through and develop professional skills and competencies to engage in lifelong learning.

M. Tech. (CNIS) - III Semester
(19MT36332) PROJECT WORK PHASE – I

Internal Marks	External Marks	Total Marks	L	T	P	C
50	50	100	-	-	-	10

PRE-REQUISITES: --
COURSE DESCRIPTION:
Identify of a domain of interest and a specific problem, Conduct literature review, Collect preliminary data, Conduct a critical study and analysis of the chosen problem, Identify appropriate modern tools/techniques, Write thesis and present.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Apply contextual knowledge to identify a domain of interest and a specific problem in core and allied areas of discipline and discern various issues, challenges to identify alternative methodologies, tools for implementing a solution for the chosen problem.
CO2. Conduct a systematic literature review, analyze, cognize and comprehend the extracted information for recognizing the current status of research pertinent to the chosen problem.
CO3. Write and present technical report/document to report the findings on the chosen problem.
CO4. Function effectively as an individual to recognize the opportunities in the chosen domain of interest and engage in independent learning.
CO5. Recognize the need to engage in lifelong learning for development of technical competence in the advanced fields of computer networks and information security to contribute to the development of scientific/ technological knowledge.

M. Tech. (CNIS) - IV Semester
(19MT46331) PROJECT WORK PHASE – II

Internal Marks	External Marks	Total Marks	L	T	P	C
150	150	300	-	-	-	16

PRE-REQUISITES: --
COURSE DESCRIPTION:
Design and develop solutions for the proposed system, Use appropriate modern tools/techniques, Implement the proposed system, Execute practical investigations, Conductcritical analysis and interpretation of results, Test and evaluate the proposed system, Write thesis and present.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:
CO1. Investigate, conceptualize and design optimal solution for the chosen problem.
CO2. Utilize appropriate modern tools/techniques to implement the proposed system.
CO3. Design and conduct investigations and experiments to test and evaluate the proposed system.
CO4. Write and present technical report/document to report the findings on the chosen problem.
CO5. Function effectively as an individual to recognize the opportunities in the chosen domain of interest and engage in independent learning.
CO6. Recognize the need to engage in lifelong learning for development of technical competence in the advanced fields of computer networks and information security to contribute to the development of scientific/ technological knowledge.

Program: M.Tech. SOFTWARE ENGINEERING

M.Tech. I Semester
(19MT12501) ADVANCED SOFTWARE ENGINEERING
(Software Engineering)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PREREQUISITES: Nil
COURSE DESCRIPTION: Software Life Cycle Models; Software Project Management; Software Design, Software Reliability And Software Quality Management; Software Maintenance, Software Reuse And Emerging Trends In Software; Devops.
COURSE OUTCOMES:
After successful completion of this course, the student will be able to:
- **CO1:** Use various Software Development Lifecycle Models in software development.
- **CO2:** Identify project management approaches as well as cost and schedule estimation strategies for quality software development.
- **CO3:** Apply software design approaches for development of software system.
- **CO4:** Understand software reliability, quality, reuse, and maintenance concepts.
- **CO5:** Choose DevOps Tools to accelerate software development and reduce defects.

M.Tech. I Semester
(19MT12502) DATA STRUCTURES AND ALGORITHMS
(Software Engineering)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PREREQUISITES: A course on "Computer Programming".
COURSE DESCRIPTION: Introduction to Data Structures and Algorithms; Searching and Sorting; Trees and Graphs; Divide and Conquer; Greedy method; Dynamic Programming, Back Tracking; Branch and Bound.
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
- **CO1:** Demonstrate knowledge on:
  - Linear data structures including Stack, Queue and Linked Lists and Non-linear data structures like Trees and Graphs.
  - Divide and Conquer, Greedy Method, Dynamic Programming, Backtracking and Branch & Bound algorithms.
- **CO2:** Analyze the efficiency of algorithms using space and time complexities.
- **CO3:** Apply Algorithm design techniques for searching and sorting applications.
- **CO4:** Choose data structures for optimum way of data organization and retrieval mechanism.
- **CO5:** Use Dynamic programming techniques to optimize shortest path finding.

M.Tech. I Semester
(19MT12503) MOBILE APPLICATION DEVELOPMENT
(Software Engineering)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C

40	**60**	**100**	**3**	**-**	**-**	**3**

PRE-REQUISITES: Courses on "Java Programming".
COURSE DESCRIPTION: Introduction to Android Platform; Activities; Basic Views; Understanding the Components of a Mobile Screen; Display Orientations; Menus; File Storage; Database Storage; SMS; e-mail; Location-Based Services; Web Services using HTTP; Android Services; Communication between a Service and an Activity; Threading; Introduction to iOS.
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1. Understand the programming concepts of Android and iOS for the development of mobile applications.
CO2. Analyze the states of Android activities, activity navigations, and screen orientations.
CO3. Design user interface for mobile applications using views and develop Android code to process the user data, exchange the data between activities and provide navigation among activities.
CO4. Apply Android programming principles to create files and databases for storing and retrieving of the user data.
CO5. Apply Android programming principles of messaging, location-based services (LBS), and networking to develop mobile applications like SMS, e-Mail, LBS, and web services.

M. Tech. I Semester
(19MT16303) CLOUD COMPUTING
(Program Elective – 1)
(Common to CN&IS, CS and SE)

Internal Marks	External Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Courses on Computer Networks and Operating Systems.
COURSE DESCRIPTION:
Characteristics and taxonomy of virtualization techniques, Cloud services, Cloud architecture - NIST and other models, communication protocols, and applications, Cloud programming concepts - concurrent programming, task programming, data intensive computing,; Trends and industrial platforms.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
CO1: Create virtual environments to deploy cloud services by using the concepts of virtualization and cloud computing.
CO2: Analyze and design cloud architectures for providing cloud services to cater needs of diverse applications.
CO3: Develop skills to research and develop cloud applications that ae resilient, elastic and cost-efficient.

M.Tech. I Semester
(19MT12504) INFORMATION RETRIEVAL SYSTEMS
Program Elective-I
(Software Engineering)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	**60**	**100**	**3**	**-**	**-**	**3**

PREREQUISITES: A course on Database Management Systems
COURSE DESCRIPTION: Architecture of Information Retrieval Systems; Functional Capabilities; Data Structures; Mathematical Algorithms; Indexing; Similarity and Clustering; Human Perception and Presentation; Text Search Techniques and Evaluation Measures.
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1: Demonstrate knowledge on different information retrieval techniques.
CO2: Use different indexing and data presentation methods.

CO3: Analyze clustering algorithms to group similar data items and text search techniques for efficient search.
CO4: Demonstrate Human Perception and Presentation Techniques in information retrieval.
CO5: Choose different search and evaluation methods for information retrieval mechanism.

M.Tech. I Semester
(19MT12505) PYTHON PROGRAMMING
Program Elective-I
(Software Engineering)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	**60**	**100**	**3**	**-**	**-**	**3**

PRE-REQUISITES: --Nil--
COURSE DESCRIPTION: Visual Programming through Scratch; Introduction to Python Programming and Control Structures; Python Data Structures, Strings, Functions and Files; Introduction to Object Oriented Programming and Python modules.
COURSE OUTCOMES:
After successful completion of the course, the student will be able to:
CO1: Understand the basic concepts of visual programming through Scratch tool and Python variables, operators, control structures, data structures, strings, functions and files.
CO2: Develop basic scripts for performing Input, Output and Computations using Scratch tool and Python programming.
CO3: Identify the strengths and weaknesses of different Scratch Palettes and Python data structures.
CO4: Design and deploy appropriate data structures, string functions and Python modules for solving computing problems.
CO5: Develop Python Programs for solving real time applications using object oriented concepts and Python modules.

M.Tech. I Semester
(19MT12506) USER INTERFACE DESIGN
(Software Engineering)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	**60**	**100**	**3**	**-**	**-**	**3**

PREREQUISITES: A course on "Advanced Software Engineering"
COURSE DESCRIPTION: Characteristics & principles of User Interface Design; Requirement analysis-direct & indirect methods; Design- using Formatting menus & Windows; Design-using Text boxes, multimedia and Windows layout.
COURSE OUTCOMES:
After successful completion of this course, the student will be able to:
CO1: Gain the knowledge on concepts of user interfaces and related business functions.
CO2: Analyze user requirements necessary for UI development.
CO3: Design interfaces using appropriate menus, windows, interfaces.
CO4: Usage and customize of advanced tools for various window layouts in project management and development of UI computing systems.

M.Tech. I Semester
(19MT12507) BIG DATA TECHNOLOGIES
(Software Engineering)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C

40	**60**	**100**	**3**	**-**	**-**	**3**

PRE-REQUISITES: Courses on Database Management Systems and Data Warehousing and Data Mining.

COURSE DESCRIPTION: Introduction to Big Data, Hadoop; Hadoop Distributed File Systems; Hadoop I/O; MapReduce; Hive; Pig; HBase; Zookeeper; Sqoop and Case studies.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO1: Demonstrate knowledge on Structure of Big Data, Big Data characteristics, storage, processing, querying and reporting.

CO2: Analyze large dataset issues with Hadoop Distributed File System and MapReduce techniques.

CO3: Use MapReduce features and file types and formats in Hadoop environment.

CO4: Apply MapReduce, Hive, Pig, Sqoop, HBase, and Zookeeper tools for data analytics.

CO5: Design and Develop classification and clustering models for health and facebook dataset applications.

M.Tech. I Semester

(19MT12508) Information Security

(Software Engineering)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	**60**	**100**	**3**	**-**	**-**	**3**

PREREQUISITES: -

COURSE DESCRIPTION:

Introduction to Security; Need for Security; Risk Management; Planning for Security; Security Technology

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO1: Understand the basics of Information Security

CO2: Demonstrate the reasons for security issues.

CO3: Understand and manage risks.

CO4: Gain knowledge on security standards.

CO5: Understand the role of access control systems and security systems.

M. Tech. I Semester

(19MT10509) MACHINE LEARNING

(Program Elective – 2)

(Common to CS, CN&IS and SE)

Internal Marks	External Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: A course on statistics.

COURSE DESCRIPTION:

Concepts of supervised, unsupervised and reinforcement learning, Bayesian decision theory, Learning rules from data, Performance evaluation of classification algorithms, Ensemble learners, Elements of Reinforcement Learning.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO1: Understand, select and apply appropriate machine learning strategies of supervised, unsupervised and reinforcement learning for solving a given problem.

CO2: Develop applications by using appropriate ensemble models to enhance the accuracy of data analysis.

CO3: Evaluate the performance of machine learning algorithms and select optimal models to suit needs of a given problem.

CO4: Redesign existing machine learning algorithms to improve efficiency of classification models.

M.Tech. I Semester

(19MT12509) SERVICE ORIENTED ARCHITECTURE

(Software Engineering)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES:A Course on "Software Engineering" and "Web Technologies"

COURSE DESCRIPTION: Introduction to SOA, Web services & Primitive SOA, Contemporary SOA, Principles of SOA, Service Layers, Delivery strategies, Service Modeling, Service and Business process design- Simple Object Access Protocol (SOAP), Web Services Description Language (WSDL), and Web Services- Business Process Execution Language (WS-BPEL), SOA support in .NET and J2EE.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO1: Demonstrate knowledge on:
- Fundamental of web services
- Development strategies, Principles, Services, Layers and building of SOA.

CO2: Analyze complex business process critically in identifying appropriate service model logic like Activity Management, Messaging and Data Security. Understanding key policies behind SOA.

CO3: Understand Service policies and web service standardswith web services technology elements in SOA.

CO4: Build service models for Entity and Task centric business with modeling guidelines and approaches.

CO5: Gain skills on XML Schema, WSDL, SOAP, BPEL and apply the modern tools and techniques of .NET and J2EE to modeling the web services.

M.Tech. I Semester

(19MT12531) ADVANCED SOFTWARE ENGINEERING LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	4	2

PREREQUISITES: Courses on "Advanced Software Engineering", and "Data Structures and Algorithms".

COURSE DESCRIPTION: Software development life cycle activities- requirements specification using open source Requirement documentation tool, modeling using AgroUML tool; Raptor-Flowchart based programming tool; Marathon IDE; Jenkins and Apache Jmeter tools; Project Management Web application using Redmine; JIRA and Scala Oriented Build tools; Implementation of various linear and non-linear data structures using C++; MIT app Inventor and Thingspeak Cloud.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO1: Demonstrate hands-on experience on:
- Requirements Engineering and Management
- Estimation of software-size, effort, schedule and cost.

CO2: Design and Develop basic flowcharts and programs for performing Input, Output and Computations using Agro UML, Raptor tools, Marathon IDE and C++ concepts.

CO3: Identify and apply designing, estimating tools and methodologies for complex engineering problems.

CO4: Develop mobile applications for solving real time applications using MIT app Inventor and Thingspeak Cloud.

CO5: Work individually and in teams collaboratively in implementing mini projects.

CO6: Demonstrate communication skills both oral and written for preparing and presenting reports.

CO7: Engage in life-long learning and enthusiasm to upgrade knowledge and skills in latest technologies and tools.

M.Tech. I Semester
(19MT12532) MOBILE APPLICATION DEVELOPMENT LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	4	2

PRE-REQUISITES: Course on Mobile Application Development
COURSE DESCRIPTION: Hands-on experience on development of Android Mobile applications using Views; Menus; Layouts; Buttons; Date Picker, and database creation and access with Android SQLite.
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:

- **CO1:** Demonstrate programming skills for the development of mobile applications using Android platform.
- **CO2:** Analyze the requirements of the user to develop Android applications.
- **CO3:** Design user interface for mobile applications using views and develop Android applications based on user requirements.
- **CO4:** Apply Android programming principles to create files and databases for storing and retrieving of the user data.
- **CO5:** Apply Android programming principles of messaging, location-based services (LBS), and networking to develop mobile applications like SMS, e-Mail, LBS, and web services.
- **CO6:** Work effectively as an individual and as a member in team for mini-project implementation.
- **CO7:** Demonstrate communication skills, both oral and written for preparing and presenting reports.

M.Tech. II Semester
(19MT22501) Full Stack Technologies
(Software Engineering)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: A course on "Object Oriented Programming".
COURSE DESCRIPTION:
HTML5, CSS3; JQuery, Bootstrap; PHP, PHP with MySQL database; Node.js; AngularJS.
COURSE OUTCOMES:
After successful completion of the course, the student will be able to:

CO1. Demonstrate knowledge on HTML5 and CSS3.
CO2. Develop and validate interactive web pages.
CO3. Design web pages compatible for various devices.
CO4. Demonstrate programming skills to develop web applications.
CO5. Apply Node.js and AngularJS to make web pages more interactive, scalable and user friendly.

M.Tech. II Semester
(19MT22502) Software Architecture and Design Patterns
(Software Engineering)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PREREQUISITES: Course on "Advanced Software Enginering," and "Object Oriented Programming".
COURSE DESCRIPTION:
This course is used to capture the persistent parts of the program and to derive the transient versions using architecture refinement. Patterns contribute to capturing the persistent parts of a program by describing often used solutions to problems in a context. This course covers the fundamental design principles and strategies for software architecture. Architectural styles, Quality attributes, Notations and Documents, Evaluating the architecture, MVC, Creational Patterns, Structural Patterns and Behavioral Patterns.
COURSE OUTCOMES:
On successful completion of this course, the students will be able to:

CO1: Demonstrate knowledge on:
- Software architecture styles and business life cycle.
- Various design issues and patterns.

CO2: Understand the requirements of a software systems and design, document and reconstruct suitable software architectures.

CO3: Identify suitable software architectures to design quality software system.

CO4: Analyze and identify suitable design patterns like creational, structural and behavioral patterns.

M.Tech. II Semester
(19MT22503) ADVANCED DATABASES
(Software Engineering)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Courses on Database Management Systems and Computer Networks.
COURSE DESCRIPTION: Parallel Databases; Object Based Databases; Distributed Databases; Distributed Transaction Management; Emerging Database Technologies and Applications.
COURSE OUTCOMES:
On successful completion of this course, the students will be able to:

CO1: Demonstrate knowledge on:
- Parallel databases.
- Object based and Object Relational databases.
- Distributed databases, horizontal and vertical data fragmentations.
- Mobile databases, Geographic Information Systems, Genome Data Management, Multimedia Database and NoSQL.

CO2: Demonstrate skills in Query optimization, Data Fragmentation, Transaction Management and Concurrency Control for Distributed Transactions.

CO3: Design Parallel, Object-Oriented, Object-Relational and NoSQL databases.

CO4: Solve Concurrency Problems in Distributed Transactions.

CO5: Use database techniques for Mobile, Geographic Information Systems, Genome Data Management, and Multimedia Data.

CO6: Create databases as per societal needs such as airline reservation, banking systems etc.

M.Tech. II Semester
(19MT10504) ARTIFICIAL INTELLIGENCE
(Common to M.Tech. (SE and CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PREREQUISITES: *Courses on "Object Oriented Programming through C++" and "Computer Graphics"*
COURSE DESCRIPTION: --Nil--

COURSE OUTCOMES: Artificial intelligence concepts, Intelligent agents, Problem solving agents, Logical agents, Knowledge representation and processing, Probabilistic learning, Natural language processing.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO1: Perceive different artificial intelligence related concepts including intelligent agents, searching strategies, knowledge representation and learning, probabilistic reasoning, and Markov decision process.

CO2: Analyze different optimal searching techniques for a given problem and select optimal search technique.

CO3: Design and develop solutions for natural language processing applications.

CO4: Apply statistical models, and algorithms for solving real-world artificial intelligence problems.

M.Tech. II Semester

(19MT22504) .NET TECHNOLOGIES

(Software Engineering)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	**60**	**100**	**3**	**-**	**-**	**3**

PRE-REQUISITES: A Course on "Object Oriented Programming".

COURSE DESCRIPTION: Knowledge on .NET Framework; The element of VB.NET; Writing Software with Visual Basic .NET; C# Programming; Object-oriented concepts with C#; Exception handling mechanism; Interfaces; Generics; Delegates and Events in C#; Database access with ADO.NET; Web application development using Web forms and Web controls.

COURSE OUTCOMES:

On successful completion of the course, the student will be able to:

CO1: Demonstrate the knowledge on basics of .NET Platform.

CO2: Building simple VB .NET applications and Demonstrate problem solving skills

CO3: for creating VB .NET Applications.

CO4: Demonstrate basic knowledge on C# and problem solving skills for creating C#

CO5: applications.

CO6: Design and Develop C# application to access the database.

CO7: Design and develop Graphical User Interface and Web applications using ASP .NET technologies.

M.Tech. II Semester

(19MT22505) SOFTWARE MEASUREMENT AND METRICS

(Software Engineering)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	**60**	**100**	**3**	**-**	**-**	**3**

PRE-REQUISITES: A course on “Advanced Software Engineering”.

COURSE DESCRIPTION: Software measurement theory; Models of software engineering measurement; Software products metrics, software process metrics; Measuring & management and Software quality metrics.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO1: Identify and apply various software metrics for determining the quality level of software.

CO2: Analyze goal based framework and prepare fault and failure reports for External products.

CO3: Identify and evaluate the quality level of internal and external attributes of a given software product.

CO4: Understand the process for calculating Complexity metrics.

CO5: Apply quality metrics for software development and evaluate the quality level of the software based on the requirement.

M. Tech. (SE) – II Semester

(19MT20501) DATA SCIENCE
(Program Elective - 4)
(Common to CS and SE)

Internal Marks	External Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Courses on Data Warehousing and Data Mining, Probability and Statistics.

COURSE DESCRIPTION:
Introduction to Data science, Using python for data science, Exploratory data analysis - Probability and distributions; Predictive modeling - Time series analysis; Data extraction - Feature selection, Single value decomposition, Principal component analysis; Data visualization - Using visualization for data science, Visualization tools.

COURSE OUTCOMES:
After successful completion of the course, students will be able to:

CO1: Analyze data by recognizing data science process and develop simple applications using relevant python libraries.
CO2: Design and develop predictive models for a given problem to support forecasting.
CO3: Select and apply appropriate data visualization models to identify trends, patterns and outliers in given datasets.
CO4: Investigate and evaluate various predictive models to contribute tools/techniques to applications of diverse domains.

M. Tech. (SE) – II Semester

(19MT26305) INTERNET OF THINGS
(Program Elective - 4)
(Common to CN&IS, CS, SE, DECS and CMS)

Internal Marks	External Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Courses on Computer Networks, Python Programming.

COURSE DESCRIPTION:
Concepts of Domain Specific IoTs, M2M and system management with Netconf-Yang, IoT privacy and security, IoT physical devices, Amazon Web Services for IoT and case studies illustrating IoT design.

COURSE OUTCOMES:

CO1: Understand the concepts of IoT, IoT protocols, privacy and security issues in IoT applications to analyze domain specific IoT's.
CO2: Design solutions through implementing IoT applications on raspberry pi, AWS and develop security solutions to strengthen IoT environment.
CO3: Carry out research to provide IoT-based solutions to solve problems in different domains.
CO4: Acquire professional integrity through understanding the need for data privacy, security and authenticity in IoT-based applications.

M.Tech. II Semester

(19MT22506) SOFTWARE QUALITY ASSURANCE
(Software Engineering)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	**60**	**100**	**3**	**-**	**-**	**3**

PRE-REQUISITES: --Nil--

COURSE DESCRIPTION: Introduction to SQA, Software quality factors, components;

Contract review, Development and quality plans; Reviews, Software testing strategies; Procedures and work instructions, Corrective and preventive actions, Documentation control; Software quality metrics, cost and quality standards.

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

- **CO1:** Understand the basic components of Software Quality Assurance, factors, reviews, testing and standards.
- **CO2:** Develop basic test suite design for improving software quality through Debugging.
- **CO3:** Identify the strengths and weaknesses of different quality metrics and quality management standards.
- **CO4:** Design and deploy novel software quality components through appropriate Procedures, work instructions and prepare effective documentation.
- **CO5:** Identify suitable metrics and estimate software cost for delivering quality software products.

M.Tech. II Semester

(19MT22531) Full Stack Technologies Lab

(Software Engineering)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	4	2

PRE-REQUISITES: --Nil--

COURSE DESCRIPTION: Hands on practice in designing, developing and executing HTML5, CSS3, JQuery, Bootstrap, PHP, Node.js and AngularJS.

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

- **CO1:** Demonstrate knowledge on web page design elements, dynamic content and database Interaction.
- **CO2:** Analyze user requirements to develop web applications.
- **CO3:** Design client-server applications using web technologies.
- **CO4:** Use HTML, CSS, JavaScript, JQuery, Bootstrap, PHP,Node.js, AngularJS technologies for device independent web application development.
- **CO5:** Apply web technologies to develop interactive, dynamic and scalable web applications for societal needs.
- **CO6:** Work effectively as an individual and as a member in team for mini-project implementation.
- **CO7:** Demonstrate communication skills, both oral and written for preparing and presenting reports.

M.Tech. II Semester

(19MT22532) SOFTWARE ARCHITECTURE AND DESIGN PATTERNS LAB

(Software Engineering)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	4	2

PREREQUISITES: Courses on "Advanced Software Engineering" and "Object Oriented Programming".

COURSE DESCRIPTION: Software development life cycle activities- Implementation of design models using enterprise architect; Creation of web service client; Implementation of Orchestration with BPEL; Test plan document; Regression testing, functional testing using UFT, and Selenium; Performance testing using Load Runner, and Web Performance Tool.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO1: Demonstrate hands-on experience on:

- Web services
- Design issues and patterns

CO2: Design and develop basic design patterns, simulations for different software applications.
CO3: Identify and apply test case design methodologies for complex software engineering problems.
CO4: Develop and test web applications for debugging real time applications using Selenium and UFT tools.
CO5: Work individually and in teams collaboratively in implementing mini-projects.
CO6: Demonstrate communication skills both oral and written for preparing and presenting reports.
CO7: Engage in life-long learning and enthusiasm to upgrade knowledge and skills in latest technologies and tools.

M. Tech. II Semester
(19MT2AC01) STATISTICS WITH R PROGRAMMING
(Audit Course)
(Common to All M. Tech. Programs)

Internal Marks	External Marks	Total Marks	L	T	P	C
--	--	--	2	-	-	-

PRE-REQUISITES: A course on Statistics.
COURSE DESCRIPTION:
Concepts of R programming basics, Bivariate and multivariate data, Confidence intervals, Goodness of fit, Analysis of variance.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
CO1: Import, manage, manipulate, and structure data files using R programming.
CO2: Implement models for statistical analysis of a given dataset.
CO3: Build data visualization using charts, plots and histograms to identify trends, patterns and outliers in data.
CO4: Summarize and graph data, test hypotheses, analyze variance, and assess goodness-of-fit using advanced packages.

M. Tech. - III Semester
(19MT32532) PROJECT WORK PHASE-I

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	-	10

PRE-REQUISITES: --
COURSE DESCRIPTION:
Identification of topic for the project work; Literature survey; Collection of preliminary data; Identification of implementation tools and methodologies; Performing critical study and analysis of the problem identified; submitting a Report.
COURSE OUTCOMES:
On successful completion of the course, students will be able to:

CO1. Apply contextual knowledge to identify specific domain in Software Engineering and allied areas of discipline.

CO2. Conduct literature review, analyze, cognize and comprehend the extracted information to recognize the current status of research pertinent to the chosen domain.

CO3. Select appropriate tools, techniques and resources for implementation of project work.

CO4. Function effectively as an individual to recognize the opportunities in the chosen domain of interest

CO5. Write and present a technical report/document to present the findings on the chosen problem.

CO6. Engage lifelong learning for development of technical competence in the field of Software Engineering.

M. Tech. - IV Semester
(19MT42531) PROJECT WORK PHASE-II

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
150	**150**	**300**	**-**	**-**	**-**	**16**

PRE-REQUISITES: --

COURSE DESCRIPTION:

Time and cost analysis; undertaking practical investigations of project work; implementation; analysis of results; validation and report writing.

COURSE OUTCOMES:

On successful completion of the course, students will be able to:

CO1. Solve engineering problems pertinent to the chosen topic for feasible solutions.

CO2. Utilize appropriate tools, techniques and resources for implementation of project work.

CO3. Function effectively as an individual to recognize the opportunities in the chosen domain of interest

CO4. Write and present a technical report/document to present the findings on the chosen problem.

CO5. Do time and cost analysis on the project.

CO6: Engage lifelong learning for development of technical competence in the field of Software Engineering.

Program: MASTER OF COMPUTER APPLICATIONS

MCA I-SEMESTER

(19MC1HS01) FINANCIAL AND MANAGEMENT ACCOUNTING (Theory)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITE: --

COURSE DESCRIPTION:

Accounting concepts, Principles of accountancy, Types of accounts, Journal, Ledger and Trial Balance; Trading account, Profit and Loss account, Balance sheet; Ratio analysis of investments; Analysis and determination of Break-Even-Points; Methods of capital budgeting.

COURSE OUTCOMES:

After successful completion of this course, the student will be able to:

CO1: Demonstrate the concepts of Financial Accounting in preparation of Financial Statements.

CO2: Analyze and interpret the financial data using Ratio Analysis, Break-Even Analysis and Capital Budgeting Techniques for the decision-making of an Organization.

MCA I- SEMESTER

(19MC10101) COMPUTER ORGANIZATION (Theory)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITE: --

COURSE DESCRIPTION:

Digital logic circuits and its components; Types of data in circuits; Design of control unit; Organizations of Central Processing Unit(CPU), instruction formats, addressing modes, types of instructions; Design of basic computer; Types of peripheral devices, modes of transfers, interrupts, memory and mappings.

COURSE OUTCOMES:

After successful completion of this course, the student will be able to:

CO1: Design control unit using logic circuits and analyze central processing unit, instruction formats, addressing modes, types of instructions, modes of transfer for effective utilization of a system.

CO2: Apply Boolean algebra and map simplification techniques to design logic circuits and basic computer using memory mappings, techniques of I/O and instruction sets.

MCA I- SEMESTER

(19MC10102) MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE (Theory)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	--	4

PRE-REQUISITES:--

COURSE DESCRIPTION:

Mathematical logic and predicates; Functions and Relations; Algebraic Structures; Mathematical Reasoning; Recurrence Relations; Graphs and Trees.

COURSE OUTCOMES:

After successful completion of this course, the student will be able to:

CO1: Identify the types of functions, formulate truth tables and solve normal forms using the knowledge of mathematical logic.

CO2: Analyze computer algorithms using the knowledge of graph theory and solve recurrence relations using discrete mathematics.

MCA I- SEMESTER

(19MC10103) OPERATING SYSTEMS (Theory)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C

40	60	100	4	-	--	4

PRE-REQUISITES:--

COURSE DESCRIPTION:

Operating Systems; Design and Implementation of Operating System Structure; Evaluation of Multithreading and CPU Scheduling Algorithms; Deadlocks and Synchronization Methods; Memory Management Techniques; Protection and Security.

COURSE OUTCOMES:

After successful completion of this course, the student will be able to:

CO1: Identify and analyze Inter Process Communication (IPC), Process Synchronization, Memory Management, Process Scheduling, System protection and Security mechanisms and algorithms to solve problems of resource utilization.

CO2: Select and apply Deadlock handling mechanisms, Synchronization tools, Process Scheduling and Page Replacement algorithms to interpret and resolve optimal resource allocation problems.

MCA I- SEMESTER

(19MC10104) PROGRAMMING IN C (Theory)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES: --

COURSE DESCRIPTION:

Problem Solving; Analysis and Efficiency of Algorithms; Problem solving approaches; Elements of C and Data types; Program design; Operators and Expressions; Data Input and Output ; Control Statements; Functions ; Arrays ; Strings ; Pointers; Structures and Unions and File handling Techniques; Preprocessor directives; Command line argument and its usage.

COURSE OUTCOMES:

After successful completion of this course, the student will be able to:

CO1: Design algorithms using problem-solving approaches, C language Tokens, Input/output Formatting styles, Control statements, Dynamic memory allocation functions, parameter passing mechanism, command line arguments and functions to solve problems.

CO2: Select and apply control statements, 'C' language constructs, functions, pre- processor directives, sequential and random access of text/binary files for persistent data storage to solve computational problems.

MCA I- SEMESTER

(19MC1HS31) COMMUNICATIVE ENGLISH LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	1.5

PRE-REQUISITE: --

COURSE DESCRIPTION:

Just a Minute, Elocution/Impromptu; Phonetics; Vocabulary Building; Grammar; Giving Directions; Role Plays; Public Speaking; Letter Writing; Describing Objects; Reading Comprehension; Information Transfer; Listening Comprehension

COURSE OUTCOMES:

After successful completion of this course, the student will be able to:

CO1: Demonstrate knowledge of Phonetics by examining and applying sounds of English in Phonetic Transcription.

CO2: Analyze sentence structures by applying and demonstrating the skills of Vocabulary and Grammar.

CO3: Apply appropriate listening and reading skills by analyzing the context and demonstrate in Listening Comprehension and Reading Comprehension.

CO4: Function effectively as an individual and as a member in diverse teams examining and applying speaking skills in Just A Minute and Role Play.

CO5: Communicate effectively applying appropriate writing and speaking techniques by examining and demonstrating knowledge through Describing Objects, Information Transfer and Letter Writing.

MCA I-SEMESTER
(19MC10131) **PC SOFTWARE LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	1.5

PRE-REQUISITE: --

COURSE DESCRIPTION:
Peripherals of a computer; Disassembling and Assembling the Personal Computer(PC); Linux file system, File handling utilities and Text processing utilities; Productivity tools including Word, Excel, Power Point, Access and publisher.

COURSE OUTCOMES:

After successful completion of this course, the student will be able to:

CO1: Identify and analyze functional parts of PC, functionalities of Operating System and Information Management.

CO2: Apply Troubleshooting techniques for Assembling and Disassembling of PC and create professional word documents, Excel Spreadsheets and power point presentations for effective management of data.

CO3: Work independently and in a team to solve problems with effective communication.

MCA I - SEMESTER
(19MC10132) **PROGRAMMING IN C LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	1.5

PRE-REQUISITES:--

COURSE DESCRIPTION:
Program Design and Problem Solving using the C Programming Language; Control Structures; Functions; Arrays; Strings; Pointers; File I/O and the usage of Preprocessor Directives.

COURSE OUTCOMES:

After successful completion of this course, the student will be able to:

CO1: Analyze and implement algorithms using C language Tokens, Input/output formatting styles and Programming components to solve problems.

CO2: Design and develop programs using Control Structures, Loops, Functions, Parameter Passing Mechanism, Command Line Arguments, File Handling to solve complex problems.

CO3: Work independently and in a team to solve problems with effective Communication.

MCA II – SEMESTER
(19MC2BS01) **PROBABILITY AND STATISTICS (Theory)**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES: --

COURSE DESCRIPTION:
Concepts of Probability; Probability distributions; Random variables; Sampling, Correlation and regression analysis; Statistical quality control; Testing of hypothesis.

COURSE OUTCOMES:

After successful completion of this course, the student will be able to:

CO1: Analyze the correlation and regression, estimation and sampling distributions to identify and solve the problems for testing of hypothesis.

CO2: Apply the methods of probability and its distributions to solve the problems on random variables and formulate statistical quality control charts.

MCA II-SEMESTER
(19MC20101) DATABASE MANAGEMENT SYSTEMS (Theory)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES:
A course on Operating Systems.
COURSE DESCRIPTION:

Databases; Database Architecture and Database Design; Concepts of Relational Database and its Design; Representation of ER Diagram to Relational model; SQL queries; Normal forms; Recovery and Concurrency Control mechanism; Storage and Indexing mechanism.
COURSE OUTCOMES:
After successful completion of this course, the student will be able to:
CO1: Identify and analyze the problems arise due to redundancy, Data normalization techniques, Transaction processing approaches, Concurrency control and Recovery mechanisms for an optimal database application system.
CO2: Select and apply integrity constraints over relations, relational models, storage and indexing, hashing techniques for the construction of relational database systems.

MCA II-SEMESTER
(19MC20102) DATA STRUCTURES (Theory)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITE:
A course on Programming in C.
COURSE DESCRIPTION:
Pseudo code; Abstract Data Type (ADT); Implementation of Stack; Queues; Linked Lists; Graphs; Tree ADT's and its Application; Sorting and Searching techniques; Binary Search Tree ADT, AVL- Height balanced trees and its Applications; Graphs; Shortest Path algorithms.
COURSE OUTCOMES:
After successful completion of this course, the student will be able to:
CO1: Analyze abstract data types to implement stacks, queues, linked lists, trees and graphs to solve computational problems.
CO2: Select and apply sorting, searching, tree and graph traversal techniques for designing algorithms.

MCA II-SEMESTER
(19MC20103) OBJECT ORIENTED PROGRAMMING THROUGH JAVA (Theory)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PREREQUISITES:
A course on Programming in C.
COURSE DESCRIPTION:
Principles of Object Oriented Programming; Representation of Java Classes and methods; Inheritance and Polymorphism using Java, Creation of Packages and Interfaces; Implementation of Utility Classes and Input/output; Exception handling mechanism and multithreading; Event handling techniques; GUI applications by using AWT and Swings.
COURSE OUTCOMES:
After successful completion of this course, the student will be able to:
CO1: Analyze Object Oriented Programming Principles and apply Exception Handling mechanisms and Multithreading for application development.

CO2: Design and develop complex user interface applications using AWT, Applets, Swings, Java Collection API and Java standard class libraries to solve complex problems.

MCA II- SEMESTER
(19MC20104) SOFTWARE ENGINEERING (Theory)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES: --
COURSE DESCRIPTION:

Nature of Software, Unique Nature of WebApps, Software Engineering, Software Process, Software Engineering Practice; Process Models, Agile Development, Understanding Requirements, Requirements Modeling; Design Concepts, Architectural And Component-Level Design; User Interface Design and Testing Strategies; Product Metrics, Risk Management And Quality Management.

COURSE OUTCOMES:

After successful completion of this course, the student will be able to:

CO1: Identify and analyze software requirements, cost estimations, risk and quality management using the principles of software engineering, process models, design models, testing strategies, risk and management strategies to develop an application software.

CO2: Design software applications by applying design principles, user interface design rules, architectural design process, component-level design, agile development and metrics to develop a quality software product.

MCA II-SEMESTER
(19MC20131) DATABASE MANAGEMENT SYSTEMS LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	1.5

PRE-REQUISITES:
A course on Database Management Systems
COURSE DESCRIPTION:
Creation of Data Definition commands; Implementation of Data Manipulation Commands; Table level and Column level Constraints; Construction of ER diagrams; Implementation of GROUP BY, HAVING, ORDER By clause; Creation and dropping of Views; Implementation of Nested Queries, Joins, Cursors, Functions, Procedures and Triggers.
COURSE OUTCOMES:
After successful completion of this course, the student will be able to:

CO1: Design and implement ER-diagrams, Relational schemas, table and column level constraints, Cursors, Triggers, Functions and procedures to develop Relational Database applications.

CO2: Select and apply Nested Queries, Joins, Views, Group functions in updating and managing the databases to solve relational database problems using SQL and PL/SQL languages.

CO3: Work independently and in team to solve problems with effective Communication.

MCA II-SEMESTER
(19MC20132) DATA STRUCTURES LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	1.5

PRE-REQUISITE:
Courses on Programming in C Lab and Data Structures.
COURSE DESCRIPTION:
Logical and physical representation of data, Abstract data types of Linear and Non-linear Data structures; Singly and Doubly Linked lists; Queues, Stacks and their applications; Binary tree, Binary Search Tree and AVL trees; Usage of graphs, Sorting and Searching techniques.
COURSE OUTCOMES:
After successful completion of this course, the student will be able to:

CO1: Analyze and implement algorithms to perform the operations of stacks, queues, linked lists, trees and graphs using problem solving approaches to solve computational problems.
CO2: Develop programs using sorting and searching techniques, trees and graph traversal techniques to solve memory utilization problems.
CO3: Work independently and in a team to solve problems with effective Communication.

MCA II-SEMESTER
(19MC20133) **OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	1.5

PRE-REQUISITES:
Courses on Programming in C and Object-Oriented Programming through JAVA.
COURSE DESCRIPTION:
Object oriented concepts, recursive and non recursive function; String Tokenizer class; Method Overloading; String Operations; Creation of package and Interfaces; Handling predefined and User Defined Exceptions; Creation of Files and its Operations; Implementation of Multithreading; Creating and testing Applets; Event handling techniques**,** GUI applications using AWT and Swings.
COURSE OUTCOMES:
After successful completion of this course, the student will be able to:
CO1: Apply object-oriented Programming Principles to solve problems using control Structures, strings, functions, packages, interfaces, types of file streams and I/O operations on files.
CO2: Design and develop applications and graphical user interface components using Applet, AWT, Swings components, multithreading techniques, Inter threaded communication and Process synchronization to solve problems.
CO3: Work independently and in team to solve problems with effective communication.

MCA III- SEMESTER
(19MC3HS01) **ORGANIZATIONAL BEHAVIOR AND HUMAN RESOURCE MANAGEMENT (Theory)**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITE: --
COURSE DESCRIPTION:
Concepts of Management and organization, Functions of Management, organizational and individual behavior, Formal and informal groups, Leadership, Functions and Objectives of HRM, Recruitment, Selection, Training.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
CO1: Demonstrate knowledge in managing behavior in an organization.
CO2: Develop requisite skills for effective and optimum utilization of Human resource management.
CO3: Develop effective communication among the work group of an organization.
CO4: Provide life-long learning for effective operation of an organization.

MCA III- SEMESTER
(19MC3BS01) **OPERATIONS RESEARCH (Theory)**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES:--
COURSE DESCRIPTION:
Optimization techniques and formulation of mathematical models in Linear Programming Problems, Transportation problem, Assignment problem, sequencing problem, Replacement problem, game theory, Inventory models, simulation models; Programme Evaluation and Review Technique/Critical Path Method (PERT/CPM) in project management.

COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1: Understand concepts and optimization techniques of Operations Research (OR), models in OR, basics of PERT/CPM, rules of drawing network diagrams and Replacement policies.
CO2: Formulate and solve Linear Programming Problems (LPP) using graphical method, simplex method and Two-Phase simplex method.
CO3: Apply the optimization techniques to solve Transportation problem, Assignment problem, sequencing problem and Replacement problems.
CO4: Analyze and solve Inventory models, simulation models, PERT/CPM in project management and game theory.

MCA III- SEMESTER
(19MC30101) COMPUTER NETWORKS (Theory)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES:--
COURSE DESCRIPTION:
Concepts of Computer Networks; The Physical Layer; The Data Link Layer; The Medium Access Control Sub layer; The Network Layer; The Transport Layer; The Application Layer.
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1: Understand the concepts of Networking, reference models, guided and unguided media, importance of multiplexing, framing and routing policy, internetworking for data communication.
CO2: Apply error and flow control mechanisms and implement transport protocols for reliable data communication.
CO3: Analyze design issues of layers, medium access control protocols, techniques for quality of service, elements of transport and application Protocols ensuring the communication procedures.
CO4: Examine the layered and e-mail architectures, networking protocols and e-mail message formats in compliance with communication standards.

MCA III- SEMESTER
(19MC30102) DATA WAREHOUSING AND DATA MINING (Theory)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITE: --
A Course on Database Management Systems.
COURSE DESCRIPTION:
Data Warehouse Components; Building Data Warehouse; Data mining; Data Preprocessing; Association Rule Mining; Classification and Clustering techniques; Mining different types of data and its Applications.
COURSE OUTCOMES:
After successful completion of this course, the student will be able to:
CO1: Design and develop data warehouse architecture, multidimensional schemas to perform business analysis using OLAP tools.
CO2: Select and apply association rule mining and classification algorithms to identify the frequent patterns and predictions effectively.
CO3: Apply Clustering algorithms on preprocessed datasets to find solutions of real time applications.
CO4: Analyze data preprocessing methods and data mining functionalities to mine text, multimedia, web and spatial data to discover knowledge.

MCA III- SEMESTER
(19MC30103) PYTHON PROGRAMMING (Theory)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES:
Courses on Programming in C and Object Oriented Programming through JAVA.
COURSE DESCRIPTION:
Data types and Expressions; Control Statements; Strings; Text Files; Lists; Dictionaries; Functions; Objects and their use; Exception Handling; Design with Classes; Graphical user Interface.
COURSE OUTCOMES:
After successful completion of this course, the student will be able to:
CO1: Understand the concepts of computer algorithms, problem solving, data types, control structures, expressions, lists, dictionaries, and tuples.
CO2: Design functions, modules, algorithms to solve recursive and non recursive problems.
CO3: Apply python programming constructs, Objects, strings and text files to implement Object Oriented Programming applications using Jupyter Notebook.
CO4: Implement towers of hanoi, Cigarette Use/ Lung cancer Correlation programs using Dictionaries, list, sets, tuples and functions.
CO5: Develop GUI based applications using tkinter, Python programming and object-oriented programming constructs to solve problems.

MCA III- SEMESTER
(19MC30131) **COMPUTER NETWORKS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	1.5

PRE-REQUISITES:
A course on Computer Networks.
COURSE DESCRIPTION:
Implementing error detection and correction techniques; sliding window protocol; simulation of routing algorithms; congestion controlling mechanism; implementation of various Transport layer protocols.

COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1: Understand guided and unguided media, Network Configurations, Network topologies, and networking devices.
CO2: Apply network simulation tools to simulate routing algorithms, flow control techniques to provide solutions in compliance with networking standards.
CO3: Implement client-server Communication, RMI, TCP/IP sockets, transport layer protocols, Congestion control protocols, error detection and correction mechanisms following Networking Principles and Standards.
CO4: Function effectively as an individual to solve problems with effective Communication.
CO5: Write and present a technical report / document effectively.

MCA III- SEMESTER
(19MC30132) **DATA WAREHOUSING AND DATA MINING LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	1.5

PRE-REQUISITES:
A course on Data Warehousing and Data Mining.
COURSE DESCRIPTION:

Hands-on experience on developing active/passive transformations; Creation of Datasets; Data Preprocessing; Association Rule Mining; Classification and Clustering techniques using Data Warehouse ETL and WEKA tool.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO1: Design and develop solutions for data acquisition process from one data source to other target data source using ETL tool.
CO2: Select and Apply Classification and Clustering algorithms on preprocessed datasets to infer predictions effectively.
CO3: Apply methods of data mining to assess and provide analytical solutions for societal issues.
CO4: Analyze preprocessing techniques, data mining algorithms and identify frequent itemsets using Apriori algorithm to extract interesting patterns from large databases using WEKA components.
CO5: Function effectively as an individual and as a member in a team to manage and implement data mining applications**.**
CO6: Write and present a technical report/ document effectively.

MCA III- SEMESTER
(19MC30133) PYTHON PROGRAMMING LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	1.5

PRE-REQUISITES:

A course on Python Programming.

COURSE DESCRIPTION:

Hands on practice–Scripting using Python Programming constructs; Conditional statements; Loops; Text Files; Lists; Dictionaries; Strings; Functions; GUI.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO1: Understand python programming constructs, data types, control structures, expressions, objects, lists, dictionaries, tuples, strings and text files to solve computational problems.
CO2: Identify and analyse classes, functions, modules, algorithms to solve problems.
CO3: Design and develop GUI based application using tkinter, Python programming and object-oriented programming constructs for Horse Race Simulation application.
CO4: Select and Apply python 3.7.5, Anaconda Navigator, Jupyter notebook to solve problems.
CO5: Work independently or in teams to solve problems with effective Communication.
CO6: Write and present a technical report/ document effectively.

MCA IV – SEMESTER
(19MC40101) OBJECT ORIENTED ANALYSIS AND DESIGN (Theory)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES:

Courses on Object Oriented Programming through JAVA and Software Engineering.

COURSE DESCRIPTION:

Things and Classes; Relationships; Class Diagrams; Object Diagrams; Usecase Diagrams; Interaction Diagrams; Activity Diagrams; State Chart Diagrams; Component Diagrams; Deployment Diagrams.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO1: Analyze the specifications of Class, Things, principles of Object-Oriented development, Use case, Activity, Sequence and State diagrams to develop static and dynamic models using pre conditions and post conditions.
CO2: Design application artifacts to construct the Logical, Behavioral and Architectural models of an application using common modeling techniques of things.

CO3: Use UML tool Rational Rose or Visual Paradigm to design Class, Use Case, Sequence, Collaboration, Activity, State Chart, Component and Deployment Diagrams.

CO4: Function effectively as a member or leader in teams to analyze and design Leave Management System.

MCA IV – SEMESTER

(19MC40102) **LINUX PROGRAMMING (Theory)**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES:

Courses on Operating Systems and Computer Networks.

COURSE DESCRIPTION: LINUX operating system features; Architecture of LINUX operating system; LINUX environment; Shell Script; Signals and Sockets.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO1: Demonstrate LINUX operating system concepts and File, Text, Network, process and Backup utilities, awk and Bourne shell.

CO2: Design and develop client/server programs by using Sockets and RPC.

CO3: Use the vi editor to execute commands and implement shell script.

CO4: Analyse LINUX files, processes and signals to design and implement programs in Linux operating system.

CO5: Investigate and select appropriate technique from semaphores, Messages and Shared Memory to solve the problems in Inter Process Communication.

MCA IV-SEMESTER

(19MC40103) **WEB PROGRAMMING (Theory)**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES:

A course on Object Oriented Programming through JAVA.

COURSE DESCRIPTION:

Concepts of HTML; Java Script and XML; Developing Web Applications using Servlets, JSP and PHP; Adopting Tomcat Server and XAMP Server for deploying Web Applications.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

CO1: Understand concepts of HTML, DHTML, Java Script, AJAX programming and XML.

CO2: Design and develop web Applications using Dynamic HTML, XML technology, Servlets, JSP and PHP.

CO3: Use JSP and PHP technologies to implement E-Commerce applications to infer potential insights. Analyze 2-tier, 3-tier and MVC architectures, Servlets Life cycle and JSP Life cycle, Directory structure of servlets and JSP to design web application.

CO4: Analyze 2-tier, 3-tier and MVC architectures, Servlets Life cycle and JSP Life cycle, Directory structure of servlets and JSP to design web application.

CO5: Investigate and Solve real time problems using Server-side technologies, Tomcat Server and XAMPP Server for deployment of web applications.

CO6: Commit to ethics to adapt JSP Standard Tag Libraries, PHP Standard Recommendation (PSR) and XML standards and extensions to develop web application.

MCA IV - SEMESTER

(19MC40104) **BLOCKCHAIN TECHNOLOGIES (Theory)**
(Professional Elective-I)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C

40	60	100	4	-	-	4

PRE-REQUISITES:
Courses on Data Structures and Computer Networks.
COURSE DESCRIPTION:
Distributed Systems, Blockchain, Types of blockchains, Decentralization, Bitcoin, Alternative Coins, Smart Contracts, Ethereum 101, Applications of Ethereum, Scalability Challenges in Privacy and Security, Current Landscape.
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:

CO1: Understand the concepts of distributed Systems, decentralization and blockchain technology for the development of an application.
CO2: Select and use the Bitcoins, Smart Contracts and Ethereum 101 for the development of distributed systems and decentralized systems.
CO3: Analyze the issues and challenges of scalability, privacy and security in monetizing the businesses using blockchain technology.
CO4: Develop and deploy the applications using BlockApps, Eris platforms.
CO5: Commit to ethics and cyber regulations to perform encryption, multiparty computation, smart governance using Smart contract security.

MCA IV - SEMESTER
(19MC40105) MULTIMEDIA APPLICATION DEVELOPMENT (Theory)
(Professional Elective-I)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES:
A course on Web Programming.
COURSE DESCRIPTION:
Multimedia Concepts; Data Representation; Action script Programming Concepts; Dynamic Action Script and Event Handling Mechanism; Video and audio compression Techniques and Multimedia communication and data transmission.
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:

CO1: Understand the concepts of Multimedia, hypermedia, validation of forms and action script programming and Event Handling.
CO2: Design and Develop online media applications using searching of motor vectors and Moving Picture Expert Group (MPEG) techniques for visual design.
CO3: Demonstrate Bitmap Programming, multimedia software tools, graphic software, scanning and digital photography to create original images.
CO4: Analyze image data representation graphics, image data types, file formats, color models in images and color models in videos to design graphics and videos.
CO5: Solve the compression of audio and video problems using audio and video compression techniques.
CO6: Apply compression standards, Adaptive Differential Pulse Code Modulations (ADPCM), Vocoders and Linear Predictive Coding (LPC) to develop quality applications.

MCA IV - SEMESTER
(19MC40106) INFORMATION SECURITY (Theory)
(Professional Elective – I)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C

40	60	100	4	-	-	4

PRE-REQUISITES:
A course on Computer Networks.
COURSE DESCRIPTION:
Cryptographic algorithms; Classical Encryption Techniques; Public key and Private key encryption; Security models; Hash Algorithms; E-mail, IP and Web Security; ensuring system security and security over the Internet; Intrusion Detection and Trusted systems.
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1: Understand Network security model and cryptographic techniques for secure communication.
CO2: Apply Cryptographic techniques to provide security for E-Mail and IP based communication
CO3: Analyze Cryptographic algorithms and provide solutions for secure data transmission.
CO4: Demonstrate web and system security techniques to prevent the data from digital attacks.

MCA IV-SEMESTER
(19MC40107) SOFTWARE PROJECT MANAGEMENT (Theory)
(Professional Elective – I)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES:
A course on Software Engineering.
COURSE DESCRIPTION:
Software Models and process improvement ; Principles of software management system and life cycle phases; Workflows and checkpoints of the process; scheduling and work break down structure ; Process automation ; Software metrics ; Future generation software economics.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
CO1: Understand the conventional software management, project organization roles and responsibilities, software economics for conventional, modern and future software project development.
CO2: Apply Life cycle phases, Planning guidelines, Cost and schedule estimation process, seven-core metrics to assess the quality of project.
CO3: Analyze the checkpoints of the process, software architecture and Work Breakdown Structure to identify the artifacts of software project deliverables.
CO4: Analyze the process workflows, tailoring the process and process automation tools to manage and deploy successful software projects.
CO5: Commit to ethics to adapt conventional and modern software project management principles at each stage of software development life cycle.

MCA IV-SEMESTER
(19MC40108) INFORMATION RETRIEVAL SYSTEMS (Theory)
(Professional Elective-II)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES:
Courses on Database Management Systems and Data Warehousing and Data Mining.
COURSE DESCRIPTION:
Functional overview; Information Retrieval System capabilities; automatic Indexing; stemming algorithms; automatic term clustering; user search techniques; Information visualization technologies; software text search algorithms; Information system evaluation.
COURSE OUTCOMES:
After successful completion of this course, the student will be able to:

CO1: Understand IRS functionality, search and browse capabilities, cataloging and Indexing process, data structures, Document and Term Clustering.

CO2: Select and apply stemming algorithms, Automatic Term Clustering and Information visualization technologies, Text search algorithms in the Internet or Web search engine to interpret meaningful and relevant patterns.

CO3: Analyze the information retrieval system capabilities, Automatic indexing, user search techniques, Information system evaluation measures to present the relevant search results to the user.

MCA IV - SEMESTER
(19MC40109) ARTIFICIAL INTELLIGENCE (Theory)
(Professional Elective - II)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES:
Courses on Mathematical Foundations of Computer Science and Data Structures.
COURSE DESCRIPTION:
AI Problems; Problem Characteristics Search Algorithms; Inference in Propositional Logic; axioms of probability; baye's rule; decision theory; computational learning theories; Basic Probability Notations; Forms of Learning; fuzzy logic.
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:

CO1: Understand the concepts of Artificial Intelligence, Problem characteristics, problem solving agents, production system and knowledge representation to solve AI problems.

CO2: Formulate Logical Agents, First-Order Logic and Inference in First-Order Logic to compute intelligent systems.

CO3: Apply knowledge representation using probabilistic and statistical reasoning, propositional theorems, reasoning theories and models to recommend advisory consultative situation.

CO4: Analyse artificial Intelligent Techniques, searching algorithms, strategies, problems, Propositional and first order Logic to infer solutions for Grammar Induction and implementation methodology problem.

CO5: Use statistical methods, distributions, genetic algorithms, learning and evolutionary strategies to optimize particle swarns problems.

MCA IV-SEMESTER
(19MC40110) CYBER SECURITY (Theory)
(Professional Elective-II)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES:
A course on Computer Networks.
COURSE DESCRIPTION:
Computer Security and threats, Browser Attacks, Security in the design of Operating Systems, Wireless Network Security, Intrusion Detection and Prevention Systems, Privacy Impacts of Emerging Technologies, Managing the incidents.
COURSE OUTCOMES:
After successful completion of this course, the student will be able to:

CO1: Understand the concepts of Threats, Harm, Vulnerabilities, Security in Operating Systems, Security Counter measures, Internet of things, Data Mining, Big Data and privacy concepts for providing Cyber Security.

CO2: Identify incidents of Economics, Electronic Voting and Cyber Warfare and privacy impacts of emerging techniques to identify the critical issues.

CO3: Apply security counter measures, intrusion detection and prevention techniques to provide Network Security.
CO4: Commit ethics of cyber regulations, responsibilities, and norms to manage incidents using privacy principles, policies, Cyber Welfare and International Laws to adapt in cyberspace.

MCA IV - SEMESTER
(19MC40111) SERVICE ORIENTED ARCHITECTURE (Theory)
(Professional Elective-II)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PRE-REQUISITES:
Courses on Software Engineering, Computer Networks and Web Programming.
COURSE DESCRIPTION:
XML document structure; Web Services; Principles of SOA; Service Layers; Simple Object Access Protocol (SOAP); Web Services Description Language (WSDL) and Building SOA-Based Applications.
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1: Understand the concepts of XML, Characteristics of SOA, Benefits of SOA, Principles of Service orientation and Service layers.
CO2: Design and develop modern softwares using XML parsers, WSDL and SOAP Web services.
CO3: Analyze XML Transformation, XSL Formatting, Service Oriented Analysis and Design, Service Modeling and guidelines to build XML and SOA based applications.
CO4: Commit to SOA standards to design service oriented web applications for an individual and society.

MCA IV - SEMESTER
(19MC4HS31) SOFT SKILLS LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	1.5

PRE-REQUISITES:--
COURSE DESCRIPTION:
Body Language; Assertiveness; Etiquette; Goal Setting; Thinking Skills; Interpersonal Skills; Team Building; Conflict Management; Technical Report Writing; Résumé Writing; Group Discussions; Interview Skills.

COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1: Demonstrate knowledge of career skills by examining and applying the styles and strategies of Goal Setting, Thinking Skills, and Etiquettes.

CO2: Analyze the limitations and possibilities of favorable situations by applying the skills of Body Language and demonstrate through Assertiveness and Interpersonal Skills.
CO3: Apply appropriate soft skills by analyzing the problem situations that arise in professional career through demonstrating remedies in Conflict Management.

CO4: Function effectively as an individual and as a member in diverse teams examining and applying soft skills in Interviews, Group Discussion and Team Building.

CO5: Communicate effectively applying appropriate writing and speaking techniques by examining and demonstrating knowledge through Technical Report Writing and Résumé Writing.

MCA IV- SEMESTER

(19MC40131) **OBJECT ORIENTED ANALYSIS AND DESIGN LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	1.5

PRE-REQUISITES:
A course on Object Oriented Analysis and Design.
COURSE DESCRIPTION:
Analyze specifications; Design Class Diagrams; Object Diagrams; Usecase Diagrams; Interaction Diagrams; Activity Diagrams; State Chart Diagrams; Component Diagrams; Deployment Diagrams.
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:

CO1: Analyze Library Management System, ATM Application, Online Bookshop, Railway Reservation System using design principles to annotate requirement specifications and Linguistic Analysis to design static and behavioral models.
CO2: Design and construct the Logical, Behavioral and Architectural model of an application using UML Tools (Visual Paradigm/ Rational Rose) for an Application Software.
CO3: Identify societal and environmental issues within local and global contexts relevant to analyze and design models for real time applications.
CO4: Work independently and in a team to solve problems with effective communication about various logical and behavioral objects of an Application.
CO5: Write and present a technical report/ document effectively.

MCA IV-SEMESTER
(16MC40132) **LINUX AND WEB PROGRAMMING LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	3	1.5

PRE-REQUISITES:
Courses on Linux Programming and Web Programming.
COURSE DESCRIPTION: HTML, Java Script**,** XML and Shell Script; Web Application Development using Servlets, Java Server Pages, PHP and JDBC; Tomcat Server and XAMP Server for Deploying Web Applications.
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:

CO1: Demonstrate LINUX operating system concepts and File, Text, Network, process and Backup utilities, awk, Bourne shell, HTML, DHTML, Java Script, AJAX programming and XML.
CO2: Design and develop client/server programs by using Sockets, RPC and web Applications using Dynamic HTML, XML technology, Servlets, JSP and PHP
CO3: Use the vi editor to execute commands and implement shell script and JSP and PHP technologies to implement E-Commerce applications.
CO4: Implement LINUX file APIs, process APIs and signal APIs in Linux operating system and directory structure of servlets and JSP to design web application.
CO5: Investigate and solve real time problems using Server-side technologies, Tomcat Server and XAMPP Server for deployment of web applications.
CO6: Commit to ethics to adapt JSP Standard Tag Libraries, PHP Standard Recommendation (PSR) and XML standards and extensions to develop web application.
CO7: Work independently or in a team to solve the problems with effective Communication.
CO8: Write and present a technical report/ document effectively.

Course Outcomes

(UG Programmes)

SREE VIDYANIKETHAN ENGINEERING COLLEGE

(AUTONOMOUS)

Sree Sainath Nagar, A.Rangampet – 517 102 (A.P.)

(AFFILIATED TO JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR, ANANTHAPURAMU)

Program: B.Tech. ELECTRONICS AND COMMUNICATION ENGINEERING

I B. Tech. - I Semester

(20BT1BS01) **DIFFERENTIAL EQUATIONS AND MULTIVARIABLE CALCULUS**

(Common to All Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: -

COURSE DESCRIPTION: Ordinary Differential Equations; Partial Differential Equations; Multivariable Calculus (Differentiation); Multivariable Calculus (Integration); Multivariable Calculus (Vector Calculus).

COURSE OUTCOMES: After successful completion of this course, the students will be able to:

CO1: Solve the higher order linear differential equations and identify solutions by analytical methods related to various engineering problems involving electrical circuits.

CO2: Formulate and solve partial differential equations for engineering problems.

CO3: Determine maxima and minima of functions of two variables and analyze their behaviour at extreme values.

CO4: Evaluate and apply multiple integrals to determine areas of plane curves.

CO5: Identify solenoidal and irrotational vector fields and apply vector integral theorems in evaluating areas and volumes.

I B. Tech. – I Semester

(20BT1BS03) ENGINEERING PHYSICS

(Common to EEE, ECE, EIE, CSE(AI) and CSE(DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: -

COURSE DESCRIPTION: Wave Optics; Electromagnetic Waves; Fiber Optics; Semiconductors; Optoelectronic Devices; Dielectrics; Magnetic materials; Superconductors and Nanomaterials.

COURSE OUTCOMES: After successful completion of this course, the students will be able to:

CO1: Apply the knowledge of light waves to interpret the concepts of Interference, Diffraction and Polarization.

CO2: Demonstrate the concepts of electromagnetic wave propagation in Optical fibers.

CO3: Apply the basic knowledge of semiconductors to understand the functioning of various optoelectronic devices.

CO4: Demonstrate the basic knowledge of dielectric and magnetic properties to understand the various dielectric polarizations and magnetic materials.

CO5: Understand the concepts of superconductors and nanomaterials to familiarize their applications in relevant fields.

I B. Tech. – I Semester

(20BT10201) **BASIC ELECTRICAL AND ELECTRONICS ENGINEERING**

(Common to ME, EEE, ECE, EIE, CSE, CSSE, IT, CSE(AI) and CSE(DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: -

COURSE DESCRIPTION: Principles of Electrical Systems; AC & DC Machines; Semiconductor Devices and Op-Amps.

COURSE OUTCOMES: After successful completion of this course, the students will be able to:

CO1: Analyze electrical circuits by applying the conceptual knowledge of circuit concepts.

CO2: Demonstrate knowledge on various generation technologies, protection devices, safety procedures and BEE standards.

CO3: Demonstrate knowledge on characteristics and applications of transformers and AC machines.

CO4: Demonstrate knowledge on characteristics and applications of diode, BJT and Op-amps.

I B. Tech. – I Semester

(20BT10341) **BASIC CIVIL AND MECHANICAL ENGINEERING**
(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: -

COURSE DESCRIPTION: Overview of Civil Engineering; Surveying, Civil Engineering Materials, Mechanics of Materials, Building Components, Civil Engineering Infrastructure; Overview of Basic Mechanical Engineering; Internal Combustion Engines and Turbines, Mechanical Power Transmission Systems, Manufacturing Processes, Machining Processes, Non-Conventional Machining.

COURSE OUTCOMES: After successful completion of this course, the students will be able to:

CO1: Apply the basic principles of civil engineering, Techniques and tools for analyzing civil structures and solve related problems.

CO2: Describe the working of principles of basic mechanical engineering and solve problems related to it.

I B. Tech. – I Semester

(20BT1BS32) **ENGINEERING PHYSICS LAB**
(Common to EEE, ECE, EIE, CSE(AI) and CSE(DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: -

COURSE DESCRIPTION: Estimation of thickness of the wire using wedge shape method; Wavelength of monochromatic light source by diffraction grating; Newton's ring method; numerical aperture and acceptance angle of optical fiber; Characteristics of p-n junction diode; Photodiode and LED; Experimental determination of carrier concentration and energy gap of a semiconductor material; Determination resistivity of semiconductor by Four probe method and magnetic field along axial line of a current carrying coil.

COURSE OUTCOMES: After successful completion of this course, the students will be able to:

CO1: Apply the basic knowledge of light waves and semiconductors to demonstrate the functioning of optoelectronic devices.

CO2: Understand the experimental procedures to calculate the thickness of a thin film, Hall coefficient, and acceptance angle of an optical fiber.

CO3: Determine the experimental values of magnetic field induction, wave length of a light source, energy gap of a semiconductor.

CO4: Apply skills to plot characteristic curves to determine the various parameters of semiconductor diodes.

CO5: Work independently and in teams to solve problems with effective communication.

I B. Tech. – I Semester

(20BT10231) **BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB**
(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: -

COURSE DESCREPTION: Practical investigations on Electrical circuits, AC Machines, Semiconductor Devices and Op-Amps.

COURSE OUTCOMES: After successful completion of this course, the students will be able to:

CO1: Analyze, measure, interpret and validate the practical observations by applying the fundamental knowledge of electrical circuits, machines and electronic devices.

CO2: Design Op-amp based amplifier, voltage summer and integrator circuits for desired specifications.

CO3: Work independently and in teams to solve problems with effective communication.

I B. Tech. – I Semester
(20BT10331) COMPUTER AIDED ENGINEERING DRAWING
(Common to CE, ME, EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	1	4	3

PRE-REQUISITES: **-**

COURSE DESCRIPTION: Engineering drawing conventions; Importance of engineering drawing; fundamental concepts of sketching; computer aided drafting and different types of projections of geometric entities (both 2D and 3D) through computer aided drafting packages.

COURSE OUTCOMES: After successful completion of this course, the students will be able to:

CO1: Apply the principles of engineering drawing, Methods and CAD tools to draw the Geometries, Curves and Orthographic projections used to communicate in engineering field.

CO2: Develop lateral surfaces of solids and draw Isometric views of given objects for engineering communication using principles of engineering drawing and CAD tools.

CO3: Work independently / in groups & communicate effectively in oral and written forms.

I B. Tech. – I Semester
(20BT10332) ENGINEERING WORKSHOP
(Common to CE, ME, EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: -

COURSE DESCRIPTION: Knowledge on various workshop hand and power tools; hands on experience in different manufacturing trades such as fitting, carpentry, sheet metal forming and foundry; Demonstration on dismantling and assembling of various two wheeler parts, power tools in machining and metal joining, basics of plumbing and working of 3D printer.

COURSE OUTCOMES: After successful completion of this course, the students will be able to:

CO1: Design and model various basic prototypes in the trade of fitting such as square/half round mating, V- mating and dovetail mating from the given MS work pieces using fitting tools.

CO2: Develop different prototypes in the carpentry trade such as cross lap joint, dovetail / bridle joints and Mortise and Tenon joint using carpentry tools.

CO3: Design and model different prototypes in the sheet metal forming trade such as rectangular tray, square vessel/cylinder, Funnel as per the dimensions using sheet metal forming tools.

CO4: Develop sand mould using single piece pattern and split piece pattern in the foundry trade using foundry tools.

CO5: Develop electric circuits for series and stair case connections.

CO6: Demonstrate the knowledge on power tools, plumbing operation, 3D printing technology involved in different engineering applications.

CO7: Work independently / in groups & communicate effectively in oral and written forms.

I B. Tech. - I Semester
(20BT1HSAC) SPOKEN ENGLISH
(Audit Course)
(Common to CE, ME, EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	2	-	-	-

PRE-REQUISITES: -

COURSE DESCRIPTION: Grammar; Functional English; Paragraph writing; Letter writing and Email writing.

COURSE OUTCOMES: After successful completion of this course, the students will be able to:

CO1: Demonstrate knowledge of grammar and vocabulary in writing effective formal letters and e-mails.

CO2: Communicate effectively by applying appropriate speaking and writing techniques by examining and applying functional English.

I B. Tech. - II semester

(20BT2BS01) **TRANSFORMATION TECHNIQUES AND LINEAR ALGEBRA**

(Common to All Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: -

COURSE DESCRIPTION: Fourier Series and Fourier Transforms; Laplace Transforms; Inverse Laplace Transforms; Linear Algebra-I (Matrices); Linear Algebra-II (Vector Spaces).

COURSE OUTCOMES: After successful completion of this course, the students will be able to:

CO1: Construct the Fourier series for periodic functions and demonstrate the use of Fourier series and Fourier transform to connect the frequency and time domain systems.

CO2: Solve initial and boundary value problems in engineering fields through Laplace Transform techniques.

CO3: Apply the matrix theory in solving system of linear equations and determine the Eigen values and Eigen vectors.

CO4: Demonstrate the knowledge of Linear Transformations to intelligent systems.

I B. Tech. - II Semester

(20BT1BS02) **ENGINEERING CHEMISTRY**

(Common to EEE, ECE, EIE, CSE(AI) and CSE(DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: -

COURSE DESCRIPTION: Water Treatment; Atomic Structure and Bonding Theories; Electrochemistry and Applications; Corrosion; Instrumental Methods and Applications; Fuel chemistry and Lubricants.

COURSE OUTCOMES: After successful completion of this course, the students will be able to:

CO1: Analyze and solve problems associated with hardness of water, boiler troubles and address the societal, health and safety issues related to quality of water.

CO2: Apply the basic knowledge of quantum mechanical approach to atomic structure and bonding theories to identify shapes of different molecules.

CO3: Apply the basic knowledge of corrosion phenomenon to identify solutions for control of corrosion and demonstrate competency in the basic concepts of electrochemical cells.

CO4: Demonstrate the basic knowledge of instrumental methods and their applications in the structural analysis of materials.

CO5: Apply the basic knowledge of fuel chemistry and lubricants to identify the quality of fuels and lubricants.

I B. Tech. - II Semester

(20BT1HS01) **COMMUNICATIVE ENGLISH**

(Common to CE, ME, EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: -

COURSE DESCRIPTION: Introduction to Communication; Active Listening; Effective Speaking; Reading and Technical Writing.

COURSE OUTCOMES: After successful completion of this course, the students will be able to:

CO1: Demonstrate knowledge of English language, examining and applying the aspects of Process of communication, Paralinguistic features, Skimming, Scanning, and Elements of style in writing.

CO2: Analyze the modes and techniques of listening, speaking, reading, writing and apply them appropriately to communicate effectively with the engineering community and society.

CO3: Apply reading and writing techniques in preparing documents by examining SQ3R Technique, Writer’s Block, and Précis Writing.

CO4: Communicate effectively in Conferences, Symposia, Seminars and in formal and real time situations by applying appropriate speaking techniques learnt by examining different communication styles used in similar contexts.

I B. Tech. - II Semester

(20BT20241) **NETWORK ANALYSIS**

(Common for ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: -

Basic electrical and Electronics Engineering and Basic electrical and Electronics Engineering Lab

COURSE DESCRIPTION:

Fundamentals of electrical circuits; Analysis of single phase AC circuits; Network theorems; Transient analysis and Two port networks.

COURSE OUTCOMES: After successful completion of this course, the students will be able to:

CO1: Analyze the electrical circuits by applying the networks reduction, node & mesh concepts and determine the electrical parameters for AC and DC excitations.

CO2: Analyze the single phase electrical circuits to investigate the response and determine the electrical parameters.

CO3: Analyze the electrical circuits by applying the network theorems and determine the electrical parameters for AC and DC excitations.

CO4: Analyze the transient response of electrical circuits for AC and DC excitations.

CO5: Evaluate two-port network parameters.

I B. Tech. – II Semester

(20BT20541) **PROGRAMMING IN C AND DATA STRUCTURES**

(Common to CE, ME, EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: A Course on Basic Mathematics

COURSE DESCRIPTION: Algorithms; Flowcharts; Introduction to C language; Operators and expressions; Input and output functions; Control statements; Arrays; Strings; Functions; Pointers; User-defined data types; Linked lists; Overview of data structures; Stack; Queue; Searching algorithms; Sorting algorithms.

COURSE OUTCOMES: After successful completion of this course, the students will be able to:

CO1: Develop flowcharts, algorithms for given problems.

CO2: Design algorithmic solutions by analyzing programming problems and using appropriate C language constructs.

CO3: Apply linear data structures such as arrays, linked lists, stacks, queues for efficient data organization and manipulation.

CO4: Select appropriate techniques for searching and sorting problems.

I B. Tech. - II Semester

(20BT1BS31) **ENGINEERING CHEMISTRY LAB**

(Common to EEE, ECE, EIE, CSE(AI) and CSE(DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: -

COURSE DESCRIPTION: Estimation of hardness ground water sample, alkalinity, dissolved oxygen of water samples, Iron, residual chlorine in drinking water and Strength of an acid in Pb-Acid battery by volumetric methods; Instrumental methods like conductivity meter, potentiometer, P^H meter and colorimeter; Measurement of viscosity of lubricants; and Determination of the influence of pH on metallic corrosion.

COURSE OUTCOMES: After successful completion of this course, the students will be able to:

CO1: Apply analytical skills for the quantitative estimation of materials through volumetric methods of analysis and address the societal, health issues related to quality of water.

CO2: Develop analytical skills for the quantitative estimation of materials through instrumental methods of analysis.

CO3: Work independently and in teams to solve problems with effective communication.

I B. Tech. - II Semester

(20BT1HS31) **COMMUNICATIVE ENGLISH LAB**

(Common to CE, ME, EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: -

COURSE DESCRIPTION: Just a Minute, Elocution/Impromptu; Phonetics; Vocabulary Building; Grammar; Giving Directions; Role Plays; Public Speaking; Letter Writing; Describing Objects; Listening Comprehension; Information Transfer and Reading Comprehension.

COURSE OUTCOMES: After successful completion of this course, the students will be able to:

CO1: Demonstrate knowledge of Phonetics by examining and applying sounds of English through Phonetics.

CO2: Analyze sentence structures by applying and demonstrating knowledge of Vocabulary and Grammar.

CO3: Apply appropriate listening and reading skills by analyzing the context, and demonstrate through listening comprehension and reading comprehension.

CO4: Function effectively as an individual and as a member in diverse teams examining and applying speaking skills in Just A Minute and Role Play.

CO5: Communicate effectively applying appropriate writing and speaking techniques by examining and demonstrating knowledge through Describing Objects, Information Transfer and Letter Writing in formal and real time situations.

I B. Tech. – II Semester

(20BT20551) **PROGRAMMING IN C AND DATA STRUCTURES LAB**

(Common to CE, ME, EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: A course on "Programming in C and Data Structures"

COURSE DESCRIPTION: Hands on practice in developing and executing simple programs using C Programming constructs – Control statements, Arrays, Strings, Functions, Pointers, Structures, Single linked lists, Stack, Queue, Searching and Sorting.

COURSE OUTCOMES: After successful completion of this course, the students will be able to:

CO1: Design algorithmic solutions by analyzing programming problems and using appropriate C language constructs.

CO2: Implement linear data structures such as arrays, linked lists, stacks, queues for efficient data organization and manipulation.

CO3: Select appropriate techniques for searching and sorting problems.

CO4: Work independently and communicate effectively in oral and written forms.

I B. Tech. - II Semester

(20BT1MC01) **UNIVERSAL HUMAN VALUES**

(Mandatory Course)

(Common to CE, ME, EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	-	30	2	-	-	-

PRE-REQUISITES: -

COURSE DESCRIPTION: Process for Value Education; Harmony in the Human Being - Harmony in Myself!; Harmony in Family and Society- Human Relationship; Harmony in the Nature and Existence – Coexistence; Implications of Holistic Understanding of Harmony on Professional Ethics.

COURSE OUTCOMES: After successful completion of this course, the students will be able to:

CO1: Understand Values and skills for sustained happiness and prosperity.

CO2: Analyse realistic implications of a Holistic understanding of ethical human conduct, trustful and mutually fulfilling human behaviour.

CO3: Apply holistic approach in personal life and profession through a positive understanding of the Human reality and existence.

Program: B.Tech. ELECTRICAL AND ELECTRONICS ENGINEERING

I B. Tech. - I Semester

(20BT1BS01) **DIFFERENTIAL EQUATIONS AND MULTIVARIABLE CALCULUS**
(Common to: All branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE REQUISITE: -
COURSE DESCRIPTION: Ordinary Differential Equations; Partial Differential Equations; Multivariable Calculus (Differentiation); Multivariable Calculus (Integration); Multivariable Calculus (Vector Calculus).
COURSE OUTCOMES: After successful completion of this course, the students will be able to:

CO1. Solve the higher order linear differential equations and identify solutions by analytical methods related to various engineering problems involving electrical circuits.
CO2. Formulate and solve partial differential equations for engineering problems.
CO3. Determine maxima and minima of functions of two variables and analyze their behaviour at extreme values.
CO4. Evaluate and apply multiple integrals to determine areas of plane curves.
CO5. Identify solenoidal and irrotational vector fields and apply vector integral theorems in evaluating areas and volumes.

I B. Tech. – I Semester

(20BT1BS03) **ENGINEERING PHYSICS**
Common to: ECE, EEE, EIE, CSE(AI) CSE(DS) and CSE(AI&ML)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Wave Optics; Electromagnetic Waves; Fiber Optics; Semiconductors; Optoelectronic Devices; Dielectrics; Magnetic materials; Superconductors and Nanomaterials.
COURSE OUTCOMES: After successful completion of this course, the students will be able to:

CO6: Apply the knowledge of light waves to interpret the concepts of Interference, Diffraction and Polarization.
CO7: Demonstrate the concepts of electromagnetic wave propagation in Optical fibers.
CO8: Apply the basic knowledge of semiconductors to understand the functioning of various optoelectronic devices.
CO9: Demonstrate the basic knowledge of dielectric and magnetic properties to understand the various dielectric polarizations and magnetic materials.
CO10: Understand the concepts of superconductors and nanomaterials to familiarize their applications in relevant fields.

I B. Tech. – I Semester

(20BT10201) **BASIC ELECTRICAL AND ELECTRONICS ENGINEERING**
Common to: ME, ECE, EEE, EIE, CSE, CSSE, IT, CSE(AI), CSE(DS), CSE(AI&ML), CSE(IOT), CS&D and CSE(CS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Principles of Electrical Systems; AC & DC Machines; Semiconductor Devices and Op-Amps.
COURSE OUTCOMES: After successful completion of this course, the students will be able to:

CO1: Analyze electrical circuits by applying the conceptual knowledge of circuit concepts.
CO2: Demonstrate knowledge on various generation technologies, protection devices, safety procedures and BEE standards.
CO3: Demonstrate knowledge on characteristics and applications of transformers and AC machines.
CO4: Demonstrate knowledge on characteristics and applications of diode, BJT and Op-amps.

I B.Tech. – I Semester
(20BT10341) **BASIC CIVIL AND MECHANICAL ENGINEERING**
(Common to: ECE, EEE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Overview of Civil Engineering; Surveying, Civil Engineering Materials, Mechanics of Materials, Building Components, Civil Engineering Infrastructure; Overview of Basic Mechanical Engineering; Internal Combustion Engines and Turbines, Mechanical Power Transmission Systems, Manufacturing Processes, Machining Processes, Non-Conventional Machining.
COURSE OUTCOMES: After successful completion of this course, the students will be able to:
CO1: Apply the basic principles of civil engineering, Techniques and tools for analysing civil structures and solve related problems.
CO2: Describe the working of principles of basic mechanical engineering and solve problems related to it.

I B. Tech. – I Semester
(20BT1BS32) **ENGINEERING PHYSICS LAB**
(Common to: ECE, EEE, EIE, CSE(AI), CSE(DS) and CSE(AI&ML))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE REQUISITE: -
COURSE DESCRIPTION: Estimation of thickness of the wire using wedge shape method; Wavelength of monochromatic light source by diffraction grating; Newton's ring method; numerical aperture and acceptance angle of optical fiber; Characteristics of p-n junction diode; Photodiode and LED; Experimental determination of carrier concentration and energy gap of a semiconductor material; Determination resistivity of semiconductor by Four probe method and magnetic field along axial line of a current carrying coil.
COURSE OUTCOMES: After successful completion of this course, the students will be able to:
CO1: apply the basic knowledge of light waves and semiconductors to demonstrate the functioning of optoelectronic devices.
CO2: understand the experimental procedures to calculate the thickness of a thin film, Hall coefficient, and acceptance angle of an optical fiber.
CO3: determine the experimental values of magnetic field induction, wave length of a light source, energy gap of a semiconductor.
CO4: apply skills to plot characteristic curves to determine the various parameters of semiconductor diodes.
CO5: work independently or in teams to solve problems with effective communication.

I B. Tech. – I Semester
(20BT10231) **BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB**
(Common to: ECE, EEE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: -
COURSE DESCREPTION: Practical investigations on Electrical circuits, AC Machines, Semiconductor Devices and Op-Amps.
COURSE OUTCOMES: After successful completion of this course, the students will be able to:
CO1: Analyze, measure, interpret and validate the practical observations by applying the fundamental knowledge of electrical circuits, machines and electronic devices.
CO2: Design Op-amp based amplifier, voltage summer and integrator circuits for desired specifications.
CO3: Work independently or in teams to solve problems with effective communication.

I B. Tech. – I Semester
(20BT10331) **COMPUTER AIDED ENGINEERING DRAWING**
(Common to: CE, ME, ECE, EEE, EIE, CSE(IOT) and CS&D)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	1	4	3

PRE-REQUISITES: **-**
COURSE DESCRIPTION: Engineering drawing conventions; Importance of engineering drawing; fundamental concepts of sketching; computer aided drafting and different types of projections of geometric entities (both 2D and 3D) through computer aided drafting packages.
COURSE OUTCOMES: After successful completion of this course, the students will be able to:
CO1: Apply the principles of engineering drawing, Methods and CAD tools to draw the Geometries, Curves and Orthographic projections used to communicate in engineering field.
CO2: Develop lateral surfaces of solids and draw Isometric views of given objects for engineering communication using principles of engineering drawing and CAD tools.
CO3: Work independently or in teams to solve problems with effective communication.

I B. Tech. – I Semester
(20BT10332) **ENGINEERING WORKSHOP**
(Common to: CE, ME, ECE, EEE, EIE, CSE(IOT) and CS&D)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: -
COURSE DESCRIPTION: Knowledge on various workshop hand and power tools; hands on experience in different manufacturing trades such as fitting, carpentry, sheet metal forming and foundry; Demonstration on dismantling and assembling of various two wheeler parts, power tools in machining and metal joining, basics of plumbing and working of 3D printer.
COURSE OUTCOMES: After successful completion of this course, the students will be able to:
CO1: Design and model various basic prototypes in the trade of fitting such as square/half round mating, V- mating and dovetail mating from the given MS work pieces using fitting tools.
CO2: Develop different prototypes in the carpentry trade such as cross lap joint, dovetail / bridle joints and Mortise and Tenon joint using carpentry tools.
CO3: Design and model different prototypes in the sheet metal forming trade such as rectangular tray, square vessel/cylinder, Funnel as per the dimensions using sheet metal forming tools.
CO4: Develop sand mould using single piece pattern and split piece pattern in the foundry trade using foundry tools.
CO5: Develop electric circuits for series and stair case connections.
CO6: Demonstrate the knowledge on power tools, plumbing operation, 3D printing technology involved in different engineering applications.
CO7: Work independently or in teams to solve problems with effective communication.

I B. Tech. - I Semester
(20BT1HSAC) **SPOKEN ENGLISH**
(Audit Course)
(Common to: CE, ME, ECE, EEE, EIE, CSE(IOT) and CS&D)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	2	-	-	-

PRE-REQUISITES: -
COURSE DESCRIPTION: Grammar; Functional English; Paragraph writing; Letter writing and Email writing.
COURSE OUTCOMES: After successful completion of this course, the students will be able to:
CO1: Demonstrate knowledge of grammar and vocabulary in writing effective formal letters and e-mails.
CO2: Communicate effectively by applying appropriate speaking and writing techniques by examining and applying functional English.

I B. Tech. - II semester
(20BT2BS01)**TRANSFORMATION TECHNIQUES AND LINEAR ALGEBRA**
(Common to: All branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITE: -
COURSE DESCRIPTION: Fourier Series and Fourier Transforms; Laplace Transforms; Inverse Laplace Transforms; Linear Algebra-I (Matrices); Linear Algebra-II (Vector Spaces).
COURSE OUTCOMES: After successful completion of this course, the students will be able to:
CO1. Construct the Fourier series for periodic functions and demonstrate the use of Fourier series and Fourier transform to connect the frequency and time domain systems.
CO2. Solve initial and boundary value problems in engineering fields through Laplace Transform techniques.
CO3. Apply the matrix theory in solving system of linear equations and determine the Eigen values and Eigen vectors.
CO4. Demonstrate the knowledge of Linear Transformations to intelligent systems.

I B. Tech. - II Semester
(20BT1BS02) **ENGINEERING CHEMISTRY**
(Common to: ECE, EEE, EIE CSE(AI), CSE(DS) and CSE(AI&ML))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE REQUISITE: -
COURSE DESCRIPTION: Water Treatment; Atomic Structure and Bonding Theories; Electrochemistry and Applications; Corrosion; Instrumental Methods and Applications; Fuel chemistry and Lubricants.
COURSE OUTCOMES: After successful completion of this course, the students will be able to:
CO1: Analyze and solve problems associated with hardness of water, boiler troubles and address the societal, health and safety issues related to quality of water.
CO2: Apply the basic knowledge of quantum mechanical approach to atomic structure and bonding theories to identify shapes of different molecules.
CO3: Apply the basic knowledge of corrosion phenomenon to identify solutions for control of corrosion and demonstrate competency in the basic concepts of electrochemical cells.
CO4: Demonstrate the basic knowledge of instrumental methods and their applications in the structural analysis of materials.
CO5: Apply the basic knowledge of fuel chemistry and lubricants to identify the quality of fuels and lubricants.

I B. Tech. - II Semester
(20BT1HS01)**COMMUNICATIVE ENGLISH**
(Common to: CE, ME, ECE, EEE, EIE, CSE(IOT) and CS&D)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Introduction to Communication; Active Listening; Effective Speaking; Reading and Technical Writing.
COURSE OUTCOMES: After successful completion of this course, the students will be able to:
CO1: Demonstrate knowledge of English language, examining and applying the aspects of Process of communication, Paralinguistic features, Skimming, Scanning, and Elements of style in writing.
CO2: Analyze the modes and techniques of listening, speaking, reading, writing and apply them appropriately to communicate effectively with the engineering community and society.
CO3: Apply reading and writing techniques in preparing documents by examining SQ3R Technique, Writer’s Block, and Précis Writing.
CO4: Communicate effectively in Conferences, Symposia, Seminars and in formal and real time situations by applying appropriate speaking techniques learnt by examining different communication styles used in similar contexts.

I B. Tech. – II Semester
(20BT20201) **ELECTRIC CIRCUITS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: A course on Basic electrical and Electronics Engineering**.**
COURSE DESCRIPTION: Circuit reduction and analyzing techniques; Analysis of single and poly phase circuits; Circuit theorems; Magnetic and coupled magnetic circuits.
COURSE OUTCOMES: After successful completion of this course, the students will be able to:
CO1. analyze the electrical circuits by applying the principles of network reduction techniques, mesh and nodal analysis.
CO2. analyze the single phase circuits to investigate the response and to determine various electrical quantities.
CO3. analyze various electrical circuits, by applying circuit theorems to determine various electrical quantities.
CO4. analyze 3-phase circuits to investigate the response and to determine various electrical quantities.
CO5. analyze magnetic circuits, coupled circuits by applying the principles of electromagnetism and determine various parameters.

I B. Tech. – II Semester
(20BT20541) **PROGRAMMING IN C AND DATA STRUCTURES**
(Common to: CE, ME, ECE, EEE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: A Course on Basic Mathematics.
COURSE DESCRIPTION: Algorithms; Flowcharts; Introduction to C language; Operators and expressions; Input and output functions; Control statements; Arrays; Strings; Functions; Pointers; User-defined data types; Linked lists; Overview of data structures; Stack; Queue; Searching algorithms; Sorting algorithms.
COURSE OUTCOMES: After successful completion of this course, the students will be able to:
CO1: Develop flowcharts, algorithms for given problems.
CO2: Design algorithmic solutions by analysing programming problems and using appropriate C language constructs.
CO3: Apply linear data structures such as arrays, linked lists, stacks, queues for efficient data organization and manipulation.
CO4: Select appropriate techniques for searching and sorting problems.

I B. Tech. - II Semester
(20BT1BS31) **ENGINEERING CHEMISTRY LAB**
(Common to: ECE, EEE, EIE CSE(AI), CSE(DS) and CSE(AI&ML))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE REQUISITE: -
COURSE DESCRIPTION: Estimation of hardness ground water sample, alkalinity, dissolved oxygen of water samples, Iron, residual chlorine in drinking water and Strength of an acid in Pb-Acid battery by volumetric methods; Instrumental methods like conductivity meter, potentiometer, P^H meter and colorimeter; Measurement of viscosity of lubricants; and Determination of the influence of pH on metallic corrosion.
COURSE OUTCOMES: After successful completion of this course, the students will be able to:
CO1: Apply analytical skills for the quantitative estimation of materials through volumetric methods of analysis and address the societal, health issues related to quality of water.
CO2: Develop analytical skills for the quantitative estimation of materials through instrumental methods of analysis.
CO3: Work independently or in teams to solve problems with effective communication.

I B. Tech. - II Semester
(20BT1HS31)**COMMUNICATIVE ENGLISH LAB**
(Common to: CE, ME, ECE, EEE, EIE, CSE(IOT) and CS&D)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE REQUISITE: -
COURSE DESCRIPTION: Just a Minute, Elocution/Impromptu; Phonetics; Vocabulary Building; Grammar; Giving Directions; Role Plays; Public Speaking; Letter Writing; Describing Objects; Listening Comprehension; Information Transfer and Reading Comprehension.
COURSE OUTCOMES: After successful completion of this course, the students will be able to:
CO1: Demonstrate knowledge of Phonetics by examining and applying sounds of English through Phonetics.
CO2: Analyze sentence structures by applying and demonstrating knowledge of Vocabulary and Grammar.
CO3: Apply appropriate listening and reading skills by analyzing the context, and demonstrate through listening comprehension and reading comprehension.
CO4: Function effectively as an individual and as a member in diverse teams examining and applying speaking skills in Just A Minute and Role Play.
CO5: Communicate effectively applying appropriate writing and speaking techniques by examining and demonstrating knowledge through Describing Objects, Information Transfer and Letter Writing in formal and real time situations.

I B. Tech. – II Semester
(20BT20551) PROGRAMMING IN C AND DATA STRUCTURES LAB
(Common to: CE, ME, ECE, EEE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: A course on Programming in C and Data Structures.
COURSE DESCRIPTION: Hands on practice in developing and executing simple programs using C Programming constructs – Control statements, Arrays, Strings, Functions, Pointers, Structures, Single linked lists, Stack, Queue, Searching and Sorting.
COURSE OUTCOMES: After successful completion of this course, the students will be able to:
CO1: Design algorithmic solutions by analyzing programming problems and using appropriate C language constructs.
CO2: Implement linear data structures such as arrays, linked lists, stacks, queues for efficient data organization and manipulation.
CO3: Select appropriate techniques for searching and sorting problems.
CO4: Work independently or in teams to solve problems with effective communication.

I B. Tech. - II Semester
(20BT1MC01) **UNIVERSAL HUMAN VALUES**
(Mandatory Course)
(Common to: CE, ME, ECE, EEE, EIE, CSE(IOT) and CS&D)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	-	30	2	-	-	-

PRE-REQUISITES: -
COURSE DESCRIPTION: Process for Value Education; Harmony in the Human Being - Harmony in Myself!; Harmony in Family and Society- Human Relationship; Harmony in the Nature and Existence – Coexistence; Implications of Holistic Understanding of Harmony on Professional Ethics.
COURSE OUTCOMES: After successful completion of this course, the students will be able to:
CO1: Understand Values and skills for sustained happiness and prosperity.
CO2: Analyse realistic implications of a Holistic understanding of ethical human conduct, trustful and mutually fulfilling human behaviour.
CO3: Apply holistic approach in personal life and profession through a positive understanding of the Human reality and existence.

Program: B.Tech. ELECTRONICS AND INSTRUMENTATION ENGINEERING

I B. Tech. - I Semester
(20BT1BS01) DIFFERENTIAL EQUATIONS AND MULTIVARIABLE CALCULUS
(Common to All Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE REQUISITE: -

COURSE DESCRIPTION: Ordinary Differential Equations; Partial Differential Equations; Multivariable Calculus (Differentiation); Multivariable Calculus (Integration); Multivariable Calculus (Vector Calculus).

COURSE OUTCOMES: After successful completion of this course, the students will be able to:

CO1. Solve the higher order linear differential equations and identify solutions by analytical methods related to various engineering problems involving electrical circuits.

CO2. Formulate and solve partial differential equations for engineering problems.

CO3. Determine maxima and minima of functions of two variables and analyze their behaviour at extreme values.

CO4. Evaluate and apply multiple integrals to determine areas of plane curves.

CO5. Identify solenoidal and irrotational vector fields and apply vector integral theorems in evaluating areas and volumes.

I B. Tech. – I Semester
(20BT1BS03) ENGINEERING PHYSICS
(Common to ECE, EEE, EIE, CSE(AI), CSE(DS) and CSE(AI&ML))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: -

COURSE DESCRIPTION: Wave Optics; Electromagnetic Waves; Fiber Optics; Semiconductors; Optoelectronic Devices; Dielectrics; Magnetic materials; Superconductors and Nanomaterials.

COURSE OUTCOMES: After successful completion of this course, the students will be able to:

CO1: Apply the knowledge of light waves to interpret the concepts of Interference, Diffraction and Polarization.

CO2: Demonstrate the concepts of electromagnetic wave propagation in Optical fibers.

CO3: Apply the basic knowledge of semiconductors to understand the functioning of various optoelectronic devices.

CO4: Demonstrate the basic knowledge of dielectric and magnetic properties to understand the various dielectric polarizations and magnetic materials.

CO5: Understand the concepts of superconductors and nanomaterials to familiarize their applications in relevant fields.

I B. Tech. – I Semester
(20BT10201) BASIC ELECTRICAL AND ELECTRONICS ENGINEERING
(Common to ME, ECE, EEE, EIE, CSE, CSSE, IT, CSE(AI), CSE(DS), CSE(AI&ML), CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: -

COURSE DESCRIPTION: Principles of Electrical Systems; AC & DC Machines; Semiconductor Devices and Op-Amps.

COURSE OUTCOMES: After successful completion of this course, the students will be able to:

CO1: Analyze electrical circuits by applying the conceptual knowledge of circuit concepts.

CO2: Demonstrate knowledge on various generation technologies, protection devices, safety procedures and BEE standards.

CO3: Demonstrate knowledge on characteristics and applications of transformers and AC machines.

CO4: Demonstrate knowledge on characteristics and applications of diode, BJT and Op-amps.

I B. Tech. – I Semester

(20BT10341) BASIC CIVIL AND MECHANICAL ENGINEERING

(Common to ECE, EEE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: -

COURSE DESCRIPTION: Overview of Civil Engineering; Surveying, Civil Engineering Materials, Mechanics of Materials, Building Components, Civil Engineering Infrastructure; Overview of Basic Mechanical Engineering; Internal Combustion Engines and Turbines, Mechanical Power Transmission Systems, Manufacturing Processes, Machining Processes, Non-Conventional Machining.

COURSE OUTCOMES: After successful completion of this course, the students will be able to

CO1: Apply the basic principles of civil engineering, Techniques and tools for analyzing civil structures and solve related problems.

CO2: Describe the working of principles of basic mechanical engineering and solve problems related to it.

I B. Tech. – I Semester

(20BT1BS32) ENGINEERING PHYSICS LAB

(Common to ECE, EEE, EIE, CSE(AI), CSE(DS) and CSE(AI&ML))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE REQUISITE: -

COURSE DESCRIPTION: Estimation of thickness of the wire using wedge shape method; Wavelength of monochromatic light source by diffraction grating; Newton's ring method; numerical aperture and acceptance angle of optical fiber; Characteristics of p-n junction diode; Photodiode and LED; Experimental determination of carrier concentration and energy gap of a semiconductor material; Determination resistivity of semiconductor by Four probe method and magnetic field along axial line of a current carrying coil.

COURSE OUTCOMES: After successful completion of this course, the students will be able to:

CO1: Apply the basic knowledge of light waves and semiconductors to demonstrate the functioning of optoelectronic devices.

CO2: Understand the experimental procedures to calculate the thickness of a thin film, Hall coefficient, and acceptance angle of an optical fiber.

CO3: Determine the experimental values of magnetic field induction, wave length of a light source, energy gap of a semiconductor.

CO4: Apply skills to plot characteristic curves to determine the various parameters of semiconductor diodes.

CO5: Work independently and in teams to solve problems with effective communication.

I B. Tech. – I Semester

(20BT10231) BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB

(Common to ECE, EEE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: --

COURSE DESCREPTION: Practical investigations on Electrical circuits, AC Machines, Semiconductor Devices and Op-Amps.

COURSE OUTCOMES: After successful completion of this course, the students will be able to:

CO1: Analyze, measure, interpret and validate the practical observations by applying the fundamental knowledge of electrical circuits, machines and electronic devices.

CO2: Design Op-amp based amplifier, voltage summer and integrator circuits for desired specifications.

CO3: Work independently and in teams to solve problems with effective communication.

I B. Tech. – I Semester
(20BT10331) COMPUTER AIDED ENGINEERING DRAWING
(Common to CE, ME, ECE, EEE, EIE, CSE(IOT) and CS&D)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	1	4	3

PRE-REQUISITES: **-**
COURSE DESCRIPTION: Engineering drawing conventions; Importance of engineering drawing; fundamental concepts of sketching; computer aided drafting and different types of projections of geometric entities (both 2D and 3D) through computer aided drafting packages.
COURSE OUTCOMES: After successful completion of this course, the students will be able to:
CO1: Apply the principles of engineering drawing, Methods and CAD tools to draw the Geometries, Curves and Orthographic projections used to communicate in engineering field.
CO2: Develop lateral surfaces of solids and draw Isometric views of given objects for engineering communication using principles of engineering drawing and CAD tools.
CO3: Work independently / in groups & communicate effectively in oral and written forms.

I B. Tech. – I Semester
(20BT10332) ENGINEERING WORKSHOP
(Common to CE, ME, ECE, EEE, EIE, CSE(IOT) and CS&D)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: -
COURSE DESCRIPTION: Knowledge on various workshop hand and power tools; hands on experience in different manufacturing trades such as fitting, carpentry, sheet metal forming and foundry; Demonstration on dismantling and assembling of various two wheeler parts, power tools in machining and metal joining, basics of plumbing and working of 3D printer.
COURSE OUTCOMES: After successful completion of this course, the students will be able to:
CO1: Design and model various basic prototypes in the trade of fitting such as square/half round mating, V- mating and dovetail mating from the given MS work pieces using fitting tools.
CO2: Develop different prototypes in the carpentry trade such as cross lap joint, dovetail / bridle joints and Mortise and Tenon joint using carpentry tools.
CO3: Design and model different prototypes in the sheet metal forming trade such as rectangular tray, square vessel/cylinder, Funnel as per the dimensions using sheet metal forming tools.
CO4: Develop sand mould using single piece pattern and split piece pattern in the foundry trade using foundry tools.
CO5: Develop electric circuits for series and stair case connections.
CO6: Demonstrate the knowledge on power tools, plumbing operation, 3D printing technology involved in different engineering applications.
CO7: Work independently / in groups & communicate effectively in oral and written forms.

I B. Tech. - I Semester
(20BT1HSAC) SPOKEN ENGLISH
(Audit Course)
(Common to CE, ME, ECE, EEE, EIE, CSE(IOT) and CS&D)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	2	-	-	-

PRE-REQUISITES: -
COURSE DESCRIPTION: Grammar; Functional English; Paragraph writing; Letter writing and Email writing.
COURSE OUTCOMES: After successful completion of this course, the students will be able to:
CO1: Demonstrate knowledge of grammar and vocabulary in writing effective formal letters and e-mails.
CO2: Communicate effectively by applying appropriate speaking and writing techniques by examining and applying functional English.

I B. Tech. - II semester

(20BT2BS01) TRANSFORMATION TECHNIQUES AND LINEAR ALGEBRA

(Common to All Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITE: -

COURSE DESCRIPTION: Fourier Series and Fourier Transforms; Laplace Transforms; Inverse Laplace Transforms; Linear Algebra-I (Matrices); Linear Algebra-II (Vector Spaces).

COURSE OUTCOMES: After successful completion of this course, the students will be able to:

CO1. Construct the Fourier series for periodic functions and demonstrate the use of Fourier series and Fourier transform to connect the frequency and time domain systems.

CO2. Solve initial and boundary value problems in engineering fields through Laplace Transform techniques.

CO3. Apply the matrix theory in solving system of linear equations and determine the Eigen values and Eigen vectors.

CO4. Demonstrate the knowledge of Linear Transformations to intelligent systems.

I B. Tech. - II Semester

(20BT1BS02) ENGINEERING CHEMISTRY

(Common to ECE, EEE, EIE, CSE(AI), CSE(DS) and CSE(AI&ML))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE REQUISITE: -

COURSE DESCRIPTION: Water Treatment; Atomic Structure and Bonding Theories; Electrochemistry and Applications; Corrosion; Instrumental Methods and Applications; Fuel chemistry and Lubricants.

COURSE OUTCOMES: After successful completion of this course, the students will be able to:

CO1: Analyze and solve problems associated with hardness of water, boiler troubles and address the societal, health and safety issues related to quality of water.

CO2: Apply the basic knowledge of quantum mechanical approach to atomic structure and bonding theories to identify shapes of different molecules.

CO3: Apply the basic knowledge of corrosion phenomenon to identify solutions for control of corrosion and demonstrate competency in the basic concepts of electrochemical cells.

CO4: Demonstrate the basic knowledge of instrumental methods and their applications in the structural analysis of materials.

CO5: Apply the basic knowledge of fuel chemistry and lubricants to identify the quality of fuels and lubricants.

I B. Tech. - II Semester

(20BT1HS01) COMMUNICATIVE ENGLISH

(Common to CE, ME, ECE, EEE, EIE, CSE(IOT) and CS&D)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: -

COURSE DESCRIPTION: Introduction to Communication; Active Listening; Effective Speaking; Reading and Technical Writing.

COURSE OUTCOMES: After successful completion of this course, students will be able to:

CO1: Demonstrate knowledge of English language, examining and applying the aspects of Process of communication, Paralinguistic features, Skimming, Scanning, and Elements of style in writing.

CO2: Analyze the modes and techniques of listening, speaking, reading, writing and apply them appropriately to communicate effectively with the engineering community and society.

CO3: Apply reading and writing techniques in preparing documents by examining SQ3R Technique, Writer’s Block, and Précis Writing.

CO4: Communicate effectively in Conferences, Symposia, Seminars and in formal and real time situations by applying appropriate speaking techniques learnt by examining different communication styles used in similar contexts.

I B. Tech. – II Semester
(20BT20241) NETWORK ANALYSIS
(Common for ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: Basic electrical and Electronics Engineering and Basic electrical and Electronics Engineering Lab

COURSE DESCRIPTION: Fundamentals of electrical circuits; Analysis of single phase AC circuits; Network theorems; Transient analysis and Two port networks.

COURSE OUTCOMES: After successful completion of this course, the students will be able to:

CO1: Analyze the electrical circuits by applying the networks reduction, node & mesh concepts and determine the electrical parameters for AC and DC excitations.

CO2: Analyze the single phase electrical circuits to investigate the response and determine the electrical parameters.

CO3: Analyze the electrical circuits by applying the network theorems and determine the electrical parameters for AC and DC excitations.

CO4: Analyze the transient response of electrical circuits for AC and DC excitations.

CO5: Evaluate two-port network parameters.

I B. Tech. – II Semester
(20BT20541) PROGRAMMING IN C AND DATA STRUCTURES
(Common to CE, ME, ECE, EEE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: A Course on Basic Mathematics

COURSE DESCRIPTION: Algorithms; Flowcharts; Introduction to C language; Operators and expressions; Input and output functions; Control statements; Arrays; Strings; Functions; Pointers; User-defined data types; Linked lists; Overview of data structures; Stack; Queue; Searching algorithms; Sorting algorithms.

COURSE OUTCOMES: After successful completion of this course, the students will be able to:

CO1: Develop flowcharts, algorithms for given problems.

CO2: Design algorithmic solutions by analyzing programming problems and using appropriate C language constructs.

CO3: Apply linear data structures such as arrays, linked lists, stacks, queues for efficient data organization and manipulation.

CO4: Select appropriate techniques for searching and sorting problems.

I B. Tech. - II Semester
(20BT1BS31) ENGINEERING CHEMISTRY LAB
(Common to ECE, EEE, EIE, CSE(AI), CSE(DS) and CSE(AI&ML))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE REQUISITE: -

COURSE DESCRIPTION: Estimation of hardness ground water sample, alkalinity, dissolved oxygen of water samples, Iron, residual chlorine in drinking water and Strength of an acid in Pb-Acid battery by volumetric methods; Instrumental methods like conductivity meter, potentiometer, P^H meter and colorimeter; Measurement of viscosity of lubricants; and Determination of the influence of pH on metallic corrosion.

COURSE OUTCOMES: After successful completion of this course, the students will be able to:

CO1: Apply analytical skills for the quantitative estimation of materials through volumetric methods of analysis and address the societal, health issues related to quality of water.

CO2: Develop analytical skills for the quantitative estimation of materials through instrumental methods of analysis.

CO3: Work independently and in teams to solve problems with effective communication.

I B. Tech. - II Semester
(20BT1HS31) COMMUNICATIVE ENGLISH LAB
(Common to CE, ME, ECE, EEE, EIE, CSE(IOT) and CS&D)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE REQUISITE: -
COURSE DESCRIPTION: Just a Minute, Elocution/Impromptu; Phonetics; Vocabulary Building; Grammar; Giving Directions; Role Plays; Public Speaking; Letter Writing; Describing Objects; Listening Comprehension; Information Transfer and Reading Comprehension.
COURSE OUTCOMES: After successful completion of this course, students will be able to:
CO1: Demonstrate knowledge of Phonetics by examining and applying sounds of English through Phonetics.
CO2: Analyze sentence structures by applying and demonstrating knowledge of Vocabulary and Grammar.
CO3: Apply appropriate listening and reading skills by analyzing the context, and demonstrate through listening comprehension and reading comprehension.
CO4: Function effectively as an individual and as a member in diverse teams examining and applying speaking skills in Just A Minute and Role Play.
CO5: Communicate effectively applying appropriate writing and speaking techniques by examining and demonstrating knowledge through Describing Objects, Information Transfer and Letter Writing in formal and real time situations.

I B. Tech. – II Semester
(20BT20551) PROGRAMMING IN C AND DATA STRUCTURES LAB
(Common to CE, ME, ECE, EEE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: A course on "Programming in C and Data Structures"
COURSE DESCRIPTION: Hands on practice in developing and executing simple programs using C Programming constructs – Control statements, Arrays, Strings, Functions, Pointers, Structures, Single linked lists, Stack, Queue, Searching and Sorting.
COURSE OUTCOMES:
After successful completion of this course, the students will be able to:
CO1: Design algorithmic solutions by analyzing programming problems and using appropriate C language constructs.
CO2: Implement linear data structures such as arrays, linked lists, stacks, queues for efficient data organization and manipulation.
CO3: Select appropriate techniques for searching and sorting problems.
CO4: Work independently and communicate effectively in oral and written forms.

I B. Tech. - II Semester
(20BT1MC01) UNIVERSAL HUMAN VALUES
(Mandatory Course)
(Common to CE, ME, ECE, EEE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	-	30	2	-	-	-

PRE-REQUISITES: -
COURSE DESCRIPTION: Process for Value Education; Harmony in the Human Being - Harmony in Myself!; Harmony in Family and Society- Human Relationship; Harmony in the Nature and Existence – Coexistence; Implications of Holistic Understanding of Harmony on Professional Ethics.
COURSE OUTCOMES: After successful completion of this course, the students will be able to:
CO1: Understand Values and skills for sustained happiness and prosperity.
CO2: Analyse realistic implications of a Holistic understanding of ethical human conduct, trustful and mutually fulfilling human behaviour.
CO3: Apply holistic approach in personal life and profession through a positive understanding of the Human reality and existence.

Program: B.Tech. COMPUTER SCIENCE AND ENGINEERING

I B. Tech. – I Semester
(20BT1BS01) DIFFERENTIAL EQUATIONS AND MULTIVARIABLE CALCULUS
(Common to All Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: --
COURSE DESCRIPTION: Ordinary Differential Equations; Partial Differential Equations; Multivariable Calculus (Differentiation); Multivariable Calculus (Integration); Multivariable Calculus (Vector Calculus).
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Solve the higher order linear differential equations and identify solutions by analytical methods related to various engineering problems involving electrical circuits.
CO2. Formulate and solve partial differential equations for engineering problems.
CO3. Determine maxima and minima of functions of two variables and analyze their behaviour at extreme values.
CO4. Evaluate and apply multiple integrals to determine areas of plane curves.
CO5. Identify solenoidal and irrotational vector fields and apply vector integral theorems in evaluating areas and volumes.

I B. Tech. – I Semester
(20BT1BS02) ENGINEERING CHEMISTRY
(Common to CE, ME, CSE, CSSE, IT, CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: --
COURSE DESCRIPTION: Water Treatment; Atomic Structure and Bonding Theories; Electrochemistry and Applications; Corrosion; Instrumental Methods and Applications; Fuel chemistry and Lubricants.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Analyze and solve problems associated with hardness of water, boiler troubles and address the societal, health and safety issues related to quality of water.
CO2. Apply the basic knowledge of quantum mechanical approach to atomic structure and bonding theories to identify shapes of different molecules
CO3. Apply the basic knowledge of corrosion phenomenon to identify solutions for control of corrosion and demonstrate competency in the basic concepts of electrochemical cells.
CO4. Demonstrate the basic knowledge of instrumental methods and their applications in the structural analysis of materials.
CO5. Apply the basic knowledge of fuel chemistry and lubricants to identify the quality of fuels and lubricants.

I B. Tech. – I Semester
(20BT1HS01)COMMUNICATIVE ENGLISH
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSBS, CSE(AI&ML) and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES:--
COURSE DESCRIPTION: Introduction to Communication; Active Listening; Effective Speaking; Reading and Technical Writing.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Demonstrate knowledge of English language, examining and applying the aspects of Process of communication, Paralinguistic features, Skimming, Scanning, and Elements of style in writing.
CO2. Analyze the modes and techniques of listening, speaking, reading, writing and apply them appropriately to communicate effectively with the engineering community and society.
CO3. Apply reading and writing techniques in preparing documents by examining SQ3R Technique, Writer's Block, and Précis Writing.
CO4. Communicate effectively in Conferences, Symposia, Seminars and in formal and real time situations by applying appropriate speaking techniques learnt by examining different communication styles used in similar contexts.

I B. Tech. – I Semester

(20BT11201) PROGRAMMING FOR PROBLEM SOLVING

(Common to CSE, CSSE, IT, CSE (AI), CSE (DS), CSBS, CSE(AI&ML), CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: A Course on Basic Mathematics.

COURSE DESCRIPTION: Introduction to C Programming; Operators and Expressions; Input and Output Functions; Control Structures; Problem Solving Aspects; Arrays and Strings; Functions; Pointers; Structures and Unions; File Handling.

COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*

CO1. Demonstrate knowledge on C programming constructs to develop programs.

CO2. Design algorithms using problem-solving techniques for given problems.

CO3. Apply functions and Arrays to enhance reusability and data manipulation.

CO4. Use pointers to manage the memory effectively.

CO5. Apply Structures, Unions and File handling concepts to develop societal applications.

I B. Tech. – I Semester

(20BT10201) BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

(Common to ME, EEE, ECE, EIE, CSE, CSSE, IT, CSE(AI), CSE(DS), CSE(AI&ML), CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: --

COURSE DESCRIPTION: Principles of Electrical Systems; AC & DC Machines; Semiconductor Devices and Op-Amps.

COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*

CO1. Analyze electrical circuits by applying the conceptual knowledge of circuit concepts.

CO2. Demonstrate knowledge on various generation technologies, protection devices, safety procedures and BEE standards.

CO3. Demonstrate knowledge on characteristics and applications of transformers and AC machines.

CO4. Demonstrate knowledge on characteristics and applications of diode, BJT and Op-amps.

I B.Tech. –I Semester

(20BT1BS31) ENGINEERING CHEMISTRY LAB

(Common to CE, ME, CSE, CSSE, IT, CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: --

COURSE DESCRIPTION: Estimation of hardness ground water sample, alkalinity, dissolved oxygen of water samples, Iron, residual chlorine in drinking water and Strength of an acid in Pb-Acid battery by volumetric methods; Instrumental methods like conductivity meter, potentiometer, P^H meter and colorimeter; Measurement of viscosity of lubricants; and Determination of the influence of pH on metallic corrosion.

COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*

CO1. Apply analytical skills for the quantitative estimation of materials through volumetric methods of analysis and address the societal, health issues related to quality of water.

CO2. Develop analytical skills for the quantitative estimation of materials through instrumental methods of analysis.

CO3. Work independently and in teams to solve problems with effective communication.

I B.Tech. – I Semester
(20BT1HS31) COMMUNICATIVE ENGLISH LAB
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSBS, CSE(AI&ML) and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: --
COURSE DESCRIPTION: Just a Minute, Elocution/Impromptu; Phonetics; Vocabulary Building; Grammar; Giving Directions; Role Plays; Public Speaking; Letter Writing; Describing Objects; Listening Comprehension; Information Transfer and Reading Comprehension.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Demonstrate knowledge of Phonetics by examining and applying sounds of English through Phonetics.
CO2. Analyze sentence structures by applying and demonstrating knowledge of Vocabulary and Grammar.
CO3. Apply appropriate listening and reading skills by analyzing the context, and demonstrate through listening comprehension and reading comprehension.
CO4. Function effectively as an individual and as a member in diverse teams examining and applying speaking skills in Just A Minute and Role Play.
CO5. Communicate effectively applying appropriate writing and speaking techniques by examining and demonstrating knowledge through Describing Objects, Information Transfer and Letter Writing in formal and real time situations.

I B. Tech. – I Semester
(20BT11231) PROGRAMMING FOR PROBLEM SOLVING LAB
(Common to CSE, CSSE, IT, CSE (AI), CSE (DS), CSBS, CSE(AI&ML), CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: A Course on "Programming for Problem Solving"
COURSE DESCRIPTION: Hands on practice in developing and executing programs using C Programming concepts include control statements, arrays, functions, strings, pointers structures and file handling.
COURSE OUTCOMES: After successful completion of this course, the students will be able to*:*
CO1. Analyse problems to designsuitable algorithmic solutions.
CO2. Apply C programming constructs to develop solutions to the engineering problems.
CO3. Work effectively as an individual to develop solutions based on the user requirements.
CO4. Write and present a substantial technical report/document effectively.

I B. Tech. – I Semester
(20BT1MC01)UNIVERSAL HUMAN VALUES
(Mandatory Course)
(Common toCSE, CSSE, IT, CSE(AI), CSE(DS), CSBS, CSE(AI&ML) and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	-	30	2	-	-	-

PRE-REQUISITES:--
COURSE DESCRIPTION: Value education; Human being and self; Family, the society and the nations; Harmony with the nature and Harmony with professional ethics.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Understand Values and skills for sustained happiness and prosperity.
CO2. Analyse realistic implications of a Holistic understanding of ethical human conduct, trustful and mutually fulfilling human behaviour.
CO3. Apply holistic approach in personal life and profession through a positive understanding of the Human reality and existence.

I B. Tech. – II Semester
(20BT2BS01) TRANSFORMATION TECHNIQUES AND LINEAR ALGEBRA
(Common toAll Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES:--
COURSE DESCRIPTION: Fourier Series and Fourier Transforms; Laplace Transforms; Inverse Laplace Transforms; Linear Algebra-I (Matrices); Linear Algebra-II (Vector Spaces).
COURSE OUTCOMES: After successful completion of this course, the students will be able to*:*
CO1. Construct the Fourier series for periodic functions and demonstrate the use of Fourier series and Fourier transform to connect the frequency and time domain systems.
CO2. Solve initial and boundary value problems in engineering fields through Laplace Transform techniques.
CO3. Apply the matrix theory in solving system of linear equations and determine the Eigen values and Eigen vectors.
CO4. Demonstrate the knowledge of Linear Transformations to intelligent systems.

I B. Tech. – II Semester
(20BT1BS03)ENGINEERING PHYSICS
(Common to CSE, CSSE, IT, CSBS, CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES:--
COURSE DESCRIPTION: Wave Optics; Electromagnetic Waves; Fiber Optics; Semiconductors; Optoelectronic Devices; Dielectrics; Magnetic materials; Superconductors and Nanomaterials.
COURSE OUTCOMES: After successful completion of this course, the students will be able to*:*
CO1. Apply the knowledge of light waves to interpret the concepts of Interference, Diffraction and Polarization.
CO2. Demonstrate the concepts of electromagnetic wave propagation in Optical fibers.
CO3. Apply the basic knowledge of semiconductors to understand the functioning of various optoelectronic devices.
CO4. Demonstrate the basic knowledge of dielectric and magnetic properties to understand the various dielectric polarizations and magnetic materials.
CO5. Understand the concepts of superconductors and nanomaterials to familiarize their applications in relevant fields.

I B. Tech. – II Semester
(20BT20501) DIGITAL LOGIC DESIGN
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSE(AI&ML), CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES:--
COURSE DESCRIPTION: Foundation in design and analysis of the operation of digital gates; Concepts of Boolean algebra, Minimization of logic circuits; Design and implementation of combinational and sequential logic circuits; Analysis and design of flip-flops, registers, and counters and comparison of their behavior and characteristics; Design digital systems using Programmable logic.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Apply knowledge of binary systems, logic gates and Boolean functions to represent a given problem using Boolean logic.
CO2. Minimize and implement Boolean functions to build combinational logic circuits.
CO3. Design combinational and sequential logic circuits for digital systems.
CO4. Design digital systems using programmable logic to solve engineering problems.

I B. Tech. – II Semester
(20BT21501) OBJECT ORIENTED PROGRAMMING THROUGH JAVA
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSBS, CSE(AI&ML), CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: A Course on "Programming for Problem Solving"
COURSE DESCRIPTION: Introduction to Object Oriented Programming, Classes and Objects; Inheritance, Packages, Interfaces; Exception handling, Multithreading; Collection Classes; Swings, Event handling.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Apply object oriented programming constructs to solve programming problems.
CO2. Design solutions to the problems by using control statements, interfaces, utility classes and Packages.
CO3. Solve real time problems using object oriented programming features – polymorphism, inheritance, exception handling and multithreading.
CO4. Apply multithreading mechanism to enhance the performance of a system.
CO5. Develop user interfaces using GUI programming techniques.

I B. Tech. – II Semester
(20BT10331) COMPUTER AIDED ENGINEERING DRAWING
(Common toCSE, CSSE, IT, CSE(AI), CSE(DS), CSE(AI&ML) and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	1	4	3

PRE-REQUISITES:--
COURSE DESCRIPTION: Engineering drawing conventions; Importance of engineering drawing; fundamental concepts of sketching; computer aided drafting and different types of projections of geometric entities (both 2D and 3D) through computer aided drafting packages.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Apply the principles of engineering drawing, Methods and CAD tools to draw the Geometries, Curves and Orthographic projections used to communicate in engineering field.
CO2. Develop lateral surfaces of solids and draw Isometric views of given objects for engineering communication using principles of engineering drawing and CAD tools.
CO3. Work independently / in groups & communicate effectively in oral and writtenforms.

I B. Tech. – II Semester
(20BT1BS32)ENGINEERING PHYSICS LAB
(Common to CSE, CSSE, IT, CSBS, CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES:--
COURSE DESCRIPTION: Estimation of thickness of the wire using wedge shape method; Wavelength of monochromatic light source by diffraction grating; Newton's ring method; numerical aperture and acceptance angle of optical fiber; Characteristics of p-n junction diode; Photodiode and LED; Experimental determination of carrier concentration and energy gap of a semiconductor material; Determination resistivity of semiconductor by Four probe method and magnetic field along axial line of a current carrying coil.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Apply the basic knowledge of light waves and semiconductors to demonstrate the functioning of optoelectronic devices.
CO2. Understand the experimental procedures to calculate the thickness of a thin film, Hall coefficient, and acceptance angle of an optical fiber.
CO3. Determine the experimental values of magnetic field induction, wave length of a light source, energy gap of a semiconductor.
CO4. Apply skills to plot characteristic curves to determine the various parameters of semiconductor diodes.
CO5. Work independently and in teams to solve problems with effective communication.

I B. Tech. – II Semester
(20BT10332) ENGINEERING WORKSHOP
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSE(AI&ML) and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES:--
COURSE DESCRIPTION: Knowledge on various workshop hand and power tools; hands on experience in different manufacturing trades such as fitting, carpentry, sheet metal forming and foundry; Demonstration on dismantling and assembling of various two wheeler parts, power tools in machining and metal joining, basics of plumbing and working of 3D printer.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Design and model various basic prototypes in the trade of fitting such as square/half round mating, V- mating and dovetail mating from the given MS work pieces using fitting tools.
CO2. Develop different prototypes in the carpentry trade such as cross lap joint, dovetail / bridle joints and Mortise and Tenon joint using carpentry tools.
CO3. Design and model different prototypes in the sheet metal forming trade such as rectangular tray, square vessel/cylinder, Funnel as per the dimensions using sheet metal forming tools.
CO4. Develop sand mould using single piece pattern and split piece pattern in the foundry trade using foundry tools.
CO5. Develop electric circuits for series and stair case connections.
CO6. Demonstrate the knowledge on power tools, plumbing operation, 3D printing technology involved in different engineering applications.
CO7. Work independently / in groups & communicate effectively in oral and written forms.

I B. Tech. – II Semester
(20BT21531) OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSBS, CSE(AI&ML), CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: A course on OOPS through Java.
COURSE DESCRIPTION: Hands-on experience on Polymorphism; Inheritance and Interfaces; Exception Handling; Multithreading; Event Handling; swings.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Apply syntactic constructs of JAVA to solve logic based problems
CO2. Develop application programs using object oriented programming features.
CO3. Solve real time problems using interfaces, packages, Exception Handling, Collection framework and Multithreading.
CO4. Develop GUI Applications using Swings, Event handling mechanisms.
CO5. Work independently and in team to solve problems with effective communication.

I B.Tech. –II Semester
(20BT1HSAC) SPOKEN ENGLISH
(Audit Course)
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSBS, CSE(AI&ML) and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	2	-	-	-

PRE-REQUISITES: --
COURSE DESCRIPTION: Grammar; Functional English; Paragraph writing; Letter writing and Email writing.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Demonstrate knowledge of grammar and vocabulary in writing effective formal letters and e-mails.
CO2. Communicate effectively by applying appropriate speaking and writing techniques by examining and applying functional English.

Program: B.Tech. COMPUTER SCIENCE AND ENGINEERING (ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

I B. Tech. - I Semester
(20BT1BS01) **DIFFERENTIAL EQUATIONS AND MULTIVARIABLE CALCULUS**
(Common to All Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Ordinary Differential Equations; Partial Differential Equations; Multivariable Calculus (Differentiation); Multivariable Calculus (Integration); Multivariable Calculus (Vector Calculus).
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*

CO1. Solve the higher order linear differential equations and identify solutions by analytical methods related to various engineering problems involving electrical circuits.
CO2. Formulate and solve partial differential equations for engineering problems.
CO3. Determine maxima and minima of functions of two variables and analyze their behaviour at extreme values.
CO4. Evaluate and apply multiple integrals to determine areas of plane curves.
CO5. Identify solenoidal and irrotational vector fields and apply vector integral theorems in evaluating areas and volumes.

I B. Tech. – I Semester
(20BT1BS03)**ENGINEERING PHYSICS**
(Common to EEE, ECE, EIE, CSE(AI),CSE(DS) and CSE(AI&ML))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES:-
COURSE DESCRIPTION: Wave Optics; Electromagnetic Waves; Fiber Optics; Semiconductors; Optoelectronic Devices; Dielectrics; Magnetic materials; Superconductors and Nanomaterials.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*

CO1. Apply the knowledge of light waves to interpret the concepts of Interference, Diffraction and Polarization.
CO2. Demonstrate the concepts of electromagnetic wave propagation in Optical fibers.
CO3. Apply the basic knowledge of semiconductors to understand the functioning of various optoelectronic devices.
CO4. Demonstrate the basic knowledge of dielectric and magnetic properties to understand the various dielectric polarizations and magnetic materials.
CO5. Understand the concepts of superconductors and nanomaterials to familiarize their applications in relevant fields.

I B. Tech. - I Semester
(20BT1HS01)**COMMUNICATIVE ENGLISH**
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSBS, CSE(AI&ML) and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES:-
COURSE DESCRIPTION: Introduction to Communication; Active Listening; Effective Speaking; Reading and Technical Writing.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*

CO1. Demonstrate knowledge of English language, examining and applying the aspects of Process of communication, Paralinguistic features, Skimming, Scanning, and Elements of style in writing.
CO2. Analyze the modes and techniques of listening, speaking, reading, writing and apply them appropriately to communicate effectively with the engineering community and society.
CO3. Apply reading and writing techniques in preparing documents by examining SQ3R Technique, Writer's Block, and Précis Writing.
CO4. Communicate effectively in Conferences, Symposia, Seminars and in formal and real time situations by applying appropriate speaking techniques learnt by examining different communication styles used in similar contexts.

I B. Tech. – I Semester
(20BT11201) **PROGRAMMING FOR PROBLEM SOLVING**
(Common to CSE, CSSE, IT, CSE (AI), CSE (DS), CSBS, CSE(AI&ML), CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: A Course on Basic Mathematics.
COURSE DESCRIPTION: Introduction to C Programming; Operators and Expressions; Input and Output Functions; Control Structures; Problem Solving Aspects; Arrays and Strings; Functions; Pointers; Structures and Unions; File Handling.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Demonstrate knowledge on C programming constructs to develop programs.
CO2. Design algorithms using problem-solving techniques for given problems.
CO3. Apply functions and Arrays to enhance reusability and data manipulation.
CO4. Use pointers to manage the memory effectively.
CO5. Apply Structures, Unions and File handling concepts to develop societal applications.

I B. Tech. – I Semester
(20BT10201) **BASIC ELECTRICAL AND ELECTRONICS ENGINEERING**
(Common to ME, EEE, ECE, EIE, CSE, CSSE, IT, CSE(AI), CSE(DS), CSE(AI&ML), CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Principles of Electrical Systems; AC & DC Machines; Semiconductor Devices and Op-Amps.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Analyze electrical circuits by applying the conceptual knowledge of circuit concepts.
CO2. Demonstrate knowledge on various generation technologies, protection devices, safety procedures and BEE standards.
CO3. Demonstrate knowledge on characteristics and applications of transformers and AC machines.
CO4. Demonstrate knowledge on characteristics and applications of diode, BJT and Op-amps.

I B.Tech. - I Semester
(20BT1BS32)**ENGINEERING PHYSICS LAB**
(Common to EEE, ECE, EIE, CSE(AI),CSE(DS) and CSE(AI&ML))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES:-
COURSE DESCRIPTION: Estimation of thickness of the wire using wedge shape method; Wavelength of monochromatic light source by diffraction grating; Newton's ring method; numerical aperture and acceptance angle of optical fiber; Characteristics of p-n junction diode; Photodiode and LED; Experimental determination of carrier concentration and energy gap of a semiconductor material; Determination resistivity of semiconductor by Four probe method and magnetic field along axial line of a current carrying coil.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Apply the basic knowledge of light waves and semiconductors to demonstrate the functioning of optoelectronic devices.
CO2. Understand the experimental procedures to calculate the thickness of a thin film, Hall coefficient, and acceptance angle of an optical fiber.
CO3. Determine the experimental values of magnetic field induction, wave length of a light source, energy gap of a semiconductor.
CO4. Apply skills to plot characteristic curves to determine the various parameters of semiconductor diodes.
CO5. Work independently and in teams to solve problems with effective communication.

I B.Tech. - I Semester
(20BT1HS31) **COMMUNICATIVE ENGLISH LAB**
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSBS, CSE(AI&ML) and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: -
COURSE DESCRIPTION: Just a Minute, Elocution/Impromptu; Phonetics; Vocabulary Building; Grammar; Giving Directions; Role Plays; Public Speaking; Letter Writing; Describing Objects; Listening Comprehension; Information Transfer and Reading Comprehension.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Demonstrate knowledge of Phonetics by examining and applying sounds of English through Phonetics.
CO2. Analyze sentence structures by applying and demonstrating knowledge of Vocabulary and Grammar.
CO3. Apply appropriate listening and reading skills by analyzing the context, and demonstrate through listening comprehension and reading comprehension.
CO4. Function effectively as an individual and as a member in diverse teams examining and applying speaking skills in Just A Minute and Role Play.
CO5. Communicate effectively applying appropriate writing and speaking techniques by examining and demonstrating knowledge through Describing Objects, Information Transfer and Letter Writing in formal and real time situations.

I B. Tech. – I Semester
(20BT11231) **PROGRAMMING FOR PROBLEM SOLVING LAB**
(Common to CSE, CSSE, IT, CSE (AI), CSE (DS), CSBS, CSE(AI&ML), CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: A Course on “Programming for Problem Solving”.
COURSE DESCRIPTION: Hands on practice in developing and executing programs using C Programming concepts include control statements, arrays, functions, strings, pointers structures and file handling.
COURSE OUTCOMES: *After successful completion of the course, students will be able to:*
CO1. Analyse problems to design suitable algorithmic solutions.
CO2. Apply C programming constructs to develop solutions to the engineering problems.
CO3. Work effectively as an individual to develop solutions based on the user requirements.
CO4. Write and present a substantial technical report/document effectively.

I B. Tech. - I Semester
(20BT1MC01)**UNIVERSAL HUMAN VALUES**
(Mandatory Course)
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSBS, CSE(AI&ML) and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	-	30	2	-	-	-

PRE-REQUISITES:-
COURSE DESCRIPTION: Value education; Human being and self; Family, the society and the nations; Harmony with the nature and Harmony with professional ethics.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Understand Values and skills for sustained happiness and prosperity.
CO2. Analyse realistic implications of a Holistic understanding of ethical human conduct, trustful and mutually fulfilling human behaviour.
CO3. Apply holistic approach in personal life and profession through a positive understanding of the Human reality and existence.

I B. Tech. - II Semester
(20BT2BS01) **TRANSFORMATION TECHNIQUES AND LINEAR ALGEBRA**
(Common to All Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES:--
COURSE DESCRIPTION: Fourier Series and Fourier Transforms; Laplace Transforms; Inverse Laplace Transforms; Linear Algebra-I (Matrices); Linear Algebra-II (Vector Spaces).
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Construct the Fourier series for periodic functions and demonstrate the use of Fourier series and Fourier transform to connect the frequency and time domain systems.
CO2. Solve initial and boundary value problems in engineering fields through Laplace Transform techniques.
CO3. Apply the matrix theory in solving system of linear equations and determine the Eigen values and Eigen vectors.
CO4. Demonstrate the knowledge of Linear Transformations to intelligent systems.

I B. Tech. - II Semester
(20BT1BS02) **ENGINEERING CHEMISTRY**
(Common to EEE, ECE, EIE,CSE(AI), CSE(DS) and CSE(AI&ML))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Water Treatment; Atomic Structure and Bonding Theories; Electrochemistry and Applications; Corrosion; Instrumental Methods and Applications; Fuel chemistry and Lubricants.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Analyze and solve problems associated with hardness of water, boiler troubles and address the societal, health and safety issues related to quality of water.
CO2. Apply the basic knowledge of quantum mechanical approach to atomic structure and bonding theories to identify shapes of different molecules
CO3. Apply the basic knowledge of corrosion phenomenon to identify solutions for control of corrosion and demonstrate competency in the basic concepts of electrochemical cells.
CO4. Demonstrate the basic knowledge of instrumental methods and their applications in the structural analysis of materials.
CO5. Apply the basic knowledge of fuel chemistry and lubricants to identify the quality of fuels and lubricants.

I B. Tech. – II Semester
(20BT20501) **DIGITAL LOGIC DESIGN**
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSE(AI&ML), CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES:-
COURSE DESCRIPTION: Foundation in design and analysis of the operation of digital gates; Concepts of Boolean algebra, Minimization of logic circuits; Design and implementation of combinational and sequential logic circuits; Analysis and design of flip-flops, registers, and counters and comparison of their behavior and characteristics; Design digital systems using Programmable logic.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Apply knowledge of binary systems, logic gates and Boolean functions to represent a given problem using Boolean logic.
CO2. Minimize and implement Boolean functions to build combinational logic circuits.
CO3. Design combinational and sequential logic circuits for digital systems.
CO4. Design digital systems using programmable logic to solve engineering problems.

I B. Tech. – II Semester
(20BT21501) **OBJECT ORIENTED PROGRAMMING THROUGH JAVA**
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSBS, CSE(AI&ML), CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: A course on Programming for Problem Solving
COURSE DESCRIPTION: Introduction to Object Oriented Programming, Classes and Objects; Inheritance, Packages, Interfaces; Exception handling, Multithreading; Collection Classes; Swings, Event handling.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Apply object oriented programming constructs to solve programming problems.
CO2. Design solutions to the problems by using control statements, interfaces, utility classes and Packages.
CO3. Solve real time problems using object oriented programming features – polymorphism, inheritance, exception handling and multithreading.
CO4. Apply multithreading mechanism to enhance the performance of a system.
CO5. Develop user interfaces using GUI programming techniques.

I B. Tech. – II Semester
(20BT10331) **COMPUTER AIDED ENGINEERING DRAWING**
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSE(AI&ML) and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	1	4	3

PRE-REQUISITES:-
COURSE DESCRIPTION: Engineering drawing conventions; Importance of engineering drawing; fundamental concepts of sketching; computer aided drafting and different types of projections of geometric entities (both 2D and 3D) through computer aided drafting packages.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Apply the principles of engineering drawing, Methods and CAD tools to draw the Geometries, Curves and Orthographic projections used to communicate in engineering field.
CO2. Develop lateral surfaces of solids and draw Isometric views of given objects for engineering communication using principles of engineering drawing and CAD tools.
CO3. Work independently / in groups & communicate effectively in oral and written forms.

I B.Tech. - II Semester
(20BT1BS31) **ENGINEERING CHEMISTRY LAB**
(Common to EEE, ECE, EIECSE(AI), CSE(DS) and CSE(AI&ML))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: -
COURSE DESCRIPTION: Estimation of hardness ground water sample, alkalinity, dissolved oxygen of water samples, Iron, residual chlorine in drinking water and Strength of an acid in Pb-Acid battery by volumetric methods; Instrumental methods like conductivity meter, potentiometer, P^H meter and colorimeter; Measurement of viscosity of lubricants; and Determination of the influence of pH on metallic corrosion.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Apply analytical skills for the quantitative estimation of materials through volumetric methods of analysis and address the societal, health issues related to quality of water.
CO2. Develop analytical skills for the quantitative estimation of materials through instrumental methods of analysis.
CO3. Work independently and in teams to solve problems with effective communication.

I B. Tech. – II Semester
(20BT10332) **ENGINEERING WORKSHOP**
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSE(AI&ML) and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: -
COURSE DESCRIPTION: Knowledge on various workshop hand and power tools; hands on experience in different manufacturing trades such as fitting, carpentry, sheet metal forming and foundry; Demonstration on dismantling and assembling of various two wheeler parts, power tools in machining and metal joining, basics of plumbing and working of 3D printer.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Design and model various basic prototypes in the trade of fitting such as square/half round mating, V- mating and dovetail mating from the given MS work pieces using fitting tools.
CO2. Develop different prototypes in the carpentry trade such as cross lap joint, dovetail / bridle joints and Mortise and Tenon joint using carpentry tools.
CO3. Design and model different prototypes in the sheet metal forming trade such as rectangular tray, square vessel/cylinder, Funnel as per the dimensions using sheet metal forming tools.
CO4. Develop sand mould using single piece pattern and split piece pattern in the foundry trade using foundry tools.
CO5. Develop electric circuits for series and stair case connections.
CO6. Demonstrate the knowledge on power tools, plumbing operation, 3D printing technology involved in different engineering applications.
CO7. Work independently / in groups & communicate effectively in oral and written forms.

I B. Tech. – II Semester
(20BT21531) **OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB**
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSBS, CSE(AI&ML), CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: A course on “Object Oriented Programming through Java”.
COURSE DESCRIPTION: Hands-on experience on Polymorphism; Inheritance and Interfaces; Exception Handling; Multithreading; Event Handling; swings.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Apply syntactic constructs of JAVA to solve logic based problems
CO2. Develop application programs using object oriented programming features.
CO3. Solve real time problems using interfaces, packages, Exception Handling, Collection framework and Multithreading.
CO4. Develop GUI Applications using Swings, Event handling mechanisms.
CO5. Work independently and in team to solve problems with effective communication.

I B.Tech. - II Semester
(20BT1HSAC) **SPOKEN ENGLISH**
(Audit Course)
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSBS, CSE(AI&ML) and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	2	-	-	-

PRE-REQUISITES: -
COURSE DESCRIPTION: Grammar; Functional English; Paragraph writing; Letter writing and Email writing.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Demonstrate knowledge of grammar and vocabulary in writing effective formal letters and e-mails.
CO2. Communicate effectively by applying appropriate speaking and writing techniques by examining and applying functional English.

Program: B.Tech. COMPUTER SCIENCE AND ENGINEERING (ARTIFICIAL INTELLIGENCE)

I B. Tech. - I Semester
(20BT1BS01) **DIFFERENTIAL EQUATIONS AND MULTIVARIABLE CALCULUS**
(Common to All Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Ordinary Differential Equations; Partial Differential Equations; Multivariable Calculus (Differentiation); Multivariable Calculus (Integration); Multivariable Calculus (Vector Calculus).
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Solve the higher order linear differential equations and identify solutions by analytical methods related to various engineering problems involving electrical circuits.
CO2. Formulate and solve partial differential equations for engineering problems.
CO3. Determine maxima and minima of functions of two variables and analyze their behaviour at extreme values.
CO4. Evaluate and apply multiple integrals to determine areas of plane curves.
CO5. Identify solenoidal and irrotational vector fields and apply vector integral theorems in evaluating areas and volumes.

I B. Tech. – I Semester
(20BT1BS03)**ENGINEERING PHYSICS**
(Common to EEE, ECE, EIE, CSE(AI),CSE(DS) and CSE(AI&ML))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES:-
COURSE DESCRIPTION: Wave Optics; Electromagnetic Waves; Fiber Optics; Semiconductors; Optoelectronic Devices; Dielectrics; Magnetic materials; Superconductors and Nanomaterials.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Apply the knowledge of light waves to interpret the concepts of Interference, Diffraction and Polarization.
CO2. Demonstrate the concepts of electromagnetic wave propagation in Optical fibers.
CO3. Apply the basic knowledge of semiconductors to understand the functioning of various optoelectronic devices.
CO4. Demonstrate the basic knowledge of dielectric and magnetic properties to understand the various dielectric polarizations and magnetic materials.
CO5. Understand the concepts of superconductors and nanomaterials to familiarize their applications in relevant fields.

I B. Tech. - I Semester
(20BT1HS01)**COMMUNICATIVE ENGLISH**
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSBS, CSE(AI&ML) and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES:-
COURSE DESCRIPTION: Introduction to Communication; Active Listening; Effective Speaking; Reading and Technical Writing.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Demonstrate knowledge of English language, examining and applying the aspects of Process of communication, Paralinguistic features, Skimming, Scanning and Elements of style in writing.
CO2. Analyze the modes and techniques of listening, speaking, reading, writing and apply them appropriately to communicate effectively with the engineering community and society.
CO3. Apply reading and writing techniques in preparing documents by examining SQ3R Technique, Writer's Block, and Précis Writing.
CO4. Communicate effectively in Conferences, Symposia, Seminars and in formal and real time situations by applying appropriate speaking techniques learnt by examining different communication styles used in similar contexts.

I B. Tech. – I Semester
(20BT11201) **PROGRAMMING FOR PROBLEM SOLVING**
(Common to CSE, CSSE, IT, CSE (AI), CSE (DS), CSBS, CSE(AI&ML), CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: A Course on Basic Mathematics.
COURSE DESCRIPTION: Introduction to C Programming; Operators and Expressions; Input and Output Functions; Control Structures; Problem Solving Aspects; Arrays and Strings; Functions; Pointers; Structures and Unions; File Handling.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Demonstrate knowledge on C programming constructs to develop programs.
CO2. Design algorithms using problem-solving techniques for given problems.
CO3. Apply functions and Arrays to enhance reusability and data manipulation.
CO4. Use pointers to manage the memory effectively.
CO5. Apply Structures, Unions and File handling concepts to develop societal applications.

I B. Tech. – I Semester
(20BT10201) **BASIC ELECTRICAL AND ELECTRONICS ENGINEERING**
(Common to ME, EEE, ECE, EIE, CSE, CSSE, IT, CSE(AI), CSE(DS), CSE(AI&ML), CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Principles of Electrical Systems; AC & DC Machines; Semiconductor Devices and Op-Amps.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Analyze electrical circuits by applying the conceptual knowledge of circuit concepts.
CO2. Demonstrate knowledge on various generation technologies, protection devices, safety procedures and BEE standards.
CO3. Demonstrate knowledge on characteristics and applications of transformers and AC machines.
CO4. Demonstrate knowledge on characteristics and applications of diode, BJT and Op-amps.

I B.Tech. - I Semester
(20BT1BS32)**ENGINEERING PHYSICS LAB**
(Common to EEE, ECE, EIE, CSE(AI),CSE(DS) and CSE(AI&ML))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES:-
COURSE DESCRIPTION: Estimation of thickness of the wire using wedge shape method; Wavelength of monochromatic light source by diffraction grating; Newton's ring method; numerical aperture and acceptance angle of optical fiber; Characteristics of p-n junction diode; Photodiode and LED; Experimental determination of carrier concentration and energy gap of a semiconductor material; Determination resistivity of semiconductor by Four probe method and magnetic field along axial line of a current carrying coil.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Apply the basic knowledge of light waves and semiconductors to demonstrate the functioning of optoelectronic devices.
CO2. Understand the experimental procedures to calculate the thickness of a thin film, Hall coefficient, and acceptance angle of an optical fiber.
CO3. Determine the experimental values of magnetic field induction, wave length of a light source, energy gap of a semiconductor.
CO4. Apply skills to plot characteristic curves to determine the various parameters of semiconductor diodes.
CO5. Work independently and in teams to solve problems with effective communication.

I B.Tech. - I Semester
(20BT1HS31) **COMMUNICATIVE ENGLISH LAB**
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSBS, CSE(AI&ML) and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: -
COURSE DESCRIPTION: Just a Minute, Elocution/Impromptu; Phonetics; Vocabulary Building; Grammar; Giving Directions; Role Plays; Public Speaking; Letter Writing; Describing Objects; Listening Comprehension; Information Transfer and Reading Comprehension.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Demonstrate knowledge of Phonetics by examining and applying sounds of English through Phonetics.
CO2. Analyze sentence structures by applying and demonstrating knowledge of Vocabulary and Grammar.
CO3. Apply appropriate listening and reading skills by analyzing the context, and demonstrate through listening comprehension and reading comprehension.
CO4. Function effectively as an individual and as a member in diverse teams examining and applying speaking skills in Just A Minute and Role Play.
CO5. Communicate effectively applying appropriate writing and speaking techniques by examining and demonstrating knowledge through Describing Objects, Information Transfer and Letter Writing in formal and real time situations.

I B. Tech. – I Semester
(20BT11231) **PROGRAMMING FOR PROBLEM SOLVING LAB**
(Common to CSE, CSSE, IT, CSE (AI), CSE (DS), CSBS, CSE(AI&ML), CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: A Course on “Programming for Problem Solving”.
COURSE DESCRIPTION: Hands on practice in developing and executing programs using C Programming concepts include control statements, arrays, functions, strings, pointers structures and file handling.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Analyse problems to design suitable algorithmic solutions.
CO2. Apply C programming constructs to develop solutions to the engineering problems.
CO3. Work effectively as an individual to develop solutions based on the user requirements.
CO4. Write and present a substantial technical report/document effectively.

I B. Tech. - I Semester
(20BT1MC01)**UNIVERSAL HUMAN VALUES**
(Mandatory Course)
(Common to CSE, CSSE,IT, CSE(AI), CSE(DS), CSBS, CSE(AI&ML) and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	-	30	2	-	-	-

PRE-REQUISITES:-
COURSE DESCRIPTION: Value education; Human being and self; Family, the society and the nations; Harmony with the nature and Harmony with professional ethics.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Understand Values and skills for sustained happiness and prosperity.
CO2. Analyse realistic implications of a Holistic understanding of ethical human conduct, trustful and mutually fulfilling human behaviour.
CO3. Apply holistic approach in personal life and profession through a positive understanding of the Human reality and existence.

I B. Tech. - II Semester
(20BT2BS01) **TRANSFORMATION TECHNIQUES AND LINEAR ALGEBRA**
(Common to All Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES:--
COURSE DESCRIPTION: Fourier Series and Fourier Transforms; Laplace Transforms; Inverse Laplace Transforms; Linear Algebra-I (Matrices); Linear Algebra-II (Vector Spaces).
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Construct the Fourier series for periodic functions and demonstrate the use of Fourier series and Fourier transform to connect the frequency and time domain systems.
CO2. Solve initial and boundary value problems in engineering fields through Laplace Transform techniques.
CO3. Apply the matrix theory in solving system of linear equations and determine the Eigen values and Eigen vectors.
CO4. Demonstrate the knowledge of Linear Transformations to intelligent systems.

I B. Tech. - II Semester
(20BT1BS02) **ENGINEERING CHEMISTRY**
(Common to EEE, ECE, EIE,CSE(AI), CSE(DS) and CSE(AI&ML))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Water Treatment; Atomic Structure and Bonding Theories; Electrochemistry and Applications; Corrosion; Instrumental Methods and Applications; Fuel chemistry and Lubricants.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Analyze and solve problems associated with hardness of water, boiler troubles and address the societal, health and safety issues related to quality of water.
CO2. Apply the basic knowledge of quantum mechanical approach to atomic structure and bonding theories to identify shapes of different molecules
CO3. Apply the basic knowledge of corrosion phenomenon to identify solutions for control of corrosion and demonstrate competency in the basic concepts of electrochemical cells.
CO4. Demonstrate the basic knowledge of instrumental methods and their applications in the structural analysis of materials.
CO5. Apply the basic knowledge of fuel chemistry and lubricants to identify the quality of fuels and lubricants.

I B. Tech. – II Semester
(20BT20501) **DIGITAL LOGIC DESIGN**
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSE(AI&ML), CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES:-
COURSE DESCRIPTION: Foundation in design and analysis of the operation of digital gates; Concepts of Boolean algebra, Minimization of logic circuits; Design and implementation of combinational and sequential logic circuits; Analysis and design of flip-flops, registers, and counters and comparison of their behavior and characteristics; Design digital systems using Programmable logic.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Apply knowledge of binary systems, logic gates and Boolean functions to represent a given problem using Boolean logic.
CO2. Minimize and implement Boolean functions to build combinational logic circuits.
CO3. Design combinational and sequential logic circuits for digital systems.
CO4. Design digital systems using programmable logic to solve engineering problems.

I B. Tech. – II Semester
(20BT21501) **OBJECT ORIENTED PROGRAMMING THROUGH JAVA**
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSBS, CSE(AI&ML), CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: A course on "Programming for Problem Solving".
COURSE DESCRIPTION: Introduction to Object Oriented Programming, Classes and Objects; Inheritance, Packages, Interfaces; Exception handling, Multithreading; Collection Classes; Swings, Event handling.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Apply object oriented programming constructs to solve programming problems.
CO2. Design solutions to the problems by using control statements, interfaces, utility classes and Packages.
CO3. Solve real time problems using object oriented programming features – polymorphism, inheritance, exception handling and multithreading.
CO4. Apply multithreading mechanism to enhance the performance of a system.
CO5. Develop user interfaces using GUI programming techniques.

I B. Tech. – II Semester
(20BT10331) **COMPUTER AIDED ENGINEERING DRAWING**
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSE(AI&ML) and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	1	4	3

PRE-REQUISITES:-
COURSE DESCRIPTION: Engineering drawing conventions; Importance of engineering drawing; fundamental concepts of sketching; computer aided drafting and different types of projections of geometric entities (both 2D and 3D) through computer aided drafting packages.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Apply the principles of engineering drawing, Methods and CAD tools to draw the Geometries, Curves and Orthographic projections used to communicate in engineering field.
CO2. Develop lateral surfaces of solids and draw Isometric views of given objects for engineering communication using principles of engineering drawing and CAD tools.
CO3. Work independently / in groups & communicate effectively in oral and written forms.

I B.Tech. - II Semester
(20BT1BS31) **ENGINEERING CHEMISTRY LAB**
(Common to EEE, ECE, EIE,CSE(AI), CSE(DS) and CSE(AI&ML))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: -
COURSE DESCRIPTION: Estimation of hardness ground water sample, alkalinity, dissolved oxygen of water samples, Iron, residual chlorine in drinking water and Strength of an acid in Pb-Acid battery by volumetric methods; Instrumental methods like conductivity meter, potentiometer, P^H meter and colorimeter; Measurement of viscosity of lubricants; and Determination of the influence of pH on metallic corrosion.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Apply analytical skills for the quantitative estimation of materials through volumetric methods of analysis and address the societal, health issues related to quality of water.
CO2. Develop analytical skills for the quantitative estimation of materials through instrumental methods of analysis.
CO3. Work independently and in teams to solve problems with effective communication.

I B. Tech. – II Semester
(20BT10332) **ENGINEERING WORKSHOP**
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSE(AI&ML) and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: -
COURSE DESCRIPTION: Knowledge on various workshop hand and power tools; hands on experience in different manufacturing trades such as fitting, carpentry, sheet metal forming and foundry; Demonstration on dismantling and assembling of various two wheeler parts, power tools in machining and metal joining, basics of plumbing and working of 3D printer.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Design and model various basic prototypes in the trade of fitting such as square/half round mating, V- mating and dovetail mating from the given MS work pieces using fitting tools.
CO2. Develop different prototypes in the carpentry trade such as cross lap joint, dovetail / bridle joints and Mortise and Tenon joint using carpentry tools.
CO3. Design and model different prototypes in the sheet metal forming trade such as rectangular tray, square vessel/cylinder, Funnel as per the dimensions using sheet metal forming tools.
CO4. Develop sand mould using single piece pattern and split piece pattern in the foundry trade using foundry tools.
CO5. Develop electric circuits for series and stair case connections.
CO6. Demonstrate the knowledge on power tools, plumbing operation, 3D printing technology involved in different engineering applications.
CO7. Work independently / in groups & communicate effectively in oral and written forms.

I B. Tech. – II Semester
(20BT21531) **OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB**
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSBS, CSE(AI&ML), CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: A course on "Object Oriented Programming through Java".
COURSE DESCRIPTION: Hands-on experience on Polymorphism; Inheritance and Interfaces; Exception Handling; Multithreading; Event Handling; swings.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Apply syntactic constructs of JAVA to solve logic based problems
CO2. Develop application programs using object oriented programming features.
CO3. Solve real time problems using interfaces, packages, Exception Handling, Collection framework and Multithreading.
CO4. Develop GUI Applications using Swings, Event handling mechanisms.
CO5. Work independently and in team to solve problems with effective communication.

I B.Tech. - II Semester
(20BT1HSAC) **SPOKEN ENGLISH**
(Audit Course)
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSBS, CSE(AI&ML) and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	2	-	-	-

PRE-REQUISITES: -
COURSE DESCRIPTION: Grammar; Functional English; Paragraph writing; Letter writing and Email writing.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Demonstrate knowledge of grammar and vocabulary in writing effective formal letters and e-mails.
CO2. Communicate effectively by applying appropriate speaking and writing techniques by examining and applying functional English.

Program: B.Tech. COMPUTER SCIENCE AND ENGINEERING (CYBER SECURITY)

I B. Tech. - I Semester
(20BT1BS01)**DIFFERENTIAL EQUATIONS AND MULTIVARIABLE CALCULUS**
(Common to All Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES:-
COURSE DESCRIPTION: Ordinary Differential Equations; Partial Differential Equations; Multivariable Calculus (Differentiation); Multivariable Calculus (Integration); Multivariable Calculus (Vector Calculus).
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Solve the higher order linear differential equations and identify solutions by analytical methods related to various engineering problems involving electrical circuits.
CO2. Formulate and solve partial differential equations for engineering problems.
CO3. Determine maxima and minima of functions of two variables and analyze their behavior at extreme values.
CO4. Evaluate and apply multiple integrals to determine areas of plane curves.
CO5. Identify solenoidal and irrotational vector fields and apply vector integral theorems in evaluating areas and volumes.

I B. Tech. - I Semester
(20BT1BS02) **ENGINEERING CHEMISTRY**
(Common to CE, ME, CSE, CSSE, IT, CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Water Treatment; Atomic Structure and Bonding Theories; Electrochemistry and Applications; Corrosion; Instrumental Methods and Applications; Fuel chemistry and Lubricants.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Analyze and solve problems associated with hardness of water, boiler troubles and address the societal, health and safety issues related to quality of water.
CO2. Apply the basic knowledge of quantum mechanical approach to atomic structure and bonding theories to identify shapes of different molecules
CO3. Apply the basic knowledge of corrosion phenomenon to identify solutions for control of corrosion and demonstrate competency in the basic concepts of electrochemical cells.
CO4. Demonstrate the basic knowledge of instrumental methods and their applications in the structural analysis of materials.
CO5. Apply the basic knowledge of fuel chemistry and lubricants to identify the quality of fuels and lubricants.

I B. Tech. - I Semester
(20BT1HS01)**COMMUNICATIVE ENGLISH**
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSBS, CSE(AI&ML) and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES:-
COURSE DESCRIPTION: Introduction to Communication; Active Listening; Effective Speaking; Reading and Technical Writing.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Demonstrate knowledge of English language, examining and applying the aspects of Process of communication, Paralinguistic features, Skimming, Scanning, and Elements of style in writing.
CO2. Analyze the modes and techniques of listening, speaking, reading, writing and apply them appropriately to communicate effectively with the engineering community and society.
CO3. Apply reading and writing techniques in preparing documents by examining SQ3R Technique, Writer's Block, and Précis Writing.
CO4. Communicate effectively in Conferences, Symposia, Seminars and in formal and real time situations by applying appropriate speaking techniques learnt by examining different communication styles used in similar contexts.

I B. Tech. – I Semester
(20BT11201) **PROGRAMMING FOR PROBLEM SOLVING**
(Common to CSE, CSSE, IT, CSE (AI), CSE(DS), CSBS, CSE(AI&ML), CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: A Course on Basic Mathematics.
COURSE DESCRIPTION: Introduction to C Programming; Operators and Expressions; Input and Output Functions; Control Structures; Problem Solving Aspects; Arrays and Strings; Functions; Pointers; Structures and Unions; File Handling.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Demonstrate knowledge on C programming constructs to develop programs.
CO2. Design algorithms using problem-solving techniques for given problems.
CO3. Apply functions and Arrays to enhance reusability and data manipulation.
CO4. Use pointers to manage the memory effectively.
CO5. Apply Structures, Unions and File handling concepts to develop societal applications.

I B. Tech. – I Semester
(20BT10201) **BASIC ELECTRICAL AND ELECTRONICS ENGINEERING**
(Common to ME, EEE, ECE, EIE, CSE, CSSE, IT, CSE(AI), CSE(DS), CSE(AI&ML), CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Principles of Electrical Systems; AC & DC Machines; Semiconductor Devices and Op-Amps.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Analyze electrical circuits by applying the conceptual knowledge of circuit concepts.
CO2. Demonstrate knowledge on various generation technologies, protection devices, safety procedures and BEE standards.
CO3. Demonstrate knowledge on characteristics and applications of transformers and AC machines.
CO4. Demonstrate knowledge on characteristics and applications of diode, BJT and Op-amps.

I B.Tech. - I Semester
(20BT1BS31) **ENGINEERING CHEMISTRY LAB**
(Common to CE, ME, CSE, CSSE, IT, CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: -
COURSE DESCRIPTION: Estimation of hardness ground water sample, alkalinity, dissolved oxygen of water samples, Iron, residual chlorine in drinking water and Strength of an acid in Pb-Acid battery by volumetric methods; Instrumental methods like conductivity meter, potentiometer, P^H meter and colorimeter; Measurement of viscosity of lubricants; and Determination of the influence of pH on metallic corrosion.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Apply analytical skills for the quantitative estimation of materials through volumetric methods of analysis and address the societal, health issues related to quality of water.
CO2. Develop analytical skills for the quantitative estimation of materials through instrumental methods of analysis.
CO3. Work independently and in teams to solve problems with effective communication.

I B.Tech. - I Semester
(20BT1HS31)**COMMUNICATIVE ENGLISH LAB**
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSBS, CSE(AI&ML) and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: -
COURSE DESCRIPTION: Just a Minute, Elocution/Impromptu; Phonetics; Vocabulary Building; Grammar; Giving Directions; Role Plays; Public Speaking; Letter Writing; Describing Objects; Listening Comprehension; Information Transfer and Reading Comprehension.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Demonstrate knowledge of Phonetics by examining and applying sounds of English through Phonetics.
CO2. Analyze sentence structures by applying and demonstrating knowledge of Vocabulary and Grammar.
CO3. Apply appropriate listening and reading skills by analyzing the context, and demonstrate through listening comprehension and reading comprehension.
CO4. Function effectively as an individual and as a member in diverse teams examining and applying speaking skills in Just A Minute and Role Play.
CO5. Communicate effectively applying appropriate writing and speaking techniques by examining and demonstrating knowledge through Describing Objects, Information Transfer and Letter Writing in formal and real time situations.

I B. Tech. – I Semester
(20BT11231) **PROGRAMMING FOR PROBLEM SOLVING LAB**
(Common to CSE, CSSE, IT, CSE (AI), CSE (DS), CSBS, CSE(AI&ML), CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: A Course on Programming for Problem Solving.
COURSE DESCRIPTION: Hands on practice in developing and executing programs using C Programming concepts include control statements, arrays, functions, strings, pointers structures and file handling.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Analyze problems to design suitable algorithmic solutions.
CO2. Apply C programming constructs to develop solutions to the engineering problems.
CO3. Work effectively as an individual to develop solutions based on the user requirements.
CO4. Write and present a substantial technical report/document effectively.

I B. Tech. - I Semester
(20BT1MC01) **UNIVERSAL HUMAN VALUES**
(Mandatory Course)
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSBS, CSE(AI&ML) and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	-	30	2	-	-	-

PRE-REQUISITES:-
COURSE DESCRIPTION: Value education; Human being and self; Family, the society and the nations; Harmony with the nature and Harmony with professional ethics.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Understand Values and skills for sustained happiness and prosperity.
CO2. Analyse realistic implications of a Holistic understanding of ethical human conduct, trustful and mutually fulfilling human behaviour.
CO3. Apply holistic approach in personal life and profession through a positive understanding of the Human reality and existence.

I B. Tech. - II Semester
(20BT2BS01)**TRANSFORMATION TECHNIQUES AND LINEAR ALGEBRA**
(Common to All Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Fourier Series and Fourier Transforms; Laplace Transforms; Inverse Laplace Transforms; Linear Algebra-I (Matrices); Linear Algebra-II (Vector Spaces).
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Apply the knowledge of Fourier and Laplace transform techniques to solve differential equations.
CO2. Analyze linear transformations and associated matrices to solve engineering problems by applying the knowledge of linear algebra.

I B. Tech. – II Semester
(20BT1BS03)**ENGINEERING PHYSICS**
(Common to CSE, CSSE, IT, CSBS, CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Wave Optics; Electromagnetic Waves; Fiber Optics; Semiconductors; Optoelectronic Devices; Dielectrics; Magnetic materials; Superconductors and Nanomaterials.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Apply the knowledge of light waves to interpret the concepts of Interference, Diffraction and Polarization.
CO2. Demonstrate the concepts of electromagnetic wave propagation in Optical fibers.
CO3. Apply the basic knowledge of semiconductors to understand the functioning of various optoelectronic devices.
CO4. Demonstrate the basic knowledge of dielectric and magnetic properties to understand the various dielectric polarizations and magnetic materials.
CO5. Understand the concepts of superconductors and nanomaterials to familiarize their applications in relevant fields.

I B. Tech. – II Semester
(20BT20501) **DIGITAL LOGIC DESIGN**
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSE(AI&ML), CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Foundation in design and analysis of the operation of digital gates; Concepts of Boolean algebra, Minimization of logic circuits; Design and implementation of combinational and sequential logic circuits; Analysis and design of flip-flops, registers, and counters and comparison of their behavior and characteristics; Design digital systems using Programmable logic.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Apply knowledge of binary systems, logic gates and Boolean functions to represent a given problem using Boolean logic.
CO2. Minimize and implement Boolean functions to build combinational logic circuits.
CO3. Design combinational and sequential logic circuits for digital systems.
CO4. Design digital systems using programmable logic to solve engineering problems.

I B. Tech. – II Semester
(20BT21501) **OBJECT ORIENTED PROGRAMMING THROUGH JAVA**
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSBS, CSE(AI&ML), CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: A Course on Programming for Problem Solving
COURSE DESCRIPTION: Introduction to Object Oriented Programming, Classes and Objects; Inheritance, Packages, Interfaces; Exception handling, Multithreading; Collection Classes; Swings, Event handling.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Apply object oriented programming constructs to solve programming problems.
CO2. Design solutions to the problems by using control statements, interfaces, utility classes and Packages.
CO3. Solve real time problems using object oriented programming features–polymorphism, inheritance, exception handling and multithreading.
CO4. Apply multithreading mechanism to enhance the performance of a system.
CO5. Develop user interfaces using GUI programming techniques.

I B. Tech. – II Semester
(20BT10331) **COMPUTER AIDED ENGINEERING DRAWING**
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSE(AI&ML) and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	1	4	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Engineering drawing conventions; Importance of engineering drawing; fundamental concepts of sketching; computer aided drafting and different types of projections of geometric entities (both 2D and 3D) through computer aided drafting packages.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Apply the principles of engineering drawing, Methods and CAD tools to draw the Geometries, Curves and Orthographic projections used to communicate in engineering field.
CO2. Develop lateral surfaces of solids and draw Isometric views of given objects for engineering communication using principles of engineering drawing and CAD tools.
CO3. Work independently / in groups & communicate effectively in oral and written forms.

I B. Tech. – II Semester
(20BT1BS32) **ENGINEERING PHYSICS LAB**
(Common to CSE, CSSE, IT, CSBS, CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: -
COURSE DESCRIPTION: Estimation of thickness of the wire using wedge shape method; Wavelength of monochromatic light source by diffraction grating; Newton's ring method; numerical aperture and acceptance angle of optical fiber; Characteristics of p-n junction diode; Photodiode and LED; Experimental determination of carrier concentration and energy gap of a semiconductor material; Determination resistivity of semiconductor by Four probe method and magnetic field along axial line of a current carrying coil.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Apply the basic knowledge of light waves and semiconductors to demonstrate the functioning of optoelectronic devices.
CO2. Understand the experimental procedures to calculate the thickness of a thin film, Hall coefficient, and acceptance angle of an optical fiber.
CO3. Determine the experimental values of magnetic field induction, wave length of a light source, energy gap of a semiconductor.
CO4. Apply skills to plot characteristic curves to determine the various parameters of semiconductor diodes.
CO5. Work independently and in teams to solve problems with effective communication.

I B. Tech. – II Semester
(20BT10332) **ENGINEERING WORKSHOP**
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSE(AI&ML) and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: -
COURSE DESCRIPTION: Knowledge on various workshop hand and power tools; hands on experience in different manufacturing trades such as fitting, carpentry, sheet metal forming and foundry; Demonstration on dismantling and assembling of various two wheeler parts, power tools in machining and metal joining, basics of plumbing and working of 3D printer.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Design and model various basic prototypes in the trade of fitting such as square/half round mating, V- mating and dovetail mating from the given MS work pieces using fitting tools.
CO2. Develop different prototypes in the carpentry trade such as cross lap joint, dovetail / bridle joints and Mortise and Tenon joint using carpentry tools.
CO3. Design and model different prototypes in the sheet metal forming trade such as rectangular tray, square vessel/cylinder, Funnel as per the dimensions using sheet metal forming tools.
CO4. Develop sand mould using single piece pattern and split piece pattern in the foundry trade using foundry tools.
CO5. Develop electric circuits for series and stair case connections.
CO6. Demonstrate the knowledge on power tools, plumbing operation, 3D printing technology involved in different engineering applications.
CO7. Work independently / in groups & communicate effectively in oral and written forms.

I B. Tech. – II Semester
(20BT21531) **OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB**
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSBS, CSE(AI&ML), CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: A course on Object Oriented Programming through Java.
COURSE DESCRIPTION: Hands-on experience on Polymorphism; Inheritance and Interfaces; Exception Handling; Multithreading; Event Handling; swings.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Apply syntactic constructs of JAVA to solve logic based problems
CO2. Develop application programs using object oriented programming features.
CO3. Solve real time problems using interfaces, packages, Exception Handling, Collection framework and Multithreading.
CO4. Develop GUI Applications using Swings, Event handling mechanisms.
CO5. Work independently and in team to solve problems with effective communication.

I B.Tech. - II Semester
(20BT1HSAC) **SPOKEN ENGLISH**
(Audit Course)
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSBS, CSE(AI&ML) and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	2	-	-	-

PRE-REQUISITES: -
COURSE DESCRIPTION: Grammar; Functional English; Paragraph writing; Letter writing and Email writing.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Demonstrate knowledge of grammar and vocabulary in writing effective formal letters and e-mails.
CO2. Communicate effectively by applying appropriate speaking and writing techniques by examining and applying functional English.

Program: B.Tech. COMPUTER SCIENCE AND ENGINEERING (DATA SCIENCE)

I B. Tech. - I Semester
(20BT1BS01) **DIFFERENTIAL EQUATIONS AND MULTIVARIABLE CALCULUS**
(Common to All Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Ordinary Differential Equations; Partial Differential Equations; Multivariable Calculus (Differentiation); Multivariable Calculus (Integration); Multivariable Calculus (Vector Calculus).
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Solve the higher order linear differential equations and identify solutions by analytical methods related to various engineering problems involving electrical circuits.
CO2. Formulate and solve partial differential equations for engineering problems.
CO3. Determine maxima and minima of functions of two variables and analyze their behaviour at extreme values.
CO4. Evaluate and apply multiple integrals to determine areas of plane curves.
CO5. Identify solenoidal and irrotational vector fields and apply vector integral theorems in evaluating areas and volumes.

I B. Tech. – I Semester
(20BT1BS03)**ENGINEERING PHYSICS**
(Common to EEE, ECE, EIE, CSE(AI),CSE(DS) and CSE(AI&ML))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES:-
COURSE DESCRIPTION: Wave Optics; Electromagnetic Waves; Fiber Optics; Semiconductors; Optoelectronic Devices; Dielectrics; Magnetic materials; Superconductors and Nanomaterials.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Apply the knowledge of light waves to interpret the concepts of Interference, Diffraction and Polarization.
CO2. Demonstrate the concepts of electromagnetic wave propagation in Optical fibers.
CO3. Apply the basic knowledge of semiconductors to understand the functioning of various optoelectronic devices.
CO4. Demonstrate the basic knowledge of dielectric and magnetic properties to understand the various dielectric polarizations and magnetic materials.
CO5. Understand the concepts of superconductors and nanomaterials to familiarize their applications in relevant fields.

I B. Tech. - I Semester
(20BT1HS01)**COMMUNICATIVE ENGLISH**
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSBS, CSE(AI&ML) and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES:-
COURSE DESCRIPTION: Introduction to Communication; Active Listening; Effective Speaking; Reading and Technical Writing.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Demonstrate knowledge of English language, examining and applying the aspects of Process of communication, Paralinguistic features, Skimming, Scanning, and Elements of style in writing.
CO2. Analyze the modes and techniques of listening, speaking, reading, writing and apply them appropriately to communicate effectively with the engineering community and society.
CO3. Apply reading and writing techniques in preparing documents by examining SQ3R Technique, Writer's Block, and Précis Writing.
CO4. Communicate effectively in Conferences, Symposia, Seminars and in formal and real time situations by applying appropriate speaking techniques learnt by examining different communication styles used in similar contexts.

I B. Tech. – I Semester
(20BT11201) **PROGRAMMING FOR PROBLEM SOLVING**
(Common to CSE, CSSE, IT, CSE (AI), CSE (DS), CSBS, CSE(AI&ML), CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: A Course on Basic Mathematics.
COURSE DESCRIPTION: Introduction to C Programming; Operators and Expressions; Input and Output Functions; Control Structures; Problem Solving Aspects; Arrays and Strings; Functions; Pointers; Structures and Unions; File Handling.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Demonstrate knowledge on C programming constructs to develop programs.
CO2. Design algorithms using problem-solving techniques for given problems.
CO3. Apply functions and Arrays to enhance reusability and data manipulation.
CO4. Use pointers to manage the memory effectively.
CO5. Apply Structures, Unions and File handling concepts to develop societal applications.

I B. Tech. – I Semester
(20BT10201) **BASIC ELECTRICAL AND ELECTRONICS ENGINEERING**
(Common to ME, EEE, ECE, EIE, CSE, CSSE, IT, CSE(AI), CSE(DS), CSE(AI&ML), CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Principles of Electrical Systems; AC & DC Machines; Semiconductor Devices and Op-Amps.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Analyze electrical circuits by applying the conceptual knowledge of circuit concepts.
CO2. Demonstrate knowledge on various generation technologies, protection devices, safety procedures and BEE standards.
CO3. Demonstrate knowledge on characteristics and applications of transformers and AC machines.
CO4. Demonstrate knowledge on characteristics and applications of diode, BJT and Op-amps.

I B.Tech. - I Semester
(20BT1BS32)**ENGINEERING PHYSICS LAB**
(Common to EEE, ECE, EIE, CSE(AI),CSE(DS) and CSE(AI&ML))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES:-
COURSE DESCRIPTION: Estimation of thickness of the wire using wedge shape method; Wavelength of monochromatic light source by diffraction grating; Newton's ring method; numerical aperture and acceptance angle of optical fiber; Characteristics of p-n junction diode; Photodiode and LED; Experimental determination of carrier concentration and energy gap of a semiconductor material; Determination resistivity of semiconductor by Four probe method and magnetic field along axial line of a current carrying coil.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Apply the basic knowledge of light waves and semiconductors to demonstrate the functioning of optoelectronic devices.
CO2. Understand the experimental procedures to calculate the thickness of a thin film, Hall coefficient, and acceptance angle of an optical fiber.
CO3. Determine the experimental values of magnetic field induction, wave length of a light source, energy gap of a semiconductor.
CO4. Apply skills to plot characteristic curves to determine the various parameters of semiconductor diodes.
CO5. Work independently and in teams to solve problems with effective communication.

I B.Tech. - I Semester
(20BT1HS31) **COMMUNICATIVE ENGLISH LAB**
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSBS, CSE(AI&ML) and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: -
COURSE DESCRIPTION: Just a Minute, Elocution/Impromptu; Phonetics; Vocabulary Building; Grammar; Giving Directions; Role Plays; Public Speaking; Letter Writing; Describing Objects; Listening Comprehension; Information Transfer and Reading Comprehension.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Demonstrate knowledge of Phonetics by examining and applying sounds of English through Phonetics.
CO2. Analyze sentence structures by applying and demonstrating knowledge of Vocabulary and Grammar.
CO3. Apply appropriate listening and reading skills by analyzing the context, and demonstrate through listening comprehension and reading comprehension.
CO4. Function effectively as an individual and as a member in diverse teams examining and applying speaking skills in Just A Minute and Role Play.
CO5. Communicate effectively applying appropriate writing and speaking techniques by examining and demonstrating knowledge through Describing Objects, Information Transfer and Letter Writing in formal and real time situations.

I B. Tech. – I Semester
(20BT11231) **PROGRAMMING FOR PROBLEM SOLVING LAB**
(Common to CSE, CSSE, IT, CSE (AI), CSE (DS), CSBS, CSE(AI&ML), CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: A Course on “Programming for Problem Solving”.
COURSE DESCRIPTION: Hands on practice in developing and executing programs using C Programming concepts include control statements, arrays, functions, strings, pointers structures and file handling.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Analyse problems to design suitable algorithmic solutions.
CO2. Apply C programming constructs to develop solutions to the engineering problems.
CO3. Work effectively as an individual to develop solutions based on the user requirements.
CO4. Write and present a substantial technical report/document effectively.

I B. Tech. - I Semester
(20BT1MC01) **UNIVERSAL HUMAN VALUES**
(Mandatory Course)
(Common to CSE,CSSE, IT, CSE(AI), CSE(DS), CSBS, CSE(AI&ML) and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	-	30	2	-	-	-

PRE-REQUISITES:-
COURSE DESCRIPTION: Value education; Human being and self; Family, the society and the nations; Harmony with the nature and Harmony with professional ethics.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Understand Values and skills for sustained happiness and prosperity.
CO2. Analyse realistic implications of a Holistic understanding of ethical human conduct, trustful and mutually fulfilling human behaviour.
CO3. Apply holistic approach in personal life and profession through a positive understanding of the Human reality and existence.

I B. Tech. - II Semester
(20BT2BS01) **TRANSFORMATION TECHNIQUES AND LINEAR ALGEBRA**
(Common to All Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES:--
COURSE DESCRIPTION: Fourier Series and Fourier Transforms; Laplace Transforms; Inverse Laplace Transforms; Linear Algebra-I (Matrices); Linear Algebra-II (Vector Spaces).
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Construct the Fourier series for periodic functions and demonstrate the use of Fourier series and Fourier transform to connect the frequency and time domain systems.
CO2. Solve initial and boundary value problems in engineering fields through Laplace Transform techniques.
CO3. Apply the matrix theory in solving system of linear equations and determine the Eigen values and Eigen vectors.
CO4. Demonstrate the knowledge of Linear Transformations to intelligent systems.

I B. Tech. - II Semester
(20BT1BS02) **ENGINEERING CHEMISTRY**
(Common to EEE, ECE, EIE,CSE(AI), CSE(DS) and CSE(AI&ML))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Water Treatment; Atomic Structure and Bonding Theories; Electrochemistry and Applications; Corrosion; Instrumental Methods and Applications; Fuel chemistry and Lubricants.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Analyze and solve problems associated with hardness of water, boiler troubles and address the societal, health and safety issues related to quality of water.
CO2. Apply the basic knowledge of quantum mechanical approach to atomic structure and bonding theories to identify shapes of different molecules
CO3. Apply the basic knowledge of corrosion phenomenon to identify solutions for control of corrosion and demonstrate competency in the basic concepts of electrochemical cells.
CO4. Demonstrate the basic knowledge of instrumental methods and their applications in the structural analysis of materials.
CO5. Apply the basic knowledge of fuel chemistry and lubricants to identify the quality of fuels and lubricants.

I B. Tech. – II Semester
(20BT20501) **DIGITAL LOGIC DESIGN**
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSE(AI&ML), CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES:-
COURSE DESCRIPTION: Foundation in design and analysis of the operation of digital gates; Concepts of Boolean algebra, Minimization of logic circuits; Design and implementation of combinational and sequential logic circuits; Analysis and design of flip-flops, registers, and counters and comparison of their behavior and characteristics; Design digital systems using Programmable logic.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Apply knowledge of binary systems, logic gates and Boolean functions to represent a given problem using Boolean logic.
CO2. Minimize and implement Boolean functions to build combinational logic circuits.
CO3. Design combinational and sequential logic circuits for digital systems.
CO4. Design digital systems using programmable logic to solve engineering problems.

I B. Tech. – II Semester
(20BT21501) **OBJECT ORIENTED PROGRAMMING THROUGH JAVA**
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSBS, CSE(AI&ML), CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: A course on "Programming for Problem Solving".
COURSE DESCRIPTION: Introduction to Object Oriented Programming, Classes and Objects; Inheritance, Packages, Interfaces; Exception handling, Multithreading; Collection Classes; Swings, Event handling.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Apply object oriented programming constructs to solve programming problems.
CO2. Design solutions to the problems by using control statements, interfaces, utility classes and Packages.
CO3. Solve real time problems using object oriented programming features– polymorphism, inheritance, exception handling and multithreading.
CO4. Apply multithreading mechanism to enhance the performance of a system.
CO5. Develop user interfaces using GUI programming techniques.

I B. Tech. – II Semester
(20BT10331) **COMPUTER AIDED ENGINEERING DRAWING**
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSE(AI&ML) and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	1	4	3

PRE-REQUISITES:-
COURSE DESCRIPTION: Engineering drawing conventions; Importance of engineering drawing; fundamental concepts of sketching; computer aided drafting and different types of projections of geometric entities (both 2D and 3D) through computer aided drafting packages.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Apply the principles of engineering drawing, Methods and CAD tools to draw the Geometries, Curves and Orthographic projections used to communicate in engineering field.
CO2. Develop lateral surfaces of solids and draw Isometric views of given objects for engineering communication using principles of engineering drawing and CAD tools.
CO3. Work independently / in groups & communicate effectively in oral and written forms.

I B.Tech. - II Semester
(20BT1BS31) **ENGINEERING CHEMISTRY LAB**
(Common to EEE, ECE, EIE,CSE(AI), CSE(DS) and CSE(AI&ML))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: -
COURSE DESCRIPTION: Estimation of hardness ground water sample, alkalinity, dissolved oxygen of water samples, Iron, residual chlorine in drinking water and Strength of an acid in Pb-Acid battery by volumetric methods; Instrumental methods like conductivity meter, potentiometer, P^H meter and colorimeter; Measurement of viscosity of lubricants; and Determination of the influence of pH on metallic corrosion.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Apply analytical skills for the quantitative estimation of materials through volumetric methods of analysis and address the societal, health issues related to quality of water.
CO2. Develop analytical skills for the quantitative estimation of materials through instrumental methods of analysis.
CO3. Work independently and in teams to solve problems with effective communication.

I B. Tech. – II Semester
(20BT10332) **ENGINEERING WORKSHOP**
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSE(AI&ML) and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: -
COURSE DESCRIPTION: Knowledge on various workshop hand and power tools; hands on experience in different manufacturing trades such as fitting, carpentry, sheet metal forming and foundry; Demonstration on dismantling and assembling of various two wheeler parts, power tools in machining and metal joining, basics of plumbing and working of 3D printer.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Design and model various basic prototypes in the trade of fitting such as square/half round mating, V- mating and dovetail mating from the given MS work pieces using fitting tools.
CO2. Develop different prototypes in the carpentry trade such as cross lap joint, dovetail / bridle joints and Mortise and Tenon joint using carpentry tools.
CO3. Design and model different prototypes in the sheet metal forming trade such as rectangular tray, square vessel/cylinder, Funnel as per the dimensions using sheet metal forming tools.
CO4. Develop sand mould using single piece pattern and split piece pattern in the foundry trade using foundry tools.
CO5. Develop electric circuits for series and stair case connections.
CO6. Demonstrate the knowledge on power tools, plumbing operation, 3D printing technology involved in different engineering applications.
CO7. Work independently / in groups & communicate effectively in oral and written forms.

I B. Tech. – II Semester
(20BT21531) **OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB**
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSBS, CSE(AI&ML), CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: A course on "Object Oriented Programming through Java".
COURSE DESCRIPTION: Hands-on experience on Polymorphism; Inheritance and Interfaces; Exception Handling; Multithreading; Event Handling; swings.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Apply syntactic constructs of JAVA to solve logic based problems
CO2. Develop application programs using object oriented programming features.
CO3. Solve real time problems using interfaces, packages, Exception Handling, Collection framework and Multithreading.
CO4. Develop GUI Applications using Swings, Event handling mechanisms.
CO5. Work independently and in team to solve problems with effective communication.

I B.Tech. - II Semester
(20BT1HSAC) **SPOKEN ENGLISH**
(Audit Course)
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSBS, CSE(AI&ML) and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	2	-	-	-

PRE-REQUISITES: -
COURSE DESCRIPTION: Grammar; Functional English; Paragraph writing; Letter writing and Email writing.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Demonstrate knowledge of grammar and vocabulary in writing effective formal letters and e-mails.
CO2. Communicate effectively by applying appropriate speaking and writing techniques by examining and applying functional English.

Program: B.Tech. COMPUTER SCIENCE AND ENGINEERING (Internet of Things)

I B. Tech. - I Semester
(20BT1BS01) DIFFERENTIAL EQUATIONS AND MULTIVARIABLE CALCULUS
(Common to CE, ME, EEE, ECE, EIE, CSE, CSSE, IT, CSE(AI), CSE(DS), CSBS, CSE(AI&ML), CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE REQUISITE: -
COURSE DESCRIPTION: Ordinary Differential Equations; Partial Differential Equations; Multivariable Calculus (Differentiation); Multivariable Calculus (Integration); Multivariable Calculus (Vector Calculus).
COURSE OUTCOMES: ***After successful completion of this course, the students will be able to:***
CO1. Solve the higher order linear differential equations and identify solutions by analytical methods related to various engineering problems involving electrical circuits.
CO2. Formulate and solve partial differential equations for engineering problems.
CO3. Determine maxima and minima of functions of two variables and analyze their behaviour at extreme values.
CO4. Evaluate and apply multiple integrals to determine areas of plane curves.
CO5. Identify solenoidal and irrotational vector fields and apply vector integral theorems in evaluating areas and volumes.

I B. Tech. - I Semester
(20BT1BS02) ENGINEERING CHEMISTRY
(Common to CE, ME, CSE, CSSE, IT, CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE REQUISITE: -
COURSE OUTCOMES: ***After successful completion of this course, the students will be able to:***
CO1. Analyze and solve problems associated with hardness of water, boiler troubles and address the societal, health and safety issues related to quality of water.
CO2. Apply the basic knowledge of quantum mechanical approach to atomic structure and bonding theories to identify shapes of different molecules.
CO3. Apply the basic knowledge of corrosion phenomenon to identify solutions for control of corrosion and demonstrate competency in the basic concepts of electrochemical cells.
CO4. Demonstrate the basic knowledge of instrumental methods and their applications in the structural analysis of materials.
CO5. Apply the basic knowledge of fuel chemistry and lubricants to identify the quality of fuels and lubricants.

I B. Tech. – I Semester
(20BT11201) PROGRAMMING FOR PROBLEM SOLVING
(Common to CSE, CSSE, IT, CSE (AI), CSE (DS), CSBS, CSE(AI&ML), CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: A Course on Basic Mathematics.
COURSE DESCRIPTION: Introduction to C Programming; Operators and Expressions; Input and Output Functions; Control Structures; Problem Solving Aspects; Arrays and Strings; Functions; Pointers; Structures and Unions; File Handling.
COURSE OUTCOMES: ***After successful completion of this course, the students will be able to:***
CO1. Demonstrate knowledge on C programming constructs to develop programs.
CO2.Design algorithms usingproblem-solving techniques for given problems.
CO3. Apply functions and Arrays to enhance reusability and data manipulation.
CO4. Use pointers to manage the memory effectively.
CO5. Apply Structures, Unions and File handling concepts to develop societal applications.

I B. Tech. – I Semester

(20BT10201) BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

(Common to ME, EEE, ECE, EIE, CSE, CSSE, IT, CSE(AI), CSE(DS) and CSBS, CSE(AI&ML), CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: --

COURSE DESCRIPTION: Principles of Electrical Systems; AC & DC Machines; Semiconductor Devices and Op-Amps.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1: Analyze electrical circuits by applying the conceptual knowledge of circuit concepts.

CO2: Demonstrate knowledge on various generation technologies, protection devices, safety procedures and BEE standards.

CO3: Demonstrate knowledge on characteristics and applications of transformers and AC machines.

CO4: Demonstrate knowledge on characteristics and applications of diode, BJT and Op-amps.

I B. Tech. - I Semester

(20BT1BS31) ENGINEERING CHEMISTRY LABORATORY

(Common to CE, ME, CSE, CSSE, IT, CSE(IOT), CS&D and CSE(CS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE REQUISITE: -

COURSE OUTCOMES: ***After successful completion of this course, the students will be able to:***

CO1. Apply analytical skills for the quantitative estimation of materials through volumetric methods of analysis and address the societal, health issues related to quality of water.

CO2. Develop analytical skills for the quantitative estimation of materials through instrumental methods of analysis.

CO3. Work independently and in teams to solve problems with effective communication.

I B. Tech. – I Semester

(20BT10331) COMPUTER AIDED ENGINEERING DRAWING

(Common to CE, ME, EEE, ECE, EIE, CSE(IOT) and CS&D)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	1	4	3

PRE-REQUISITES: **--**

COURSE DESCRIPTION: Engineering drawing conventions; Importance of engineering drawing; fundamental concepts of sketching; computer aided drafting and different types of projections of geometric entities (both 2D and 3D) through computer aided drafting packages.

COURSE OUTCOMES: ***After successful completion of this course, the students will be able to:***

CO4: Apply the principles of engineering drawing, Methods and CAD tools to draw the Geometries, Curves and Orthographic projections used to communicate in engineering field.

CO5: Develop lateral surfaces of solids and draw Isometric views of given objects for engineering communication using principles of engineering drawing and CAD tools.

CO3. Work independently / in groups & communicate effectively in oral and written forms.

I B. Tech. – II Semester
(20BT10332) ENGINEERING WORKSHOP
(Common to CE, ME, EEE, ECE, EIE, CSE(IOT) and CS&D)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: --
COURSE DESCRIPTION: Knowledge on various workshop hand and power tools; hands on experience in different manufacturing trades such as fitting, carpentry, sheet metal forming and foundry; Demonstration on dismantling and assembling of various two wheeler parts, power tools in machining and metal joining, basics of plumbing and working of 3D printer.
COURSE OUTCOMES: ***After successful completion of this course, the students will be able to:***
CO1: Design and model various basic prototypes in the trade of fitting such as square/half round mating, V- mating and dovetail mating from the given MS work pieces using fitting tools.
CO2: Develop different prototypes in the carpentry trade such as cross lap joint, dovetail / bridle joints and Mortise and Tenon joint using carpentry tools.
CO3: Design and model different prototypes in the sheet metal forming trade such as rectangular tray, square vessel/cylinder, Funnel as per the dimensions using sheet metal forming tools.
CO4: Develop sand mould using single piece pattern and split piece pattern in the foundry trade using foundry tools.
CO5: Develop electric circuits for series and stair case connections.
CO6: Demonstrate the knowledge on power tools, plumbing operation, 3D printing technology involved in different engineering applications.
CO7: Work independently / in groups & communicate effectively in oral and written forms.

I B. Tech. – I Semester
(20BT11231) PROGRAMMING FOR PROBLEM SOLVING LAB
(Common to CSE, CSSE, IT, CSE (AI), CSE (DS), CSBS, CSE(AI&ML), CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: A Course on Programming for Problem Solving.
COURSE DESCRIPTION: Hands on practice in developing and executing programs using C Programming concepts include control statements, arrays, functions, strings, pointers structures and file handling.
COURSE OUTCOMES: ***After successful completion of this course, the students will be able to:***
CO1. Analyze problems to design suitable algorithmic solutions.
CO2. Apply C programming constructs to develop solutions to the engineering problems.
CO3. Work effectively as an individual to develop solutions based on the user requirements.
CO4. Write and present a substantial technical report/document effectively.

I B. Tech. - I Semester
(20BT1HSAC) SPOKEN ENGLISH
(Common to CE, ME, EEE, ECE, EIE, CSE, (IOT) and CS&D)
(Audit Course)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	2	-	-	-

PRE-REQUISITES: -
COURSE OUTCOMES: ***After successful completion of this course, the students will be able to:***
CO1: Demonstrate knowledge of grammar and vocabulary in writing effective formal letters and e-mails.
CO2: Communicate effectively by applying appropriate speaking and writing techniques by examining and applying functional English.

I B. Tech. - II semester
(20BT2BS01) TRANSFORMATION TECHNIQUES AND LINEAR ALGEBRA
(Common to CE, ME, EEE, ECE, EIE, CSE, CSSE, IT, CSE(AI), CSE(DS), CSBS, CSE(AI&ML), CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITE: -
COURSE DESCRIPTION: Fourier Series and Fourier Transforms; Laplace Transforms; Inverse Laplace Transforms; Linear Algebra-I (Matrices); Linear Algebra-II (Vector Spaces).
COURSE OUTCOMES: ***After successful completion of this course, the students will be able to:***
CO1. Construct the Fourier series for periodic functions and demonstrate the use of Fourier series and Fourier transform to connect the frequency and time domain systems.
CO2. Solve initial and boundary value problems in engineering fields through Laplace Transform techniques.
CO3. Apply the matrix theory in solving system of linear equations and determine the Eigen values and Eigen vectors.
CO4. Demonstrate the knowledge of Linear Transformations to intelligent systems.

I B. Tech. – II Semester
(20BT1BS03) ENGINEERING PHYSICS
(Common to CSE, CSSE, IT, CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: -
COURSE OUTCOMES: ***After successful completion of this course, the students will be able to:***
CO1. Apply the knowledge of light waves to interpret the concepts of Interference, Diffraction and Polarization.
CO2. Demonstrate the concepts of electromagnetic wave propagation in Optical fibers.
CO3. Apply the basic knowledge of semiconductors to understand the functioning of various optoelectronic devices.
CO4. Demonstrate the basic knowledge of dielectric and magnetic properties to understand the various dielectric polarizations and magnetic materials.
CO5. Understand the concepts of superconductors and nano materials to familiarize their applications in relevant fields.

I B. Tech. – II Semester
(20BT20501) DIGITAL LOGIC DESIGN
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSE(AI&ML), CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: --
COURSE DESCRIPTION: Foundation in design and analysis of the operation of digital gates; Concepts of Boolean algebra, Minimization of logic circuits; Design and implementation of combinational and sequential logic circuits; Analysis and design of flip-flops, registers, and counters and comparison of their behavior and characteristics; Design digital systems using Programmable logic.
COURSE OUTCOMES: ***After successful completion of this course, the students will be able to:***
CO1. Apply knowledge of binary systems, logic gates and Boolean functions to represent a given problem using Boolean logic.
CO2. Minimize and implement Boolean functions to build combinational logic circuits.
CO3. Design combinational and sequential logic circuits for digital systems.
CO4. Design digital systems using programmable logic to solve engineering problems.

I B. Tech. – II Semester
(20BT21501) OBJECT ORIENTED PROGRAMMING THROUGH JAVA
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSBS, CSE(AI&ML), CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: A course on Programming for Problem Solving
COURSE DESCRIPTION: Introduction to Object Oriented Programming, Classes and Objects; Inheritance, Packages, Interfaces; Exception handling, Multithreading; Collection Classes; Swings, Event handling.
COURSE OUTCOMES: ***After successful completion of this course, the students will be able to:***
CO1. Apply object oriented programming constructs to solve programming problems.
CO2. Design solutions to the problems by using control statements, interfaces, utility classes and Packages.
CO3. Solve real time problems using object oriented programming features – polymorphism, inheritance, exception handling and multithreading.
CO4. Apply multithreading mechanism to enhance the performance of a system.
CO5. Develop user interfaces using GUI programming techniques.

I B. Tech. - I Semester
(20BT1HS01) COMMUNICATIVE ENGLISH
(Common to CE, ME, EEE, ECE, EIE, CSE, CSE(IOT) and CS&D)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: -
COURSE OUTCOMES: ***After successful completion of this course, the students will be able to:***
CO1: Demonstrate knowledge of English language, examining and applying the aspects of Process of communication, Paralinguistic features, Skimming, Scanning, and Elements of style in writing.
CO2: Analyze the modes and techniques of listening, speaking, reading, writing and apply them appropriately to communicate effectively with the engineering community and society.
CO3: Apply reading and writing techniques in preparing documents by examining SQ3R Technique, Writer's Block, and Précis Writing.
CO4: Communicate effectively in Conferences, Symposia, Seminars and in formal and real time situations by applying appropriate speaking techniques learnt by examining different communication styles used in similar contexts.

I B. Tech. – II Semester
(20BT1BS32) ENGINEERING PHYSICS LAB
(Common to CSE, CSSE, IT, CSBS, CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE REQUISITE: -
COURSE OUTCOMES: ***After successful completion of this course, the students will be able to:***
CO1. Apply the basic knowledge of light waves and semiconductors to demonstrate the functioning of optoelectronic devices.
CO2. Understand the experimental procedures to calculate the thickness of a thin film, Hall coefficient, and acceptance angle of an optical fiber.
CO3. Determine the experimental values of magnetic field induction, wave length of a light source, energy gap of a semiconductor.
CO4. Apply skills to plot characteristic curves to determine the various parameters of semiconductor diodes.
CO5: Work independently and in teams to solve problems with effective communication.

I B.Tech. - II Semester
(20BT1HS31) COMMUNICATIVE ENGLISH LAB
(Common to CE, ME, EEE, ECE, EIE, CSE, CSE(IOT) and CS&D)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE REQUISITE: -
COURSE OUTCOMES: ***After successful completion of this course, the students will be able to:***
CO1: Demonstrate knowledge of Phonetics by examining and applying sounds of English through Phonetics.
CO2: Analyze sentence structures by applying and demonstrating knowledge of Vocabulary and Grammar.
CO3: Apply appropriate listening and reading skills by analyzing the context, and demonstrate through listening comprehension and reading comprehension.
CO4: Function effectively as an individual and as a member in diverse teams examining and applying speaking skills in Just A Minute and Role Play.
CO5: Communicate effectively applying appropriate writing and speaking techniques by examining and demonstrating knowledge through Describing Objects, Information Transfer and Letter Writing in formal and real time situations.

I B. Tech. – II Semester
(20BT21531) OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSBS, CSE(AI&ML), CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: A course on OOPS through Java.
COURSE DESCRIPTION: Hands-on experience on Polymorphism; Inheritance and Interfaces; Exception Handling; Multithreading; Event Handling; swings.
COURSE OUTCOMES: ***After successful completion of this course, the students will be able to:***
CO1: Apply syntactic constructs of JAVA to solve logic based problems
CO2: Develop application programs using object oriented programming features.
CO3: Solve real time problems using interfaces, packages, Exception Handling, Collection framework and Multithreading.
CO4: Develop GUI Applications using Swings, Event handling mechanisms.
CO5: Work independently and in team to solve problems with effective communication

I B. Tech. - II Semester
(20BT1MC01) UNIVERSAL HUMAN VALUES
(Common to CE, ME, EEE, ECE, EIE, CSE, CSE(IOT) and CS&D)
(Mandatory Course)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	-	30	2	-	-	-

PRE-REQUISITES: -
COURSE DESCRIPTION: Process for Value Education; Harmony in the Human Being - Harmony in Myself; Harmony in Family and Society- Human Relationship; Harmony in the Nature and Existence – Coexistence; Implications of Holistic Understanding of Harmony on Professional Ethics.
COURSE OUTCOMES: ***After successful completion of this course, the students will be able to:***
CO1. Understand Values and skills for sustained happiness and prosperity.
CO2. Analyse realistic implications of a Holistic understanding of ethical human conduct, trustful and mutually fulfilling human behaviour.
CO3. Apply holistic approach in personal life and profession through a positive understanding of the Human reality and existence.

Program: B.Tech. INFORMATION TECHNOLOGY

I B. Tech. - I Semester
(20BT1BS01)**DIFFERENTIAL EQUATIONS AND MULTIVARIABLE CALCULUS**
(Common to All Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE REQUISITE: -
COURSE DESCRIPTION: Ordinary Differential Equations; Partial Differential Equations; Multivariable Calculus (Differentiation); Multivariable Calculus (Integration); Multivariable Calculus (Vector Calculus).
COURSE OUTCOMES: ***After successful completion of this course, the students will be able to***:
CO1. Solve the higher order linear differential equations and identify solutions by analytical methods related to various engineering problems involving electrical circuits.
CO2. Formulate and solve partial differential equations for engineering problems.
CO3. Determine maxima and minima of functions of two variables and analyze their behaviour at extreme values.
CO4. Evaluate and apply multiple integrals to determine areas of plane curves.
CO5. Identify solenoidal and irrotational vector fields and apply vector integral theorems in evaluating areas and volumes.

I B. Tech. - I Semester
(20BT1BS02) **ENGINEERING CHEMISTRY**
(Common to CE, ME, CSE, CSSE, IT, CSE(IoT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE REQUISITE: -
COURSE DESCRIPTION: Water Treatment; Atomic Structure and Bonding Theories; Electrochemistry and Applications; Corrosion; Instrumental Methods and Applications; Fuel chemistry and Lubricants.
COURSE OUTCOMES: ***After successful completion of this course, the students will be able to:***
CO1. Analyze and solve problems associated with hardness of water, boiler troubles and address the societal, health and safety issues related to quality of water.
CO2. Apply the basic knowledge of quantum mechanical approach to atomic structure and bonding theories to identify shapes of different molecules.
CO3. Apply the basic knowledge of corrosion phenomenon to identify solutions for control of corrosion and demonstrate competency in the basic concepts of electrochemical cells.
CO4. Demonstrate the basic knowledge of instrumental methods and their applications in the structural analysis of materials.
CO5. Apply the basic knowledge of fuel chemistry and lubricants to identify the quality of fuels and lubricants.

I B. Tech. - I Semester
(20BT1HS01)COMMUNICATIVE ENGLISH
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSBS, CSE(AI&ML) and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Introduction to Communication; Active Listening; Effective Speaking; Reading and Technical Writing.
COURSE OUTCOMES: ***After successful completion of this course, students will be able to:***
CO1: Demonstrate knowledge of English language, examining and applying the aspects of Process of communication, Paralinguistic features, Skimming, Scanning, and Elements of style in writing.
CO2: Analyze the modes and techniques of listening, speaking, reading, writing and apply them appropriately to communicate effectively with the engineering community and society.
CO3: Apply reading and writing techniques in preparing documents by examining SQ3R Technique, Writer's Block, and Précis Writing.
CO4: Communicate effectively in Conferences, Symposia, Seminars and in formal and real time situations by applying appropriate speaking techniques learnt by examining different communication styles used in similar contexts.

I B. Tech. – I Semester
(20BT11201) **PROGRAMMING FOR PROBLEM SOLVING**
(Common to CSE, CSSE, IT, CSE (AI), CSE (DS), CSBS, CSE(AI&ML),CSE(IoT),CS&D, and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: A Course on Basic Mathematics.
COURSE DESCRIPTION: Introduction to C Programming; Operators and Expressions; Input and Output Functions; Control Structures; Problem Solving Aspects; Arrays and Strings; Functions; Pointers; Structures and Unions; File Handling.
COURSE OUTCOMES: ***After successful completion of this course, the students will be able to:***
CO1. Demonstrate knowledge on C programming constructs to develop programs.
CO2. Design algorithms using problem-solving techniques for given problems.
CO3. Apply functions and Arrays to enhance reusability and data manipulation.
CO4. Use pointers to manage the memory effectively.
CO5. Apply Structures, Unions and File handling concepts to develop societal applications.

I B. Tech. – I Semester
(20BT10201) **BASIC ELECTRICAL AND ELECTRONICS ENGINEERING**
(Common to ME, EEE, ECE, EIE, CSE, CSSE, IT, CSE(AI), CSE(DS), CSE(AI&ML), CSE(IoT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: --
COURSE DESCRIPTION: Principles of Electrical Systems; AC & DC Machines; Semiconductor Devices and Op-Amps.
COURSE OUTCOMES: ***After successful completion of this course, the students will be able to:***
CO1: Analyze electrical circuits by applying the conceptual knowledge of circuit concepts.
CO2: Demonstrate knowledge on various generation technologies, protection devices, safety procedures and BEE standards.
CO3: Demonstrate knowledge on characteristics and applications of transformers and AC machines.
CO4: Demonstrate knowledge on characteristics and applications of diode, BJT and Op-amps.

I B.Tech. – I Semester
(20BT1BS31) **ENGINEERING CHEMISTRY LABORATORY**
(Common to CE, ME, CSE, CSSE, IT, CSE(IoT) , CS&D, and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE REQUISITE: -
COURSE DESCRIPTION: Estimation of hardness ground water sample, alkalinity, dissolved oxygen of water samples, Iron, residual chlorine in drinking water and Strength of an acid in Pb-Acid battery by volumetric methods; Instrumental methods like conductivity meter, potentiometer, P^H meter and colorimeter; Measurement of viscosity of lubricants; and Determination of the influence of pH on metallic corrosion.
COURSE OUTCOMES: ***After successful completion of this course, the students will be able to:***
CO1. Apply analytical skills for the quantitative estimation of materials through volumetric methods of analysis and address the societal, health issues related to quality of water.
CO2. Develop analytical skills for the quantitative estimation of materials through instrumental methods of analysis.
CO3. Work independently and in teams to solve problems with effective communication.

I B.Tech.- I Semester
(20BT1HS31)**COMMUNICATIVE ENGLISH LAB**
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSBS, CSE(AI&ML) and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE REQUISITE: -
COURSE DESCRIPTION: Just a Minute, Elocution/Impromptu; Phonetics; Vocabulary Building; Grammar; Giving Directions; Role Plays; Public Speaking; Letter Writing; Describing Objects; Listening Comprehension; Information Transfer and Reading Comprehension.
COURSE OUTCOMES: ***After successful completion of this course, the students will be able to:***
CO1: Demonstrate knowledge of Phonetics by examining and applying sounds of English through Phonetics.
CO2: Analyze sentence structures by applying and demonstrating knowledge of Vocabulary and Grammar.
CO3: Apply appropriate listening and reading skills by analyzing the context, and demonstrate through listening comprehension and reading comprehension.
CO4: Function effectively as an individual and as a member in diverse teams examining and applying speaking skills in Just A Minute and Role Play.
CO5: Communicate effectively applying appropriate writing and speaking techniques by examining and demonstrating knowledge through Describing Objects, Information Transfer and Letter Writing in formal and real time situations.

I B. Tech. – I Semester
(20BT11231) PROGRAMMING FOR PROBLEM SOLVING LAB
(Common to CSE, CSSE, IT, CSE (AI), CSE (DS), CSBS and CSE(AI&ML), CSE(IoT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: A Course on Programming for Problem Solving.
COURSE DESCRIPTION: Hands on practice in developing and executing programs using C Programming concepts include control statements, arrays, functions, strings, pointers structures and file handling.
COURSE OUTCOMES: ***After successful completion of this course, the students will be able to:***
CO1. Analyze problems to design suitable algorithmic solutions.
CO2. Apply C programming constructs to develop solutions to the engineering problems.
CO3. Work effectively as an individual to develop solutions based on the user requirements.
CO4. Write and present a substantial technical report/document effectively.

I B. Tech. - I/II Semester
(20BT1MC01) **UNIVERSAL HUMAN VALUES**
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSBS, CSE(AI&ML), and CSE(CS))
(Mandatory Course)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	-	30	2	-	-	-

PRE-REQUISITES: -
COURSE DESCRIPTION: Process for Value Education; Harmony in the Human Being - Harmony in Myself!; Harmony in Family and Society- Human Relationship; Harmony in the Nature and Existence – Coexistence; Implications of Holistic Understanding of Harmony on Professional Ethics.
COURSE OUTCOMES: ***After successful completion of this course, the students will be able to:***
CO1. Understand Values and skills for sustained happiness and prosperity.
CO2. Analyse realistic implications of a Holistic understanding of ethical human conduct, trustful and mutually fulfilling human behaviour.
CO3. Apply holistic approach in personal life and profession through a positive understanding of the Human reality and existence.

I B. Tech. - II Semester
(20BT2BS01) **TRANSFORMATION TECHNIQUES AND LINEAR ALGEBRA**
(Common to All Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITE: -
COURSE DESCRIPTION: Fourier Series and Fourier Transforms; Laplace Transforms; Inverse Laplace Transforms; Linear Algebra-I (Matrices); Linear Algebra-II (Vector Spaces).
COURSE OUTCOMES: ***After successful completion of this course, the students will be able to:***
CO1. Construct the Fourier series for periodic functions and demonstrate the use of Fourier series and Fourier transform to connect the frequency and time domain systems.
CO2. Solve initial and boundary value problems in engineering fields through Laplace Transform techniques.
CO3. Apply the matrix theory in solving system of linear equations and determine the Eigen values and Eigen vectors.
CO4. Demonstrate the knowledge of Linear Transformations to intelligent systems.

I B. Tech. –II Semester
(20BT1BS03)**ENGINEERING PHYSICS**
(Common to CSE, CSSE, IT, CSBS, CSE(IoT), CS&D, and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Wave Optics; Electromagnetic Waves; Fiber Optics; Semiconductors; Optoelectronic Devices; Dielectrics; Magnetic materials; Superconductors and Nanomaterials.
COURSE OUTCOMES: ***After successful completion of this course, the students will be able to:***
CO1. Apply the knowledge of light waves to interpret the concepts of Interference, Diffraction and Polarization.
CO2. Demonstrate the concepts of electromagnetic wave propagation in Optical fibers.
CO3. Apply the basic knowledge of semiconductors to understand the functioning of various optoelectronic devices.
CO4. Demonstrate the basic knowledge of dielectric and magnetic properties to understand the various dielectric polarizations and magnetic materials.
CO5. Understand the concepts of superconductors and nanomaterials to familiarize their applications in relevant fields.

I B. Tech. – II Semester
(20BT20501)DIGITAL LOGIC DESIGN
(Common to CSE, CSSE, IT, CSE (AI), CSE (DS), CSE (AI&ML),
CSE (IoT), CS&D, and CSE (CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: --
COURSE DESCRIPTION: Foundation in design and analysis of the operation of digital gates; Concepts of Boolean algebra, Minimization of logic circuits; Design and implementation of combinational and sequential logic circuits; Analysis and design of flip-flops, registers, and counters and comparison of their behavior and characteristics; Design digital systems using Programmable logic.
COURSE OUTCOMES: ***After successful completion of this course, the students will be able to:***
CO1. Apply knowledge of binary systems, logic gates and Boolean functions to represent a given problem using Boolean logic.
CO2. Minimize and implement Boolean functions to build combinational logic circuits.
CO3. Design combinational and sequential logic circuits for digital systems.
CO4. Design digital systems using programmable logic to solve engineering problems.

I B. Tech. – II Semester
(20BT21501) **OBJECT ORIENTED PROGRAMMING THROUGH JAVA**
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSBS, CSE(AI&ML), CSE(IoT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: A course on Programming for Problem Solving.
COURSE DESCRIPTION: Introduction to Object Oriented Programming, Classes and Objects; Inheritance, Packages, Interfaces; Exception handling, Multithreading; Collection Classes; Swings, Event handling.
COURSE OUTCOMES: ***After successful completion of this course, the students will be able to:***
CO1. Apply object oriented programming constructs to solve programming problems.
CO2. Design solutions to the problems by using control statements, interfaces, utility classes and Packages.
CO3. Solve real time problems usingobject oriented programming features– polymorphism, inheritance, exception handling and multithreading.
CO4. Apply multithreading mechanism to enhance the performance of a system.
CO5. Develop user interfaces using GUI programming techniques.

I B. Tech. –II Semester
(20BT10331) **COMPUTER AIDED ENGINEERING DRAWING**
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSE(AI&ML) and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	1	4	3

PRE-REQUISITES: **--**
COURSE DESCRIPTION: Engineering drawing conventions; Importance of engineering drawing; fundamental concepts of sketching; computer aided drafting and different types of projections of geometric entities (both 2D and 3D) through computer aided drafting packages.
COURSE OUTCOMES: ***After successful completion of this course, the students will be able to:***
CO1: Apply the principles of engineering drawing, Methods and CAD tools to draw the Geometries, Curves and Orthographic projections used to communicate in engineering field.
CO2: Develop lateral surfaces of solids and draw Isometric views of given objects for engineering communication using principles of engineering drawing and CAD tools.
CO3: Work independently / in groups & communicate effectively in oral and written forms.

I B. Tech. –II Semester
(20BT1BS32)**ENGINEERING PHYSICS LAB**
(Common to CSE, CSSE, IT, CSBS, CSE(IoT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: -
COURSE DESCRIPTION: Estimation of thickness of the wire using wedge shape method; Wavelength of monochromatic light source by diffraction grating; Newton's ring method; numerical aperture and acceptance angle of optical fiber; Characteristics of p-n junction diode; Photodiode and LED; Experimental determination of carrier concentration and energy gap of a semiconductor material; Determination resistivity of semiconductor by Four probe method and magnetic field along axial line of a current carrying coil.
COURSE OUTCOMES: ***After successful completion of this course, the students will be able to:***
CO1. Apply the basic knowledge of light waves and semiconductors to demonstrate the functioning of optoelectronic devices.
CO2. Understand the experimental procedures to calculate the thickness of a thin film, Hall coefficient, and acceptance angle of an optical fiber.
CO3. Determine the experimental values of magnetic field induction, wave length of a light source, energy gap of a semiconductor.
CO4. Apply skills to plot characteristic curves to determine the various parameters of semiconductor diodes.
CO5: Work independently and in teams to solve problems with effective communication.

I B. Tech. – II Semester
(20BT10332) **ENGINEERING WORKSHOP**
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSE(AI&ML) and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: --
COURSE DESCRIPTION: Knowledge on various workshop hand and power tools; hands on experience in different manufacturing trades such as fitting, carpentry, sheet metal forming and foundry; Demonstration on dismantling and assembling of various two wheeler parts, power tools in machining and metal joining, basics of plumbing and working of 3D printer.
COURSE OUTCOMES: ***After successful completion of this course, the students will be able to:***
CO1: Design and model various basic prototypes in the trade of fitting such as square/half round mating, V- mating and dovetail mating from the given MS work pieces using fitting tools.
CO2: Develop different prototypes in the carpentry trade such as cross lap joint, dovetail / bridle joints and Mortise and Tenon joint using carpentry tools.
CO3: Design and model different prototypes in the sheet metal forming trade such as rectangular tray, square vessel/cylinder, Funnel as per the dimensions using sheet metal forming tools.
CO4: Develop sand mould using single piece pattern and split piece pattern in the foundry trade using foundry tools.
CO5: Develop electric circuits for series and stair case connections.
CO6: Demonstrate the knowledge on power tools, plumbing operation, 3D printing technology involved in different engineering applications.
CO7: Work independently or in groups and communicate effectively in oral and written forms.

I B. Tech. – II Semester
(20BT21531) **OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB**
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSBS, CSE(AI&ML), CSE(IoT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: A course on Object Oriented Programming through Java.
COURSE DESCRIPTION: Hands-on experience on Polymorphism; Inheritance and Interfaces; Exception Handling; Multithreading; Event Handling; swings.
COURSE OUTCOMES: ***After successful completion of this course, the students will be able to:***
CO1: Apply syntactic constructs of JAVA to solve logic based problems
CO2: Develop application programs using object oriented programming features.
CO3: Solve real time problems using interfaces, packages, Exception Handling, Collection framework and Multithreading.
CO4: Develop GUI Applications using Swings, Event handling mechanisms.
CO5: Work independently and in team to solve problems with effective communication

I B.Tech.- II Semester
(20BT1HSAC) **SPOKEN ENGLISH**
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSBS, CSE(AI&ML) and CSE(CS))
(Audit Course)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	2	-	-	-

PRE-REQUISITES: -
COURSE DESCRIPTION: Grammar; Functional English; Paragraph writing; Letter writing and Email writing.
COURSE OUTCOMES: ***After successful completion of this course, the students will be able to:***
CO1: Demonstrate knowledge of grammar and vocabulary in writing effective formal letters and e-mails.
CO2: Communicate effectively by applying appropriate speaking and writing techniques by examining and applying functional English.

Program: B.Tech. COMPUTER SCIENCE AND SYSTEMS ENGINEERING

I B. Tech. - I Semester
(20BT1BS01) **DIFFERENTIAL EQUATIONS AND MULTIVARIABLE CALCULUS**
(Common to All Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES:-
COURSE DESCRIPTION: Ordinary Differential Equations; Partial Differential Equations; Multivariable Calculus (Differentiation); Multivariable Calculus (Integration); Multivariable Calculus (Vector Calculus).

COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Solve the higher order linear differential equations and identify solutions by analytical methods related to various engineering problems involving electrical circuits.
CO2. Formulate and solve partial differential equations for engineering problems.
CO3. Determine maxima and minima of functions of two variables and analyze their behavior at extreme values.
CO4. Evaluate and apply multiple integrals to determine areas of plane curves.
CO5. Identify solenoidal and irrotational vector fields and apply vector integral theorems in evaluating areas and volumes.

I B. Tech. - I Semester
(20BT1BS02) **ENGINEERING CHEMISTRY**
(Common to CE, ME, CSE, CSSE, IT, CSE (IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Water Treatment; Atomic Structure and Bonding Theories; Electrochemistry and Applications; Corrosion; Instrumental Methods and Applications; Fuel chemistry and Lubricants.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Analyze and solve problems associated with hardness of water, boiler troubles and address the societal, health and safety issues related to quality of water.
CO2. Apply the basic knowledge of quantum mechanical approach to atomic structure and bonding theories to identify shapes of different molecules
CO3. Apply the basic knowledge of corrosion phenomenon to identify solutions for control of corrosion and demonstrate competency in the basic concepts of electrochemical cells.
CO4. Demonstrate the basic knowledge of instrumental methods and their applications in the structural analysis of materials.
CO5. Apply the basic knowledge of fuel chemistry and lubricants to identify the quality of fuels and lubricants.

I B. Tech. - I Semester
(20BT1HS01) **COMMUNICATIVE ENGLISH**
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSBS, CSE(AI&ML) and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Introduction to Communication; Active Listening; Effective Speaking; Reading and Technical Writing.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Demonstrate knowledge of English language, examining and applying the aspects of Process of communication, Paralinguistic features, Skimming, Scanning, and Elements of style in writing.
CO2. Analyze the modes and techniques of listening, speaking, reading, writing and apply them appropriately to communicate effectively with the engineering community and society.
CO3. Apply reading and writing techniques in preparing documents by examining SQ3R Technique, Writer's Block, and Précis Writing.
CO4. Communicate effectively in Conferences, Symposia, Seminars and in formal and real time situations by applying appropriate speaking techniques learnt by examining different communication styles used in similar contexts.

I B. Tech. – I Semester
(20BT11201) **PROGRAMMING FOR PROBLEM SOLVING**
(Common to CSE, CSSE, IT, CSE (AI), CSE(DS), CSBS, CSE(AI&ML), CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: A Course on Basic Mathematics.
COURSE DESCRIPTION: Introduction to C Programming; Operators and Expressions; Input and Output Functions; Control Structures; Problem Solving Aspects; Arrays and Strings; Functions; Pointers; Structures and Unions; File Handling.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Demonstrate knowledge on C programming constructs to develop programs.
CO2. Design algorithms using problem-solving techniques for given problems.
CO3. Apply functions and Arrays to enhance reusability and data manipulation.
CO4. Use pointers to manage the memory effectively.
CO5. Apply Structures, Unions and File handling concepts to develop societal applications.

I B. Tech. – I Semester
(20BT10201) **BASIC ELECTRICAL AND ELECTRONICS ENGINEERING**
(Common to ME, EEE, ECE, EIE, CSE, CSSE, IT, CSE(AI), CSE(DS), CSE(AI&ML), CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Principles of Electrical Systems; AC & DC Machines; Semiconductor Devices and Op-Amps.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Analyze electrical circuits by applying the conceptual knowledge of circuit concepts.
CO2. Demonstrate knowledge on various generation technologies, protection devices, safety procedures and BEE standards.
CO3. Demonstrate knowledge on characteristics and applications of transformers and AC machines.
CO4. Demonstrate knowledge on characteristics and applications of diode, BJT and Op-amps.

I B. Tech. - I Semester
(20BT1BS31) **ENGINEERING CHEMISTRY LAB**
(Common to CE, ME, CSE, CSSE, IT, CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: -
COURSE DESCRIPTION: Estimation of hardness ground water sample, alkalinity, dissolved oxygen of water samples, Iron, residual chlorine in drinking water and Strength of an acid in Pb-Acid battery by volumetric methods; Instrumental methods like conductivity meter, potentiometer, P^H meter and colorimeter; Measurement of viscosity of lubricants; and Determination of the influence of pH on metallic corrosion.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Apply analytical skills for the quantitative estimation of materials through volumetric methods of analysis and address the societal, health issues related to quality of water.
CO2. Develop analytical skills for the quantitative estimation of materials through instrumental methods of analysis.
CO3. Work independently and in teams to solve problems with effective communication.

I B. Tech. - I Semester
(20BT1HS31) **COMMUNICATIVE ENGLISH LAB**
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSBS, CSE(AI&ML) and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: -
COURSE DESCRIPTION: Just a Minute, Elocution/Impromptu; Phonetics; Vocabulary Building; Grammar; Giving Directions; Role Plays; Public Speaking; Letter Writing; Describing Objects; Listening Comprehension; Information Transfer and Reading Comprehension.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Demonstrate knowledge of Phonetics by examining and applying sounds of English through Phonetics.
CO2. Analyze sentence structures by applying and demonstrating knowledge of Vocabulary and Grammar.
CO3. Apply appropriate listening and reading skills by analyzing the context, and demonstrate through listening comprehension and reading comprehension.
CO4. Function effectively as an individual and as a member in diverse teams examining and applying speaking skills in Just A Minute and Role Play.
CO5. Communicate effectively applying appropriate writing and speaking techniques by examining and demonstrating knowledge through Describing Objects, Information Transfer and Letter Writing in formal and real time situations.

I B. Tech. – I Semester
(20BT11231) **PROGRAMMING FOR PROBLEM SOLVING LAB**
(Common to CSE, CSSE, IT, CSE (AI), CSE (DS), CSBS, CSE(AI&ML), CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: A Course on Programming for Problem Solving.
COURSE DESCRIPTION: Hands on practice in developing and executing programs using C Programming concepts include control statements, arrays, functions, strings, pointers structures and file handling.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Analyse problems to design suitable algorithmic solutions.
CO2. Apply C programming constructs to develop solutions to the engineering problems.
CO3. Work effectively as an individual to develop solutions based on the user requirements.
CO4. Write and present a substantial technical report/document effectively.

I B. Tech. - I Semester
(20BT1MC01) **UNIVERSAL HUMAN VALUES**
(Mandatory Course)
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSBS, CSE(AI&ML) and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	-	30	2	-	-	-

PRE-REQUISITES: -
COURSE DESCRIPTION: Value education; Human being and self; Family, the society and the nations; Harmony with the nature and Harmony with professional ethics.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Understand Values and skills for sustained happiness and prosperity.
CO2. Analyse realistic implications of a Holistic understanding of ethical human conduct, trustful and mutually fulfilling human behaviour.
CO3. Apply holistic approach in personal life and profession through a positive understanding of the Human reality and existence.

I B. Tech. - II Semester
(20BT2BS01) **TRANSFORMATION TECHNIQUES AND LINEAR ALGEBRA**
(Common to All Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Fourier Series and Fourier Transforms; Laplace Transforms; Inverse Laplace Transforms; Linear Algebra-I (Matrices); Linear Algebra-II (Vector Spaces).
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Construct the Fourier series for periodic functions and demonstrate the use of Fourier series and Fourier transform to connect the frequency and time domain systems.
CO2. Solve initial and boundary value problems in engineering fields through Laplace Transform techniques.
CO3. Apply the matrix theory in solving system of linear equations and determine the Eigen values and Eigen vectors.
CO4. Demonstrate the knowledge of Linear Transformations to intelligent systems.

I B. Tech. – II Semester
(20BT1BS03) **ENGINEERING PHYSICS**
(Common to CSE, CSSE, IT and CSBS, CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Wave Optics; Electromagnetic Waves; Fiber Optics; Semiconductors; Optoelectronic Devices; Dielectrics; Magnetic materials; Superconductors and Nanomaterials.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Apply the knowledge of light waves to interpret the concepts of Interference, Diffraction and Polarization.
CO2. Demonstrate the concepts of electromagnetic wave propagation in Optical fibers.
CO3. Apply the basic knowledge of semiconductors to understand the functioning of various optoelectronic devices.
CO4. Demonstrate the basic knowledge of dielectric and magnetic properties to understand the various dielectric polarizations and magnetic materials.
CO5. Understand the concepts of superconductors and nanomaterials to familiarize their applications in relevant fields.

I B. Tech. – II Semester
(20BT20501) **DIGITAL LOGIC DESIGN**
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSE(AI&ML), CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Foundation in design and analysis of the operation of digital gates; Concepts of Boolean algebra, Minimization of logic circuits; Design and implementation of combinational and sequential logic circuits; Analysis and design of flip-flops, registers, and counters and comparison of their behavior and characteristics; Design digital systems using Programmable logic.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Apply knowledge of binary systems, logic gates and Boolean functions to represent a given problem using Boolean logic.
CO2. Minimize and implement Boolean functions to build combinational logic circuits.
CO3. Design combinational and sequential logic circuits for digital systems.
CO4. Design digital systems using programmable logic to solve engineering problems.

I B. Tech. – II Semester
(20BT21501) **OBJECT ORIENTED PROGRAMMING THROUGH JAVA**
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSBS, CSE(AI&ML), CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: A course on Programming for Problem Solving
COURSE DESCRIPTION: Introduction to Object Oriented Programming, Classes and Objects; Inheritance, Packages, Interfaces; Exception handling, Multithreading; Collection Classes; Swings, Event handling.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Apply object oriented programming constructs to solve programming problems.
CO2. Design solutions to the problems by using control statements, interfaces, utility classes and Packages.
CO3. Solve real time problems using object oriented programming features – polymorphism, inheritance, exception handling and multithreading.
CO4. Apply multithreading mechanism to enhance the performance of a system.
CO5. Develop user interfaces using GUI programming techniques.

I B. Tech. – II Semester
(20BT10331) **COMPUTER AIDED ENGINEERING DRAWING**
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSE(AI&ML) and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	1	4	3

PRE-REQUISITES:-
COURSE DESCRIPTION: Engineering drawing conventions; Importance of engineering drawing; fundamental concepts of sketching; computer aided drafting and different types of projections of geometric entities (both 2D and 3D) through computer aided drafting packages.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Apply the principles of engineering drawing, Methods and CAD tools to draw the Geometries, Curves and Orthographic projections used to communicate in engineering field.
CO2. Develop lateral surfaces of solids and draw Isometric views of given objects for engineering communication using principles of engineering drawing and CAD tools.
CO3. Work independently / in groups & communicate effectively in oral and written forms.

I B. Tech. – II Semester
(20BT1BS32) **ENGINEERING PHYSICS LAB**
(Common to CSE, CSSE, IT, CSBS, CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: -
COURSE DESCRIPTION: Estimation of thickness of the wire using wedge shape method; Wavelength of monochromatic light source by diffraction grating; Newton's ring method; numerical aperture and acceptance angle of optical fiber; Characteristics of p-n junction diode; Photodiode and LED; Experimental determination of carrier concentration and energy gap of a semiconductor material; Determination resistivity of semiconductor by Four probe method and magnetic field along axial line of a current carrying coil.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Apply the basic knowledge of light waves and semiconductors to demonstrate the functioning of optoelectronic devices.
CO2. Understand the experimental procedures to calculate the thickness of a thin film, Hall coefficient, and acceptance angle of an optical fiber.
CO3. Determine the experimental values of magnetic field induction, wave length of a light source, energy gap of a semiconductor.
CO4. Apply skills to plot characteristic curves to determine the various parameters of semiconductor diodes.
CO5. Work independently and in teams to solve problems with effective communication.

I B. Tech. – II Semester
(20BT10332) **ENGINEERING WORKSHOP**
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSE(AI&ML) and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: -
COURSE DESCRIPTION: Knowledge on various workshop hand and power tools; hands on experience in different manufacturing trades such as fitting, carpentry, sheet metal forming and foundry; Demonstration on dismantling and assembling of various two wheeler parts, power tools in machining and metal joining, basics of plumbing and working of 3D printer.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Design and model various basic prototypes in the trade of fitting such as square/half round mating, V- mating and dovetail mating from the given MS work pieces using fitting tools.
CO2. Develop different prototypes in the carpentry trade such as cross lap joint, dovetail / bridle joints and Mortise and Tenon joint using carpentry tools.
CO3. Design and model different prototypes in the sheet metal forming trade such as rectangular tray, square vessel/cylinder, Funnel as per the dimensions using sheet metal forming tools.
CO4. Develop sand mould using single piece pattern and split piece pattern in the foundry trade using foundry tools.
CO5. Develop electric circuits for series and stair case connections.
CO6. Demonstrate the knowledge on power tools, plumbing operation, 3D printing technology involved in different engineering applications.
CO7. Work independently / in groups & communicate effectively in oral and written forms.

I B. Tech. – II Semester
(20BT21531) **OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB**
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSBS, CSE(AI&ML), CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: A Course on OOPS through Java.
COURSE DESCRIPTION: Hands-on experience on Polymorphism; Inheritance and Interfaces; Exception Handling; Multithreading; Event Handling; swings.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Apply syntactic constructs of JAVA to solve logic based problems
CO2. Develop application programs using object oriented programming features.
CO3. Solve real time problems using interfaces, packages, Exception Handling, Collection framework and Multithreading.
CO4. Develop GUI Applications using Swings, Event handling mechanisms.
CO5. Work independently and in team to solve problems with effective communication.

I B. Tech. - II Semester
(20BT1HSAC) **SPOKEN ENGLISH**
(Audit Course)
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSBS, CSE(AI&ML) and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	2	-	-	-

PRE-REQUISITES: -
COURSE DESCRIPTION: Grammar; Functional English; Paragraph writing; Letter writing and Email writing.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Demonstrate knowledge of grammar and vocabulary in writing effective formal letters and e-mails.
CO2. Communicate effectively by applying appropriate speaking and writing techniques by examining and applying functional English.

Program: B.Tech. COMPUTER SCIENCE AND DESIGN

I B. Tech. - I Semester
(20BT1BS01) DIFFERENTIAL EQUATIONS AND MULTIVARIABLE CALCULUS
(Common to CE, ME, EEE, ECE, EIE, CSE, CSSE, IT, CSE(AI), CSE(DS), CSBS, CSE(AI&ML), CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE REQUISITE: -
COURSE DESCRIPTION: Ordinary Differential Equations; Partial Differential Equations; Multivariable Calculus (Differentiation); Multivariable Calculus (Integration); Multivariable Calculus (Vector Calculus).
COURSE OUTCOMES: ***After successful completion of this course, the students will be able to:***
CO1. Solve the higher order linear differential equations and identify solutions by analytical methods related to various engineering problems involving electrical circuits.
CO2. Formulate and solve partial differential equations for engineering problems.
CO3. Determine maxima and minima of functions of two variables and analyze their behaviour at extreme values.
CO4. Evaluate and apply multiple integrals to determine areas of plane curves.
CO5. Identify solenoidal and irrotational vector fields and apply vector integral theorems in evaluating areas and volumes.

I B. Tech. - I Semester
(20BT1BS02) ENGINEERING CHEMISTRY
(Common to CE, ME, CSE, CSSE, IT, CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE REQUISITE: -
COURSE OUTCOMES: ***After successful completion of this course, the students will be able to:***
CO1. Analyze and solve problems associated with hardness of water, boiler troubles and address the societal, health and safety issues related to quality of water.
CO2. Apply the basic knowledge of quantum mechanical approach to atomic structure and bonding theories to identify shapes of different molecules.
CO3. Apply the basic knowledge of corrosion phenomenon to identify solutions for control of corrosion and demonstrate competency in the basic concepts of electrochemical cells.
CO4. Demonstrate the basic knowledge of instrumental methods and their applications in the structural analysis of materials.
CO5. Apply the basic knowledge of fuel chemistry and lubricants to identify the quality of fuels and lubricants.

I B. Tech. – I Semester
(20BT11201) PROGRAMMING FOR PROBLEM SOLVING
(Common to CSE, CSSE, IT, CSE (AI), CSE (DS), CSBS, CSE(AI&ML), CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: A Course on Basic Mathematics.
COURSE DESCRIPTION: Introduction to C Programming; Operators and Expressions; Input and Output Functions; Control Structures; Problem Solving Aspects; Arrays and Strings; Functions; Pointers; Structures and Unions; File Handling.
COURSE OUTCOMES: ***After successful completion of this course, the students will be able to:***
CO1. Demonstrate knowledge on C programming constructs to develop programs.
CO2. Design algorithms usingproblem-solving techniques for given problems.
CO3. Apply functions and Arrays to enhance reusability and data manipulation.
CO4. Use pointers to manage the memory effectively.
CO5. Apply Structures, Unions and File handling concepts to develop societal applications.

I B. Tech. – I Semester
(20BT10201) BASIC ELECTRICAL AND ELECTRONICS ENGINEERING
(Common to ME, EEE, ECE, EIE, CSE, CSSE, IT, CSE(AI), CSE(DS) and CSBS, CSE(AI&ML), CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: --
COURSE DESCRIPTION: Principles of Electrical Systems; AC & DC Machines; Semiconductor Devices and Op-Amps.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1: Analyze electrical circuits by applying the conceptual knowledge of circuit concepts.
CO2: Demonstrate knowledge on various generation technologies, protection devices, safety procedures and BEE standards.
CO3: Demonstrate knowledge on characteristics and applications of transformers and AC machines.
CO4: Demonstrate knowledge on characteristics and applications of diode, BJT and Op-amps.

I B. Tech. - I Semester
(20BT1BS31) ENGINEERING CHEMISTRY LABORATORY
(Common to CE, ME, CSE, CSSE, IT, CSE(IOT), CS&D and CSE(CS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE REQUISITE: -
COURSE OUTCOMES: ***After successful completion of this course, the students will be able to:***
CO1. Apply analytical skills for the quantitative estimation of materials through volumetric methods of analysis and address the societal, health issues related to quality of water.
CO2. Develop analytical skills for the quantitative estimation of materials through instrumental methods of analysis.
CO3. Work independently and in teams to solve problems with effective communication.

I B. Tech. – I Semester
(20BT10331) COMPUTER AIDED ENGINEERING DRAWING
(Common to CE, ME, EEE, ECE, EIE, CSE(IOT) and CS&D)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	1	4	3

PRE-REQUISITES: **--**
COURSE DESCRIPTION: Engineering drawing conventions; Importance of engineering drawing; fundamental concepts of sketching; computer aided drafting and different types of projections of geometric entities (both 2D and 3D) through computer aided drafting packages.
COURSE OUTCOMES: ***After successful completion of this course, the students will be able to:***
CO1: Apply the principles of engineering drawing, Methods and CAD tools to draw the Geometries, Curves and Orthographic projections used to communicate in engineering field.
CO2: Develop lateral surfaces of solids and draw Isometric views of given objects for engineering communication using principles of engineering drawing and CAD tools.
CO3: Work independently / in groups & communicate effectively in oral and written forms.

I B. Tech. – II Semester
(20BT10332) ENGINEERING WORKSHOP
(Common to CE, ME, EEE, ECE, EIE, CSE(IOT) and CS&D)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: --
COURSE DESCRIPTION: Knowledge on various workshop hand and power tools; hands on experience in different manufacturing trades such as fitting, carpentry, sheet metal forming and foundry; Demonstration on dismantling and assembling of various two wheeler parts, power tools in machining and metal joining, basics of plumbing and working of 3D printer.
COURSE OUTCOMES: ***After successful completion of this course, the students will be able to:***
CO1: Design and model various basic prototypes in the trade of fitting such as square/half round mating, V- mating and dovetail mating from the given MS work pieces using fitting tools.
CO2: Develop different prototypes in the carpentry trade such as cross lap joint, dovetail / bridle joints and Mortise and Tenon joint using carpentry tools.
CO3: Design and model different prototypes in the sheet metal forming trade such as rectangular tray, square vessel/cylinder, Funnel as per the dimensions using sheet metal forming tools.
CO4: Develop sand mould using single piece pattern and split piece pattern in the foundry trade using foundry tools.
CO5: Develop electric circuits for series and stair case connections.
CO6: Demonstrate the knowledge on power tools, plumbing operation, 3D printing technology involved in different engineering applications.
CO7: Work independently / in groups & communicate effectively in oral and written forms.

I B. Tech. – I Semester
(20BT11231) PROGRAMMING FOR PROBLEM SOLVING LAB
(Common to CSE, CSSE, IT, CSE (AI), CSE (DS), CSBS, CSE(AI&ML), CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: A Course on Programming for Problem Solving.
COURSE DESCRIPTION: Hands on practice in developing and executing programs using C Programming concepts include control statements, arrays, functions, strings, pointers structures and file handling.
COURSE OUTCOMES: ***After successful completion of this course, the students will be able to:***
CO1. Analyze problems to design suitable algorithmic solutions.
CO2. Apply C programming constructs to develop solutions to the engineering problems.
CO3. Work effectively as an individual to develop solutions based on the user requirements.
CO4. Write and present a substantial technical report/document effectively.

I B. Tech. - I Semester
(20BT1HSAC) SPOKEN ENGLISH
(Common to CE, ME, EEE, ECE, EIE, CSE, (IOT) and CS&D)
(Audit Course)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	2	-	-	-

PRE-REQUISITES: -
COURSE OUTCOMES: ***After successful completion of this course, the students will be able to:***
CO1: Demonstrate knowledge of grammar and vocabulary in writing effective formal letters and e-mails.
CO2: Communicate effectively by applying appropriate speaking and writing techniques by examining and applying functional English.

I B. Tech. - II semester
(20BT2BS01) TRANSFORMATION TECHNIQUES AND LINEAR ALGEBRA
(Common to CE, ME, EEE, ECE, EIE, CSE, CSSE, IT, CSE(AI), CSE(DS), CSBS, CSE(AI&ML), CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITE: -
COURSE DESCRIPTION: Fourier Series and Fourier Transforms; Laplace Transforms; Inverse Laplace Transforms; Linear Algebra-I (Matrices); Linear Algebra-II (Vector Spaces).
COURSE OUTCOMES: ***After successful completion of this course, the students will be able to:***
CO1. Construct the Fourier series for periodic functions and demonstrate the use of Fourier series and Fourier transform to connect the frequency and time domain systems.
CO2. Solve initial and boundary value problems in engineering fields through Laplace Transform techniques.
CO3. Apply the matrix theory in solving system of linear equations and determine the Eigen values and Eigen vectors.
CO4. Demonstrate the knowledge of Linear Transformations to intelligent systems.

I B. Tech. – II Semester
(20BT1BS03) ENGINEERING PHYSICS
(Common to CSE, CSSE, IT, CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: -
COURSE OUTCOMES: ***After successful completion of this course, the students will be able to:***
CO1. Apply the knowledge of light waves to interpret the concepts of Interference, Diffraction and Polarization.
CO2. Demonstrate the concepts of electromagnetic wave propagation in Optical fibers.
CO3. Apply the basic knowledge of semiconductors to understand the functioning of various optoelectronic devices.
CO4. Demonstrate the basic knowledge of dielectric and magnetic properties to understand the various dielectric polarizations and magnetic materials.
CO5. Understand the concepts of superconductors and nano materials to familiarize their applications in relevant fields.

I B. Tech. – II Semester
(20BT20501) DIGITAL LOGIC DESIGN
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSE(AI&ML), CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: --
COURSE DESCRIPTION: Foundation in design and analysis of the operation of digital gates; Concepts of Boolean algebra, Minimization of logic circuits; Design and implementation of combinational and sequential logic circuits; Analysis and design of flip-flops, registers, and counters and comparison of their behavior and characteristics; Design digital systems using Programmable logic.
COURSE OUTCOMES: ***After successful completion of this course, the students will be able to:***
CO1. Apply knowledge of binary systems, logic gates and Boolean functions to represent a given problem using Boolean logic.
CO2. Minimize and implement Boolean functions to build combinational logic circuits.
CO3. Design combinational and sequential logic circuits for digital systems.
CO4. Design digital systems using programmable logic to solve engineering problems.

I B. Tech. – II Semester
(20BT21501) OBJECT ORIENTED PROGRAMMING THROUGH JAVA
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSBS, CSE(AI&ML), CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: A course on Programming for Problem Solving
COURSE DESCRIPTION: Introduction to Object Oriented Programming, Classes and Objects; Inheritance, Packages, Interfaces; Exception handling, Multithreading; Collection Classes; Swings, Event handling.
COURSE OUTCOMES: ***After successful completion of this course, the students will be able to:***
CO1. Apply object oriented programming constructs to solve programming problems.
CO2. Design solutions to the problems by using control statements, interfaces, utility classes and Packages.
CO3. Solve real time problems using object oriented programming features – polymorphism, inheritance, exception handling and multithreading.
CO4. Apply multithreading mechanism to enhance the performance of a system.
CO5. Develop user interfaces using GUI programming techniques.

I B. Tech. - I Semester
(20BT1HS01) COMMUNICATIVE ENGLISH
(Common to CE, ME, EEE, ECE, EIE, CSE, CSE(IOT) and CS&D)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: -
COURSE OUTCOMES: ***After successful completion of this course, the students will be able to:***
CO1: Demonstrate knowledge of English language, examining and applying the aspects of Process of communication, Paralinguistic features, Skimming, Scanning, and Elements of style in writing.
CO2: Analyze the modes and techniques of listening, speaking, reading, writing and apply them appropriately to communicate effectively with the engineering community and society.
CO3: Apply reading and writing techniques in preparing documents by examining SQ3R Technique, Writer's Block, and Précis Writing.
CO4: Communicate effectively in Conferences, Symposia, Seminars and in formal and real time situations by applying appropriate speaking techniques learnt by examining different communication styles used in similar contexts.

I B. Tech. – II Semester
(20BT1BS32) ENGINEERING PHYSICS LAB
(Common to CSE, CSSE, IT, CSBS, CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE REQUISITE: -
COURSE OUTCOMES: ***After successful completion of this course, the students will be able to:***
CO1. Apply the basic knowledge of light waves and semiconductors to demonstrate the functioning of optoelectronic devices.
CO2. Understand the experimental procedures to calculate the thickness of a thin film, Hall coefficient, and acceptance angle of an optical fiber.
CO3. Determine the experimental values of magnetic field induction, wave length of a light source, energy gap of a semiconductor.
CO4. Apply skills to plot characteristic curves to determine the various parameters of semiconductor diodes.
CO5: Work independently and in teams to solve problems with effective communication.

I B.Tech. - II Semester
(20BT1HS31) COMMUNICATIVE ENGLISH LAB
(Common to CE, ME, EEE, ECE, EIE, CSE, CSE(IOT) and CS&D)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE REQUISITE: -
COURSE OUTCOMES: ***After successful completion of this course, the students will be able to:***
CO1: Demonstrate knowledge of Phonetics by examining and applying sounds of English through Phonetics.
CO2: Analyze sentence structures by applying and demonstrating knowledge of Vocabulary and Grammar.
CO3: Apply appropriate listening and reading skills by analyzing the context, and demonstrate through listening comprehension and reading comprehension.
CO4: Function effectively as an individual and as a member in diverse teams examining and applying speaking skills in Just A Minute and Role Play.
CO5: Communicate effectively applying appropriate writing and speaking techniques by examining and demonstrating knowledge through Describing Objects, Information Transfer and Letter Writing in formal and real time situations.

I B. Tech. – II Semester
(20BT21531) OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSBS, CSE(AI&ML), CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: A course on OOPS through Java.
COURSE DESCRIPTION: Hands-on experience on Polymorphism; Inheritance and Interfaces; Exception Handling; Multithreading; Event Handling; swings.
COURSE OUTCOMES: ***After successful completion of this course, the students will be able to:***
CO1: Apply syntactic constructs of JAVA to solve logic based problems
CO2: Develop application programs using object oriented programming features.
CO3: Solve real time problems using interfaces, packages, Exception Handling, Collection framework and Multithreading.
CO4: Develop GUI Applications using Swings, Event handling mechanisms.
CO5: Work independently and in team to solve problems with effective communication

I B. Tech. - II Semester
(20BT1MC01) UNIVERSAL HUMAN VALUES
(Common to CE, ME, EEE, ECE, EIE, CSE, CSE(IOT) and CS&D)
(Mandatory Course)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	-	30	2	-	-	-

PRE-REQUISITES: -
COURSE DESCRIPTION: Process for Value Education; Harmony in the Human Being - Harmony in Myself; Harmony in Family and Society- Human Relationship; Harmony in the Nature and Existence – Coexistence; Implications of Holistic Understanding of Harmony on Professional Ethics.
COURSE OUTCOMES: ***After successful completion of this course, the students will be able to:***
CO1. Understand Values and skills for sustained happiness and prosperity.
CO2. Analyse realistic implications of a Holistic understanding of ethical human conduct, trustful and mutually fulfilling human behaviour.
CO3. Apply holistic approach in personal life and profession through a positive understanding of the Human reality and existence.

Program: B.Tech. COMPUTER SCIENCE AND BUSINESS SYSTEMS

I B. Tech. - I Semester
(20BT1BS01)**DIFFERENTIAL EQUATIONS AND MULTIVARIABLE CALCULUS**
(Common to All Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Ordinary Differential Equations; Partial Differential Equations; Multivariable Calculus (Differentiation); Multivariable Calculus (Integration); Multivariable Calculus (Vector Calculus).
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Solve the higher order linear differential equations and identify solutions by analytical methods related to various engineering problems involving electrical circuits.
CO2. Formulate and solve partial differential equations for engineering problems.
CO3. Determine maxima and minima of functions of two variables and analyze their behavior at extreme values.
CO4. Evaluate and apply multiple integrals to determine areas of plane curves.
CO5. Identify solenoidal and irrotational vector fields and apply vector integral theorems in evaluating areas and volumes.

I B. Tech. - I Semester
(20BT1HS01)**COMMUNICATIVE ENGLISH**
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS) and CSBS,CSE(AI&ML) and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Introduction to Communication; Active Listening; Effective Speaking; Reading and Technical Writing.
COURSE OUTCOMES: *After successful completion of this course, students will be able to:*
CO1: Demonstrate knowledge of English language, examining and applying the aspects of Process of communication, Paralinguistic features, Skimming, Scanning, and Elements of style in writing.
CO2: Analyze the modes and techniques of listening, speaking, reading, writing and apply them appropriately to communicate effectively with the engineering community and society.
CO3: Apply reading and writingtechniques in preparing documents by examining SQ3R Technique, Writer’s Block, and Précis Writing.
CO4: Communicate effectively in Conferences, Symposia, Seminars and in formal and real time situations by applying appropriate speaking techniques learnt by examining different communication styles used in similar contexts.

I B. Tech. – I Semester
(20BT11201) **PROGRAMMING FOR PROBLEM SOLVING**
(Common to CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS,CSE(AI&ML),CSE(IOT),CS&D and CSE(DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: A Course on Basic Mathematics.
COURSE DESCRIPTION: Introduction to C Programming; Operators and Expressions; Input and Output Functions; Control Structures; Problem Solving Aspects; Arrays and Strings; Functions; Pointers; Structures and Unions; File Handling.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Demonstrate knowledge on C programming constructs to develop programs.
CO2. Design algorithms using problem-solving techniques for given problems
CO3. Apply functions and Arrays to enhance reusability and data manipulation.
CO4. Use pointers to manage the memory effectively.
CO5. Apply Structures, Unions and File handling concepts to develop societal applications.

I B. Tech. - I Semester
(20BT12901) **DISCRETE MATHEMATICAL STRUCTURES**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: A Course on Transformation Techniques and Linear Algebra.
COURSE DESCRIPTION: Mathematical Logic; Predicates; Relations; Algebra Structures; Mathematical Reasoning; Recurrence Relations; Graphs; Graph Theory and its Applications.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Demonstrate knowledge on mathematical logic and predicates.
CO2. Analyze sets using functions and relations.
CO3. Analyze properties of different algebraic structures.
CO4. Apply mathematical reasoning, recurrence relations, permutations and combinations to solve computational problems.
CO5. Apply concepts of graph theory and trees to implement computer applications.

I B. Tech. – I Semester
(20BT12902)**FUNDAMENTALS OF BUSINESS INFORMATION SYSTEMS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Managerial decision making, E-business and Enterprise systems; Spread sheets, Document production software; Databases, Business analytics; Network components, Network types; Operations information systems, Departmental applications.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Analyze types of business information systems suitable for E-business and enterprise systems.
CO2. Choose hardware and software for the computer system used in a business.
CO3. Analyze the business data by applying business analytics tools such as OLAP, cube and visualization
CO4. Identify components of communication techniques that are necessary to exchange information within and between businesses.
CO5. Evaluate transaction processing systems, process control and office automation systems for the operational management of a business.
CO6. Assess the potential for using business information systems in different parts of an organization.

I B.Tech. - I Semester
(20BT1HS31) **COMMUNICATIVE ENGLISH LAB**
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS) and CSBS,CSE(AI&ML)and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: -
COURSE DESCRIPTION: Just a Minute, Elocution/Impromptu; Phonetics; Vocabulary Building; Grammar; Giving Directions; Role Plays; Public Speaking; Letter Writing; Describing Objects; Listening Comprehension; Information Transfer and Reading Comprehension.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1: Demonstrate knowledge of Phonetics by examining and applying sounds of English through Phonetics.
CO2: Analyze sentence structures by applying and demonstrating knowledge of Vocabulary and Grammar.
CO3: Apply appropriate listening and reading skills by analyzing the context, and demonstrate through listening comprehension and reading comprehension.
CO4: Function effectively as an individual and as a member in diverse teams examining and applying speaking skills in Just A Minute and Role Play.
CO5: Communicate effectively applying appropriate writing and speaking techniques by examining and demonstrating knowledge through Describing Objects, Information Transfer and Letter Writing in formal and real time situations.

I B. Tech. – I Semester
(20BT11231) **PROGRAMMING FOR PROBLEM SOLVING LAB**
(Common to CSE, CSSE, IT, CSE (AI), CSE (DS) and CSBS,CSE(AI&ML),CSE(IOT),CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: A Course on Programming for Problem Solving.
COURSE DESCRIPTION: Hands on practice in developing and executing programs using C Programming concepts include control statements, arrays, functions, strings, pointers structures and file handling.
COURSE OUTCOMES: *After successful completion of this course, students will be able to:*
CO1. Analyse problems to design suitable algorithmic solutions.
CO2. Apply C programming constructs to develop solutions to the engineering problems.
CO3. Work effectively as an individual to develop solutions based on the user requirements.
CO4. Write and present a substantial technical report/document effectively.

I B. Tech. – II Semester
(20BT12931)**FUNDAMENTALS OF BUSINESS INFORMATION SYSTEMS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: A Course on Fundamentals of Business Information Systems
COURSE DESCRIPTION: Technical Support documents, Worksheet, Web pages for business, Visualization and functionalities, Survey, Data Sources
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Create Spread sheets and technical support documents for business scenarios.
CO2. Design Web pages using HTML for business promotions.
CO3. Identify the functionalities of data visualization tools.
CO4. Create and connect to a data source by conducting a survey and visualize it on desired parameters.
CO5. Work independently and communicate effectively in oral and written forms.

I B. Tech. – I Semester
(20BT1MC01)**UNIVERSAL HUMAN VALUES**
(Mandatory Course)
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS) and CSBS,CSE(AI&ML) and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	-	30	2	-	-	-

PRE-REQUISITES: -
COURSE DESCRIPTION: Process for Value Education; Harmony in the Human Being - Harmony in Myself!;Harmony in Family and Society- Human Relationship; Harmony in the Nature and Existence – Coexistence; Implications of Holistic Understanding of Harmony on Professional Ethics.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Understand Values and skills for sustained happiness and prosperity.
CO2. Analyse realistic implications of a Holistic understanding of ethical human conduct, trustful and mutually fulfilling human behavior.
CO3. Apply holistic approach in personal life and profession through a positive understanding of the Human reality and existence.

I B. Tech. - II semester
(20BT2BS01) **TRANSFORMATION TECHNIQUES AND LINEAR ALGEBRA**
(Common to All Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Fourier Series and Fourier Transforms; Laplace Transforms; Inverse Laplace Transforms; Linear Algebra-I (Matrices); Linear Algebra-II (Vector Spaces).
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Construct the Fourier series for periodic functions and demonstrate the use of Fourier series and Fourier transform to connect the frequency and time domain systems.
CO2. Solve initial and boundary value problems in engineering fields through Laplace Transform techniques.
CO3. Apply the matrix theory in solving system of linear equations and determine the Eigen values and Eigen vectors.
CO4. Demonstrate the knowledge of Linear Transformations to intelligent systems.

I B. Tech. – II Semester
(20BT1BS03)**ENGINEERING PHYSICS**
(Common to CSE, CSSE, IT, CSBS,CSE(IOT),CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Wave Optics; Electromagnetic Waves; Fiber Optics; Semiconductors; Optoelectronic Devices; Dielectrics; Magnetic materials; Superconductors and Nanomaterials.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Apply the knowledge of light waves to interpret the concepts of Interference, Diffraction and Polarization.
CO2. Demonstrate the concepts of electromagnetic wave propagation in Optical fibers.
CO3. Apply the basic knowledge of semiconductors to understand the functioning of various optoelectronic devices.
CO4. Demonstrate the basic knowledge of dielectric and magnetic properties to understand the various dielectric polarizations and magnetic materials.
CO5. Understand the concepts of superconductors and nanomaterials to familiarize their applications in relevant fields.

I B. Tech. – II Semester
(20BT10201) **BASIC ELECTRICAL AND ELECTRONICS ENGINEERING**
(Common to CE and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION: Principles of Electrical Systems; AC & DC Machines; Semiconductor Devices and Op-Amps.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1: Analyze electrical circuits by applying the conceptual knowledge of circuit concepts.
CO2: Demonstrate knowledge on various generation technologies, protection devices, safety procedures and BEE standards.
CO3: Demonstrate knowledge on characteristics and applications of transformers and AC machines.
CO4: Demonstrate knowledge on characteristics and applications of diode, BJT and Op-amps.

I B. Tech. – II Semester
(20BT21501) **OBJECT ORIENTED PROGRAMMING THROUGH JAVA**
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSBS,CSE(AI&ML), CSE(IOT),CS&D and CSE(CS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: A course on Programming for Problem Solving
COURSE DESCRIPTION: Introduction to Object Oriented Programming, Classes and Objects; Inheritance, Packages, Interfaces; Exception handling, Multithreading; Collection Classes; Swings, Event handling.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Apply object oriented programming constructs to solve programming problems.
CO2. Design solutions to the problems by using control statements, interfaces, utility classes and Packages.
CO3. Solve real time problems using object oriented programming features – polymorphism, inheritance, exception handling and multithreading.
CO4. Apply multithreading mechanism to enhance the performance of a system.
CO5. Develop user interfaces using GUI programming techniques.

I B. Tech. – II Semester
(20BT22901) **DATA STRUCTURES AND ALGORITHMS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: A Course on Programming for Problem Solving
COURSE DESCRIPTION: Algorithm Analysis; Linked Lists; Stacks and Queues; Trees; Binary search trees; AVL trees; Heaps; Multiway search trees; Graphs; Sorting and Searching; Hashing
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Understand the fundamental concepts of data structures, asymptotic notations and Algorithm analysis techniques to measure the performance of an algorithm.
CO2. Analyze performance of sorting and searching algorithms by making use of time and space complexity.
CO3. Design algorithms to solve societal problems by applying contextual knowledge on linked lists
CO4. Solve computational problems by using stacks and queues
CO5. Apply suitable data structure to perform operations on trees and graphs
CO6. Construct hash tables by using Hash functions and relevant collision resolution technique.

I B. Tech. – II Semester
(20BT1BS32)**ENGINEERING PHYSICS LAB**
(Common to CSE, CSSE, IT and CSBS,CSE(IOT),CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: -
COURSE DESCRIPTION: Estimation of thickness of the wire using wedge shape method; Wavelength of monochromatic light source by diffraction grating; Newton's ring method; numerical aperture and acceptance angle of optical fiber; Characteristics of p-n junction diode; Photodiode and LED; Experimental determination of carrier concentration and energy gap of a semiconductor material; Determination resistivity of semiconductor by Four probe method and magnetic field along axial line of a current carrying coil.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Apply the basic knowledge of light waves and semiconductors to demonstrate the functioning of optoelectronic devices.
CO2. Understand the experimental procedures to calculate the thickness of a thin film, Hall coefficient, and acceptance angle of an optical fiber.
CO3. Determine the experimental values of magnetic field induction, wave length of a light source, energy gap of a semiconductor.
CO4. Apply skills to plot characteristic curves to determine the various parameters of semiconductor diodes.
CO5: Work independently and in teams to solve problems with effective communication.

I B. Tech. – II Semester
(20BT21531) **OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB**
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSBS,CSE(AI&ML), CSE(IOT),CS&D and CSE(CS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: A course on OOPS through Java.
COURSE DESCRIPTION: Hands-on experience on Polymorphism; Inheritance and Interfaces; Exception Handling; Multithreading; Event Handling; swings.
COURSE OUTCOMES: *After successful completion of this course, students will be able to:*
CO1: Apply syntactic constructs of JAVA to solve logic based problems
CO2: Develop application programs using object oriented programming features.
CO3: Solve real time problems using interfaces, packages, Exception Handling, Collection framework and Multithreading.
CO4: Develop GUI Applications using Swings, Event handling mechanisms.
CO5: Work independently and in team to solve problems with effective communication

I B. Tech. – II Semester
(20BT22931**) DATA STRUCTURES AND ALGORITHMS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: A course on Data Structures Through C
COURSE DESCRIPTION: Sorting and Searching; Linked Lists; Stacks and Queues; Binary Search Trees; AVL trees; Graph Traversing Techniques; Collision Resolution Techniques
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1. Implement sorting and searching algorithms using suitable data structure.
CO2. Develop algorithms to solve real time problems using Linked lists
CO3. Solve computational problems using stacks and queues
CO4. Develop algorithms to perform operations on trees and graphs
CO5. Build solution for collisions in hash tables using suitable data structure
CO6. Work independently and in team to solve problems with effective communication

I B.Tech. - II Semester
(20BT1HSAC) **SPOKEN ENGLISH**
(Audit Course)
(Common to CSE, CSSE, IT, CSE(AI), CSE(DS), CSBS,CSE(AI&ML) and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	2	-	-	-

PRE-REQUISITES: -
COURSE DESCRIPTION: Grammar; Functional English; Paragraph writing; Letter writing and Email writing.
COURSE OUTCOMES: *After successful completion of this course, the students will be able to:*
CO1: Demonstrate knowledge of grammar and vocabulary in writing effective formal letters and e-mails.
CO2: Communicate effectively by applying appropriate speaking and writing techniques by examining and applying functional English.

Program: B.Tech. MECHANICAL ENGINEERING

I B. Tech. - I Semester
(20BT1BS01) DIFFERENTIAL EQUATIONS AND MULTIVARIABLE CALCULUS
(Common to All Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE REQUISITE: -
COURSE DESCRIPTION:
Ordinary Differential Equations; Partial Differential Equations; Multivariable Calculus (Differentiation); Multivariable Calculus (Integration); Multivariable Calculus (Vector Calculus).
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
CO1. Solve the higher order linear differential equations and identify solutions by analytical methods related to various engineering problems involving electrical circuits.
CO2. Formulate and solve partial differential equations for engineering problems.
CO3. Determine maxima and minima of functions of two variables and analyze their behaviour at extreme values.
CO4. Evaluate and apply multiple integrals to determine areas of plane curves.
CO5. Identify solenoidal and irrotational vector fields and apply vector integral theorems in evaluating areas and volumes.

I B. Tech. – I Semester
(20BT1BS02) ENGINEERING CHEMISTRY
(Common to CE, ME, CSE, CSSE, IT, CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE REQUISITE: -
COURSE DESCRIPTION:
Water Treatment; Atomic Structure and Bonding Theories; Electrochemistry and Applications; Corrosion; Instrumental Methods and Applications; Fuel chemistry and Lubricants.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
CO1. Analyze and solve problems associated with hardness of water, boiler troubles and address the societal, health and safety issues related to quality of water.
CO2. Apply the basic knowledge of quantum mechanical approach to atomic structure and bonding theories to identify shapes of different molecules.
CO3. Apply the basic knowledge of corrosion phenomenon to identify solutions for control of corrosion and demonstrate competency in the basic concepts of electrochemical cells.
CO4. Demonstrate the basic knowledge of instrumental methods and their applications in the structural analysis of materials.
CO5. Apply the basic knowledge of fuel chemistry and lubricants to identify the quality of fuels and lubricants.

I B. Tech. – I Semester
(20BT10201) BASIC ELECTRICAL AND ELECTRONICS ENGINEERING
(Common to ME, EEE, ECE, EIE, CSE, CSSE, IT, CSE(AI), CSE(DS), CSE(AI&ML), CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: --
COURSE DESCRIPTION:
Principles of Electrical Systems; AC & DC Machines; Semiconductor Devices and Op-Amps.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
CO1: Analyze electrical circuits by applying the conceptual knowledge of circuit concepts.
CO2: Demonstrate knowledge on various generation technologies, protection devices, safety procedures and BEE standards.
CO3: Demonstrate knowledge on characteristics and applications of transformers and AC machines.
CO4: Demonstrate knowledge on characteristics and applications of diode, BJT and Op-amps.

I B. Tech. - I Semester
(20BT10301) MATERIAL SCIENCE AND ENGINEERING

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES:
Courses on Engineering Chemistry
COURSE DESCRIPTION:
Materials Structure and Constitution of Alloys; Heat treatment of steels; Properties of ferrous materials and its alloys; Properties of non-ferrous materials and its alloys; Properties and applications of Ceramics, Polymers and Composite materials.
COURSE OUTCOMES:
After successful completion of the course, the student will be able to:
CO1. Analyze the structural, constitutional characteristics of alloys and calculate atomic packing factor of different structures.
CO2. Analyze the properties of materials and enhance the same through heat treatment processes.
CO3. Demonstrate knowledge of ferrous materials and its alloys for engineering applications.
CO4. Demonstrate knowledge of Non-ferrous materials and its alloys for engineering applications.
CO5. Demonstrate knowledge of Ceramics, Polymers, and Composite materials for suitable engineering applications.

I B.Tech. - I Semester
(20BT1BS31) ENGINEERING CHEMISTRY LABORATORY
(Common to CE, ME, CSE, CSSE, IT, CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE REQUISITE: -
COURSE DESCRIPTION:
Estimation of hardness ground water sample, alkalinity, dissolved oxygen of water samples, Iron, residual chlorine in drinking water and Strength of an acid in Pb-Acid battery by volumetric methods; Instrumental methods like conductivity meter, potentiometer, PH meter and colorimeter; Measurement of viscosity of lubricants; and Determination of the influence of pH on metallic corrosion.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
CO1. Apply analytical skills for the quantitative estimation of materials through volumetric methods of analysis and address the societal, health issues related to quality of water.
CO2. Develop analytical skills for the quantitative estimation of materials through instrumental methods of analysis.
CO3. Work independently and in teams to solve problems with effective communication.

I B. Tech. – I Semester
(20BT10331) COMPUTER AIDED ENGINEERING DRAWING
(Common to CE, ME, EEE, ECE, EIE, CSE(IOT) and CS&D)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	1	4	3

PRE-REQUISITES: **--**
COURSE DESCRIPTION:
Engineering drawing conventions; Importance of engineering drawing; fundamental concepts of sketching; computer aided drafting and different types of projections of geometric entities (both 2D and 3D) through computer aided drafting packages.
COURSE OUTCOMES:
After successful completion of the course, the students will be able to:
- CO1: Apply the principles of engineering drawing, Methods and CAD tools to draw the Geometries, Curves and Orthographic projections used to communicate in engineering field.
- CO2: Develop lateral surfaces of solids and draw Isometric views of given objects for engineering communication using principles of engineering drawing and CAD tools.
- CO3: Work independently or in teams to solve problems with effective communication

I B. Tech. – I Semester
(20BT10332) ENGINEERING WORKSHOP
(Common to CE, ME, EEE, ECE, EIE, CSE(IOT) and CS&D)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: --
COURSE DESCRIPTION: Knowledge on various workshop hand and power tools; hands on experience in different manufacturing trades such as fitting, carpentry, sheet metal forming and foundry; Demonstration on dismantling and assembling of various two wheeler parts, power tools in machining and metal joining, basics of plumbing and working of 3D printer.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
- CO1: Design and model various basic prototypes in the trade of fitting such as square/half round mating, V- mating and dovetail mating from the given MS workpieces using fitting tools.
- CO2: Develop different prototypes in the carpentry trade such as cross lap joint, dovetail / bridle joints and Mortise and Tenon joint using carpentry tools.
- CO3: Design and model different prototypes in the sheet metal forming trade such as rectangular tray, square vessel/cylinder, Funnel as per the dimensions using sheet metal forming tools.
- CO4: Develop sand mold using single piece pattern and split piece pattern in the foundry trade using foundry tools.
- CO5: Develop electric circuits for series and stair case connections.
- CO6: Demonstrate the knowledge on power tools, plumbing operation, 3D printing technology involved in different engineering applications.
- CO7: Work independently or in teams to solve problems with effective communication

I B. Tech. - I Semester
(20BT10333) MATERIAL SCIENCE AND ENGINEERING LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: Intermediate Physics, Intermediate Chemistry
COURSE DESCRIPTION: Characterization of microstructures of steels, cast irons and non-ferrous metals; heat treatment procedures; data acquisition and recording; grain size analysis; phase segmentation; non-destructive tests.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
- CO1. Analyze metallographic study of various metals using tools & software.
- CO2. Determine the mechanical properties of heat treated materials using tools & equipment.
- CO3. Apply non-destructive methods to identify and analyze the metal defects.
- CO4. Work individually or in a team to solve problems with effective communication.

I B.Tech. - I Semester
(20BT1HSAC) SPOKEN ENGLISH
(Common to CE, ME, EEE, ECE, EIE, CSE(IOT) and CS&D)
(Audit Course)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	2	-	-	-

PRE-REQUISITES: -
COURSE DESCRIPTION:
Grammar; Functional English; Paragraph writing; Letter writing and Email writing.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
CO1. Demonstrate knowledge of grammar and vocabulary in writing effective formal letters and e-mails.
CO2. Communicate effectively by applying appropriate speaking and writing techniques by examining and applying functional English.

I B. Tech. - II semester
(20BT2BS01) TRANSFORMATION TECHNIQUES AND LINEAR ALGEBRA
(Common to All Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITE: -
COURSE DESCRIPTION:
Fourier Series and Fourier Transforms; Laplace Transforms; Inverse Laplace Transforms; Linear Algebra-I (Matrices); Linear Algebra-II (Vector Spaces).
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
CO1. Construct the Fourier series for periodic functions and demonstrate the use of Fourier series and Fourier transform to connect the frequency and time domain systems.
CO2. Solve initial and boundary value problems in engineering fields through Laplace Transform techniques.
CO3. Apply the matrix theory in solving system of linear equations and determine the Eigen values and Eigen vectors.
CO4. Demonstrate the knowledge of Linear Transformations to intelligent systems.

I B. Tech. – II Semester
(20BT1BS04) APPLIED PHYSICS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: --
COURSE DESCRIPTION:
Fiber optics; Acoustics; Ultrasonics; Kinematics; Kinetics; Thermal Physics and Modern Engineering Materials.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
CO1. Understand the electromagnetic wave propagation in various types of Optical Fibers.
CO2. Apply the basic knowledge of acoustics and ultrasonics to provide solutions for various engineering problems.
CO3. Analyze and solve the problems associated with kinetics and kinematics.
CO4. Acquire the basic knowledge in several heat transfer mechanisms and heat conduction through the compound media.
CO5. Demonstrate the knowledge on characteristics and applications of modern engineering materials.

I B. Tech. - II Semester
(20BT1HS01) COMMUNICATIVE ENGLISH
(Common to CE, ME, EEE, ECE, EIE, CSE(IOT) and CS&D)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: -
COURSE DESCRIPTION:
Introduction to Communication; Active Listening; Effective Speaking; Reading and Technical Writing.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:

CO1. Demonstrate knowledge of English language, examining and applying the aspects of Process of communication, Paralinguistic features, Skimming, Scanning, and Elements of style in writing.
CO2. Analyze the modes and techniques of listening, speaking, reading, writing and apply them appropriately to communicate effectively with the engineering community and society.
CO3. Apply reading and writing techniques in preparing documents by examining SQ3R Technique, Writer's Block, and Précis Writing.
CO4. Communicate effectively in Conferences, Symposia, Seminars and in formal and real time situations by applying appropriate speaking techniques learnt by examining different communication styles used in similar contexts.

I B. Tech. – II Semester
(20BT20541) PROGRAMMING IN C AND DATA STRUCTURES
(Common to CE, ME, EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: A Course on Basic Mathematics
COURSE DESCRIPTION:
Algorithms; Flowcharts; Introduction to C language; Operators and expressions; Input and output functions; Control statements; Arrays; Strings; Functions; Pointers; User-defined data types; Linked lists; Overview of data structures; Stack; Queue; Searching algorithms; Sorting algorithms.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:

CO1. Develop flowcharts, algorithms for given problems.
CO2. Design algorithmic solutions by analyzing programming problems and using appropriate C language constructs.
CO3. Apply linear data structures such as arrays, linked lists, stacks, queues for efficient data organization and manipulation.
CO4. Select appropriate techniques for searching and sorting problems.

I B. Tech. – II Semester
(20BT20301) BASIC ENGINEERING MECHANICS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: Applied Physics
COURSE DESCRIPTION:
Statics of Particles and Rigid Bodies; Support Reactions; Analysis of Perfect Frames; Friction; Centroid, Centre of Gravity and Moment of Inertia; kinetics and Vibrations
COURSE OUTCOMES:
After successful completion of the course, students will be able to:

CO1. Analyze the equilibrium of forces in static particles, rigid bodies, and effect of friction by applying the principles of Engineering Mechanics, and solve the problems..
CO2. Analyze composite areas and bodies to find centroid, centre of gravity and moment of inertia.
CO3. Apply D'Alembert's Principle for analyzing the kinetics of rigid bodies.
CO4. Apply the basic principles of Simple Harmonic Motion and vibrations to solve problems in mechanical systems

I B. Tech. – II Semester
(20BT1BS33) APPLIED PHYSICS LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE REQUISITE: -
COURSE DESCRIPTION:
Determination of acceleration due to gravity using Compound Pendulum; Moment of inertia of a Flywheel; rectangular body using Bifilar Pendulum; Rigidity Modulus of a wire using Torsional Pendulum and frequency of electrically vibrating tuning fork; Thermal conductivity of a bad conductor (Lee's disc method); Seebeck Effect using Thermocouple; Verification of Newton's Law of Cooling for any two liquids; Characteristics of Optical fiber; Experimental determination of carrier concentration and energy gap of a material by varying temperatures and Determination of spring constant of springs using Coupled Oscillator.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
- CO1. Demonstrate the experimental procedures to compute the frequency of a tuning fork, hall coefficient, energy gap, moment of inertia, rigidity modulus and thermal conductivity of materials.
- CO2. Apply skills to plot various characteristic curves of an optical Fiber and also determine thermal conductivity, thermo emf and energy gap.
- CO3. Work independently and in teams to solve problems with effective communication.

I B.Tech. - II Semester
(20BT1HS31) COMMUNICATIVE ENGLISH LAB
(Common to CE, ME, EEE, ECE, EIE, CSE(IOT) and CS&D)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE REQUISITE: -
COURSE DESCRIPTION:
Just a Minute, Elocution/Impromptu; Phonetics; Vocabulary Building; Grammar; Giving Directions; Role Plays; Public Speaking; Letter Writing; Describing Objects; Listening Comprehension; Information Transfer and Reading Comprehension.
COURSE OUTCOMES:
After successful completion of this course, students will be able to:
- CO1. Demonstrate knowledge of Phonetics by examining and applying sounds of English through Phonetics.
- *CO2.* Analyze sentence structures by applying and demonstrating knowledge of Vocabulary and Grammar.
- CO3. Apply appropriate listening and reading skills by analyzing the context, and demonstrate through listening comprehension and reading comprehension.
- CO4. Function effectively as an individual and as a member in diverse teams examining and applying speaking skills in Just A Minute and Role Play.
- CO5. Communicate effectively applying appropriate writing and speaking techniques by examining and demonstrating knowledge through Describing Objects, Information Transfer and Letter Writing in formal and real time situations.

I B. Tech. – II Semester
(20BT20551) PROGRAMMING IN C AND DATA STRUCTURES LAB
(Common to CE, ME, EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES:
A course on "Programming in C and Data Structures"
COURSE DESCRIPTION:
Hands on practice in developing and executing simple programs using C Programming constructs – Control statements, Arrays, Strings, Functions, Pointers, Structures, Single linked lists, Stack, Queue, Searching and Sorting.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
CO1. Design algorithmic solutions by analyzing programming problems and using appropriate C language constructs.
CO2. Implement linear data structures such as arrays, linked lists, stacks, queues for efficient data organization and manipulation.
CO3. Select appropriate techniques for searching and sorting problems.
CO4. Work independently and communicate effectively in oral and written forms.

I B. Tech. - II Semester
(20BT1MC01) UNIVERSAL HUMAN VALUES
(Mandatory Course)
(Common to CE, ME, EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	-	-	2	-	-	-

PRE-REQUISITES: -
COURSE DESCRIPTION:
Process for Value Education; Harmony in the Human Being - Harmony in Myself!; Harmony in Family and Society- Human Relationship; Harmony in the Nature and Existence – Coexistence; Implications of Holistic Understanding of Harmony on Professional Ethics.
COURSE OUTCOMES:
After successful completion of the course, students will be able to:
CO1. Understand Values and skills for sustained happiness and prosperity.
CO2. Analyse realistic implications of a Holistic understanding of ethical human conduct, trustful and mutually fulfilling human behaviour.
CO3. Apply holistic approach in personal life and profession through a positive understanding of the Human reality and existence.

Program: B.Tech. CIVIL ENGINEERING

I B. Tech. - I Semester
(20BT1BS01) **DIFFERENTIAL EQUATIONS AND MULTIVARIABLE CALCULUS**
(Common to All Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE REQUISITE:-
COURSE DESCRIPTION: Ordinary Differential Equations; Partial Differential Equations; Multivariable Calculus (Differentiation); Multivariable Calculus (Integration); Multivariable Calculus (Vector Calculus).
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Solve the higher order linear differential equations and identify solutions by analytical methods related to various engineering problems involving electrical circuits.
CO2. Formulate and solve partial differential equations for engineering problems.
CO3. Determine maxima and minima of functions of two variables and analyze their behaviour at extreme values.
CO4. Evaluate and apply multiple integrals to determine areas of plane curves.
CO5. Identify solenoidal and irrotational vector fields and apply vector integral theorems in evaluating areas and volumes.

I B. Tech. – I Semester
(20BT1BS02) **ENGINEERING CHEMISTRY**
(Common to CE, ME, CSE, CSSE, IT, CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE REQUISITE:-
COURSE DESCRIPTION: Water Treatment; Atomic Structure and Bonding Theories; Electrochemistry and Applications; Corrosion; Instrumental Methods and Applications; Fuel chemistry and Lubricants.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Analyze and solve problems associated with hardness of water, boiler troubles and address the societal, health and safety issues related to quality of water.
CO2. Apply the basic knowledge of quantum mechanical approach to atomic structure and bonding theories to identify shapes of different molecules.
CO3. Apply the basic knowledge of corrosion phenomenon to identify solutions for control of corrosion and demonstrate competency in the basic concepts of electrochemical cells.
CO4. Demonstrate the basic knowledge of instrumental methods and their applications in the structural analysis of materials.
CO5. Apply the basic knowledge of fuel chemistry and lubricants to identify the quality of fuels and lubricants.

I B. Tech. – I Semester
(20BT1BS04) **APPLIED PHYSICS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PREREQUISITES:-
COURSE DESCRIPTION: Fiber optics; Acoustics; Ultrasonics; Kinematics; Kinetics; Thermal Physics and Modern Engineering Materials.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Understand the electromagnetic wave propagation in various types of Optical Fibers.
CO2. Apply the basic knowledge of acoustics and ultrasonics to provide solutions for various engineering problems.
CO3. Analyze and solve the problems associated with kinetics and kinematics.
CO4. Acquire the basic knowledge in several heat transfer mechanisms and heat conduction through the compound media.
CO5. Demonstrate the knowledge on characteristics and applications of modern engineering materials.

I B. Tech. – I Semester
(20BT10101) **ENGINEERING MECHANICS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES:-
COURSE DESCRIPTION: Statics of Particles and Rigid Bodies; Support Reactions; Analysis of Perfect Frames; Friction; Centroid, Centre of Gravity and Moment of Inertia; Simple Stresses and Strains; Thin and Thick Cylinders.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Analyze complex engineering problems related to statics of particles and rigid bodies for effective solutions using appropriate methods ensuring safety besides communicating effectively in graphical form.
CO2. Analyze complex friction problems for effective solutions ensuring safety besides communicating effectively in graphical form.
CO3. Analyze complex engineering problems related to sectional properties for effective solutions using appropriate methods besides communicating effectively in graphical form.
CO4. Analyze simple stresses and strains in structural elements to solve complex engineering problems using appropriate methods ensuring safety besides communicating effectively in graphical form.
CO5. Design cylinders to solve complex piping engineering problems employing appropriate methods ensuring safety besides communicating effectively in graphical form.

I B. Tech. – I Semester
(20BT1BS31) **ENGINEERING CHEMISTRY LAB**
(Common to CE, ME, CSE, CSSE, IT, CSE(IOT), CS&D and CSE(CS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE REQUISITE:-
COURSE DESCRIPTION: Estimation of hardness ground water sample, alkalinity, dissolved oxygen of water samples, Iron, residual chlorine in drinking water and Strength of an acid in Pb-Acid battery by volumetric methods; Instrumental methods like conductivity meter, potentiometer, P^H meter and colorimeter; Measurement of viscosity of lubricants; and Determination of the influence of pH on metallic corrosion.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Apply analytical skills for the quantitative estimation of materials through volumetric methods of analysis and address the societal, health issues related to quality of water.
CO2. Develop analytical skills for the quantitative estimation of materials through instrumental methods of analysis.
CO3. Work independently and in teams to solve problems with effective communication.

I B. Tech. – I Semester
(20BT1BS33) **APPLIED PHYSICS LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE REQUISITE:-
COURSE DESCRIPTION: Determination of acceleration due to gravity using Compound Pendulum; Moment of inertia of a Flywheel; rectangular body using Bifilar Pendulum; Rigidity Modulus of a wire using Torsional Pendulum and frequency of electrically vibrating tuning fork; Thermal conductivity of a bad conductor (Lee's disc method); Seebeck Effect using Thermocouple; Verification of Newton's Law of Cooling for any two liquids; Characteristics of Optical fiber; Experimental determination of carrier concentration and energy gap of a material by varying temperatures and Determination of spring constant of springs using Coupled Oscillator.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Demonstrate the experimental procedures to compute the frequency of a tuning fork, hall coefficient, energy gap, moment of inertia, rigidity modulus and thermal conductivity of materials.
CO2. Apply skills to plot various characteristic curves of an optical Fiber and also determine thermal conductivity, thermo emf and energy gap.
CO3. Work independently and in teams to solve problems with effective communication.

I B. Tech. – I Semester
(20BT10331) **COMPUTER AIDED ENGINEERING DRAWING**
(Common to CE, ME, EEE, ECE, EIE, CSE(IOT) and CS&D)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	1	4	3

PRE-REQUISITES:**-**
COURSE DESCRIPTION: Engineering drawing conventions; Importance of engineering drawing; fundamental concepts of sketching; computer aided drafting and different types of projections of geometric entities (both 2D and 3D) through computer aided drafting packages.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1: Apply the principles of engineering drawing, Methods and CAD tools to draw the Geometries, Curves and Orthographic projections used to communicate in engineering field.
CO2: Develop lateral surfaces of solids and draw Isometric views of given objects for engineering communication using principles of engineering drawing and CAD tools.
CO3: Work independently / in groups & communicate effectively in oral and written forms.

I B. Tech. – I Semester
(20BT10332) **ENGINEERING WORKSHOP**
(Common to CE, ME, EEE, ECE, EIE, CSE(IOT) and CS&D)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES:-
COURSE DESCRIPTION: Knowledge on various workshop hand and power tools; hands on experience in different manufacturing trades such as fitting, carpentry, sheet metal forming and foundry; Demonstration on dismantling and assembling of various two wheeler parts, power tools in machining and metal joining, basics of plumbing and working of 3D printer.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1: Design and model various basic prototypes in the trade of fitting such as square/half round mating, V- mating and dovetail mating from the given MS workpieces using fitting tools.
CO2: Develop different prototypes in the carpentry trade such as cross lap joint, dovetail / bridle joints and Mortise and Tenon joint using carpentry tools.
CO3: Design and model different prototypes in the sheet metal forming trade such as rectangular tray, square vessel/cylinder, Funnel as per the dimensions using sheet metal forming tools.
CO4: Develop sand mould using single piece pattern and split piece pattern in the foundry trade using foundry tools.
CO5: Develop electric circuits for series and stair case connections.
CO6: Demonstrate the knowledge on power tools, plumbing operation, 3D printing technology involved in different engineering applications.
CO7: Work independently / in groups & communicate effectively in oral and written forms.

I B.Tech. - I Semester
(20BT1HSAC) **SPOKEN ENGLISH**
(Audit Course)
(Common to CE, ME, EEE, ECE, EIE, CSE(IOT) and CS&D)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
-	-	-	2	-	-	-

PRE-REQUISITES:-
COURSE DESCRIPTION: Grammar; Functional English; Paragraph writing; Letter writing and Email writing.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Demonstrate knowledge of grammar and vocabulary in writing effective formal letters and e-mails.
CO2. Communicate effectively by applying appropriate speaking and writing techniques by examining and applying functional English.

I B. Tech. - II semester
(20BT2BS01) **TRANSFORMATION TECHNIQUES AND LINEAR ALGEBRA**
(Common to All Branches)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITE:-
COURSE DESCRIPTION: Fourier Series and Fourier Transforms; Laplace Transforms; Inverse Laplace Transforms; Linear Algebra-I (Matrices); Linear Algebra-II (Vector Spaces).
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Construct the Fourier series for periodic functions and demonstrate the use of Fourier series and Fourier transform to connect the frequency and time domain systems.
CO2. Solve initial and boundary value problems in engineering fields through Laplace Transform techniques.
CO3. Apply the matrix theory in solving system of linear equations and determine the Eigen values and Eigen vectors.
CO4. Demonstrate the knowledge of Linear Transformations to intelligent systems.

I B. Tech. - II Semester
(20BT1HS01) **COMMUNICATIVE ENGLISH**
(Common to CE, ME, EEE, ECE, EIE, CSE(IOT) and CS&D)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES:-
COURSE DESCRIPTION: Introduction to Communication; Active Listening; Effective Speaking; Reading and Technical Writing.
COURSE OUTCOMES: After successful completion of this course, students will be able to:
CO1. Demonstrate knowledge of English language, examining and applying the aspects of Process of communication, Paralinguistic features, Skimming, Scanning, and Elements of style in writing.
CO2. Analyze the modes and techniques of listening, speaking, reading, writing and apply them appropriately to communicate effectively with the engineering community and society.
CO3. Apply reading and writing techniques in preparing documents by examining SQ3R Technique, Writer’s Block, and Précis Writing.
CO4. Communicate effectively in Conferences, Symposia, Seminars and in formal and real time situations by applying appropriate speaking techniques learnt by examining different communication styles used in similar contexts.

I B. Tech. –II Semester
(20BT10201) BASIC ELECTRICAL AND ELECTRONICS ENGINEERING
(Common to CE and CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES:-
COURSE DESCRIPTION: Principles of Electrical Systems; AC & DC Machines; Semiconductor Devices and Op-Amps.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1: Analyze electrical circuits by applying the conceptual knowledge of circuit concepts.
CO2: Demonstrate knowledge on various generation technologies, protection devices, safety procedures and BEE standards.
CO3: Demonstrate knowledge on characteristics and applications of transformers and AC machines.
CO4: Demonstrate knowledge on characteristics and applications of diode, BJT and Op-amps.

I B. Tech. – II Semester
(20BT20541) PROGRAMMING IN C AND DATA STRUCTURES
(Common to CE, ME, EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: A Course on Basic Mathematics
COURSE DESCRIPTION: Algorithms; Flowcharts; Introduction to C language; Operators and expressions; Input and output functions; Control statements; Arrays; Strings; Functions; Pointers; User-defined data types; Linked lists; Overview of data structures; Stack; Queue; Searching algorithms; Sorting algorithms.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Develop flowcharts, algorithms for given problems.
CO2. Design algorithmic solutions by analyzing programming problems and using appropriate C language constructs.
CO3. Apply linear data structures such as arrays, linked lists, stacks, queues for efficient data organization and manipulation.
CO4. Select appropriate techniques for searching and sorting problems.

I B. Tech. – II Semester
(20BT20101) **CIVIL ENGINEERING MATERIALS AND CONCRETE TECHNOLOGY**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

PRE-REQUISITES: Course on Engineering Chemistry
COURSE DESCRIPTION: Stones; Bricks; Tiles; Timber; Miscellaneous Materials in Construction; Cement, Admixtures and Aggregates; Fresh and Hardened Concrete; Elasticity, Shrinkage, Creep and Concrete Mix Design.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Analyze stones, bricks and tiles using different tools and techniques for civil engineering construction considering codes of practice, safety, environment and sustainability besides communicating effectively in graphical form.
CO2. Analyze timber and miscellaneous materials using different tools and techniques and through continuous learning for civil engineering construction considering codes of practice, environment and sustainability besides communicating effectively in graphical form.
CO3. Analyze cement, admixtures and aggregates Using different tools and techniques for civil engineering construction considering codes of practice, environment and sustainability besides communicating effectively in graphical form.
CO4. Analyze fresh and hardened concrete using different tools and techniques for civil engineering construction considering codes of practice, environment and sustainability besides communicating effectively in graphical form.
CO5. Analyze elasticity, shrinkage and creep of concrete using different tools and techniques for civil engineering construction considering codes of practice, environment and sustainability besides communicating effectively in graphical form.
CO6. Design a concrete mix using appropriate methods for solving complex concrete technology problems considering codes of practice, safety, environment and sustainability.

I B.Tech. - II Semester
(20BT1HS31) **COMMUNICATIVE ENGLISH LAB**
(Common to CE, ME, EEE, ECE, EIE, CSE(IOT) and CS&D)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE REQUISITE:-
COURSE DESCRIPTION: Just a Minute, Elocution/Impromptu; Phonetics; Vocabulary Building; Grammar; Giving Directions; Role Plays; Public Speaking; Letter Writing; Describing Objects; Listening Comprehension; Information Transfer and Reading Comprehension.
COURSE OUTCOMES: After successful completion of this course, students will be able to:
CO1. Demonstrate knowledge of Phonetics by examining and applying sounds of English through Phonetics.
CO2. Analyze sentence structures by applying and demonstrating knowledge of Vocabulary and Grammar.
CO3. Apply appropriate listening and reading skills by analyzing the context, and demonstrate through listening comprehension and reading comprehension.
CO4. Function effectively as an individual and as a member in diverse teams examining and applying speaking skills in Just A Minute and Role Play.
CO5. Communicate effectively applying appropriate writing and speaking techniques by examining and demonstrating knowledge through Describing Objects, Information Transfer and Letter Writing in formal and real time situations.

I B. Tech. – II Semester
(20BT20551) **PROGRAMMING IN C AND DATA STRUCTURES LAB**
(Common to CE, ME, EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: A course on “Programming in C and Data Structures”
COURSE DESCRIPTION: Hands on practice in developing and executing simple programs using C Programming constructs – Control statements, Arrays, Strings, Functions, Pointers, Structures, Single linked lists, Stack, Queue, Searching and Sorting.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Design algorithmic solutions by analyzing programming problems and using appropriate C language constructs.
CO2. Implement linear data structures such as arrays, linked lists, stacks, queues for efficient data organization and manipulation.
CO3. Select appropriate techniques for searching and sorting problems.
CO4. Work independently and communicate effectively in oral and written forms.

I B. Tech. – II Semester
(20BT20131) **ENGINEERING GEOLOGY LAB**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: -
COURSE DESCRIPTION: Study of physical properties and identification of minerals and rocks; Rock forming minerals; Ore forming minerals; Igneous rocks; Sedimentary rocks; Metamorphic rocks; Geological maps; Problems on structural geology; Geophysical studies; Measurement of groundwater level.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Identify minerals and rocks using appropriate tools and techniques in order to understand the impact of geological features on civil engineering projects considering standard protocols.
CO2. Analyze structural geology problems for feasible inferences associated with civil engineering projects.
CO3. Develop and interpret geological sections from the geological maps for the benefit of civil engineering projects.
CO4. Perform individually or in a team besides communicating effectively in written, oral and graphical forms on geological information.

I B. Tech. - II Semester
(20BT1MC01) **UNIVERSAL HUMAN VALUES**
(Mandatory Course)
(Common to CE, ME, EEE, ECE, EIE, CSE(IOT) and CS&D)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	-	30	2	-	-	-

PRE-REQUISITES:-
COURSE DESCRIPTION: Value education; Human being and self; Family, the society and the nations; Harmony with the nature and Harmony with professional ethics.
COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO1. Understand Values and skills for sustained happiness and prosperity.
CO2. Analyse realistic implications of a Holistic understanding of ethical human conduct, trustful and mutually fulfilling human behaviour.
CO3. Apply holistic approach in personal life and profession through a positive understanding of the Human reality and existence.

ACADEMIC REGULATIONS

COURSE STRUCTURE

AND

DETAILED SYLLABI

OF

CIVIL ENGINEERING

FOR

B.TECH REGULAR FOUR YEAR DEGREE PROGRAM

(For the batches admitted from 2019-2020)

&

for B.TECH LATERAL ENTRY PROGRAM

(For the batches admitted from 2020-2021)

CHOICE BASED CREDIT SYSTEM

SREE VIDYANIKETHAN ENGINEERING COLLEGE
(AUTONOMOUS)
(Affiliated to JNTU Anantapur, Approved by AICTE,
Accredited by NBA, NAAC with 'A' grade)
Sree Sainath Nagar, A.Rangampet, Near Tirupati - 517 102. A.P.

SREE VIDYANIKETHAN
Engineering college
(Autonomous)

PROGRAM EDUCATIONAL OBJECTIVES

After few years of graduation, the graduates of B.Tech. (CE) will:

1. Pursue higher education in civil engineering or other fields of engineering or management or other areas of interest.
2. Address the contemporary issues in Civil Engineering or related field and provide appropriate solutions through professional career in industry/teaching/research.
3. Engage in 'technology innovation and deployment' and engineering system implementation, as an entrepreneur.
4. Exhibit leadership qualities, participate in continuing education programmes for lifelong learning and contribute individually and as a member in multidisciplinary teams to meet social and ethical constraints.

PROGRAM OUTCOMES

On successful completion of the Program, the graduates of B.Tech. (CE) program will be able to:

1. Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems. **(Engineering knowledge)**
2. Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences. **(Problem analysis)**
3. Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations. **(Design/development of solutions)**
4. Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions. **(Conduct investigations of complex problems)**

5. Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations. **(Modern tool usage**)

6. Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice. (**The engineer and society**)

7. Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development). **(Environment and sustainability)**

8. Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice. (**Ethics**)

9. Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings. **(Individual and team work**)

10. Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions. **(Communication**)

11. Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments. **(Project management and finance**)

12. Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. **(Life-long learning**)

I B. Tech. - I Semester
(19BT1BS04) **ENGINEERING CHEMISTRY**
(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: -

COURSE DESCRIPTION: Atomic Structure and Bonding Theories; Water Treatment; Electrochemistry and Applications; Corrosion; Instrumental Methods and Applications; Fuel chemistry and Lubricants.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Apply the basic knowledge of quantum mechanical approach to atomic structure and bonding theories to identify shapes of different orbitals and molecules.

CO2. Analyze and solve problems associated with hardness of water, boiler troubles and address the societal, health and safety issues related to quality of water.

CO3. Apply the basic knowledge of corrosion phenomenon to identify solutions for control of corrosion and demonstrate competency in the basic concepts of electrochemical cells.

CO4. Demonstrate the basic knowledge of instrumental methods and their applications in the structural analysis of materials.

CO5. Apply the basic knowledge of fuel chemistry and lubricants to identify the quality of fuels and lubricants.

DETAILED SYLLABUS:

Unit I: Atomic Structure and Bonding Theories **(9 Periods)**

Quantum-mechanical model of atom, Schrodinger wave equation, significance of Ψ and Ψ^2, applications to particle in a box and hydrogen atom; Molecular orbital theory – bonding in homo and hetero nuclear diatomic molecules – energy level diagrams of N_2, O_2, NO and CO; Π-molecular orbitals of butadiene and benzene; VSEPR theory and molecular shapes.

ACADEMIC REGULATIONS

COURSE STRUCTURE

AND

DETAILED SYLLABI

OF

ELECTRICAL AND ELECTRONICS ENGINEERING

FOR

B.TECH REGULAR FOUR YEAR DEGREE PROGRAM

(For the batches admitted from 2019-2020)

&

for B.TECH LATERAL ENTRY PROGRAM

(For the batches admitted from 2020-2021)

CHOICE BASED CREDIT SYSTEM

SREE VIDYANIKETHAN ENGINEERING COLLEGE

(AUTONOMOUS)

(Affiliated to JNTU Anantapur, Approved by AICTE,

Accredited by NBA, NAAC with 'A' grade)

Sree Sainath Nagar, A.Rangampet, Near Tirupati - 517 102. A.P.

PROGRAM EDUCATIONAL OBJECTIVES

After few years of graduation, the graduates of B.Tech. (EEE) Program will be:

1. Enrolled in academic program in the disciplines of electrical engineering, multidisciplinary areas and management studies.
2. Become entrepreneurs or be employed as productive and valued engineers in reputed industries.
3. Engage in lifelong learning, career enhancement and adopt to changing professional and societal needs.

PROGRAM OUTCOMES

On successful completion of the Program, the graduates of B. Tech. (EEE) Program will be able to

1. Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES

On successful completion of the Program, the graduates of B.Tech. (EEE) Program will be able to:

PSO1: **Plan** to **conserve and harness** electrical energy using electrical and electronic systems for **sustainability**.

PSO2: Use domain specific **tools** to **analyze, design and develop** electrical and electronic systems for feasible operation and control of Electrical and Electronic Systems.

PSO3: Develop **operating strategies** for utilization of energy and **application** of Electrical and Electronics systems in relevance to industry and society.

I- B. Tech - I Semester

(19BT1BS02) **BIOLOGY FOR ENGINEERS**

(Common to ECE, EEE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	2	-	-	2

PRE-REQUISITES: --

COURSE DESCRIPTION: Living Organisms; Proteins, Nucleic acids and Enzymes; Genetics and Molecular Biology; Recombinant DNA technology; Human Physiology and Applied Biology.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Apply the basic knowledge of biology to understand the significance of various biological techniques.

CO2. Identify the role of DNA in the molecular basis of information transfer and understand single gene disorders related to the health perspective.

CO3. Apply the basic knowledge of bio-analytical devices and methods to assess health issues.

DETAILED SYLLABUS:

UNIT I – Living Organisms **(6 Periods)**

Comparison of biological organisms with man-made systems, Classification of living organisms, Cellular basis of life, differences between prokaryotes and eukaryotes, classification on the basis of carbon and energy sources, molecular taxonomy

UNIT II – Proteins, Nucleic acids and Enzymes **(6 Periods)**

Biomolecules, structure and functions of proteins and nucleic acids, Industrial applications of enzymes, Fermentation and its industrial applications

UNIT III – Genetics and Molecular Biology **(6 Periods)**

Mendel's laws, single gene disorders in humans, Genetic code, DNA replication, Transcription, Translation.

UNIT IV – Recombinant DNA technology **(6 Periods)**

Recombinant DNA Technology: recombinant vaccines, transgenic microbes, plants and animals, animal cloning, biosensors, biochips.

ACADEMIC REGULATIONS

COURSE STRUCTURE

AND

DETAILED SYLLABI

OF

MECHANICAL ENGINEERING

FOR

B.TECH REGULAR FOUR YEAR DEGREE PROGRAM

(For the batches admitted from 2019-2020)

&

for B.TECH LATERAL ENTRY PROGRAM

(For the batches admitted from 2020-2021)

CHOICE BASED CREDIT SYSTEM

SREE VIDYANIKETHAN ENGINEERING COLLEGE

(AUTONOMOUS)

(Affiliated to JNTU Anantapur, Approved by AICTE

PROGRAM EDUCATIONAL OBJECTIVES

After few years of graduation, the graduates of B. Tech. (ME) Program will be:

1. Pursuing further education in Mechanical Engineering, business administration, or other disciplines.
2. In program related industry, allied industry, software industry, and able to start entrepreneurial ventures related to Mechanical Engineering.
3. Able to recognize the developing technology through life-long learning for solving problems related to Mechanical Engineering.

PROGRAM OUTCOMES

On successful completion of the Program, the graduates of B. Tech. (ME) Program will be able to:

1. Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems. (**Engineering knowledge**)
2. Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences. (**Problem analysis**)
3. Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations. (**Design/development of solutions**)
4. Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the (**Conduct investigations of complex problems**) information to provide valid conclusions.
5. Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations. (**Modern tool usage**)

PROGRAM EDUCATIONAL OBJECTIVES

After few years of graduation, the graduates of B. Tech. (ME) Program will be:

1. Pursuing further education in Mechanical Engineering, business administration, or other disciplines.
2. In program related industry, allied industry, software industry, and able to start entrepreneurial ventures related to Mechanical Engineering.
3. Able to recognize the developing technology through life-long learning for solving problems related to Mechanical Engineering.

PROGRAM OUTCOMES

On successful completion of the Program, the graduates of B. Tech. (ME) Program will be able to:

1. Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems. (**Engineering knowledge**)
2. Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences. (**Problem analysis**)
3. Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations. (**Design/development of solutions**)
4. Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the (**Conduct investigations of complex problems**) information to provide valid conclusions.
5. Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations. (**Modern tool usage**)

6. Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice. (**The engineer and society**)
7. Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development. (**Environment and sustainability**)
8. Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice. (**Ethics**)
9. Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings. (**Individual and team work**).
10. Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions. (**Communication**)
11. Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments. (**Project management and finance**)
12. Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. (**Life-long learning**)

PROGRAM SPECIFIC OUTCOMES

On successful completion of the Program, the graduates of B. Tech. (ME) Program will be able to:

PSO1: Design, develop, analyze and maintain of mechanical systems and processes by applying the concepts of material science, Manufacturing, Design and Computer aided Design & Manufacturing technologies

PSO2: Apply the principles thermodynamics, Fluid mechanics and Heat Transfer in the thermal design of various components of thermal energy systems and asses the performance of various thermal energy systems.

PSO3: Identify, define, analyze, formulate, and solve problems related to manufacturing and service systems for optimized conditions by applying tools of Industrial Engineering for effective decision making and support purposes.

I B. Tech. - I Semester

(19BT1BS04) **ENGINEERING CHEMISTRY**

(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: -

COURSE DESCRIPTION: Atomic Structure and Bonding Theories; Water Treatment; Electrochemistry and Applications; Corrosion; Instrumental Methods and Applications; Fuel chemistry and Lubricants.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Apply the basic knowledge of quantum mechanical approach to atomic structure and bonding theories to identify shapes of different orbitals and molecules.

CO2. Analyze and solve problems associated with hardness of water, boiler troubles and address the societal, health and safety issues related to quality of water.

CO3. Apply the basic knowledge of corrosion phenomenon to identify solutions for control of corrosion and demonstrate competency in the basic concepts of electrochemical cells.

CO4. Demonstrate the basic knowledge of instrumental methods and their applications in the structural analysis of materials.

CO5. Apply the basic knowledge of fuel chemistry and lubricants to identify the quality of fuels and lubricants.

DETAILED SYLLABUS:

Unit I: Atomic Structure and Bonding Theories **(9 Periods)**

Quantum-mechanical model of atom, Schrodinger wave equation, significance of Ψ and Ψ^2 , applications to particle in a box and hydrogen atom; Molecular orbital theory – bonding in homo and hetero nuclear diatomic molecules – energy level diagrams of N_2, O_2, NO and CO; Π-molecular orbitals of butadiene and benzene; VSEPR theory and molecular shapes.

ACADEMIC REGULATIONS
COURSE STRUCTURE
AND
DETAILED SYLLABI
OF
ELECTRONICS AND COMMUNICATION ENGINEERING
FOR
B.TECH REGULAR FOUR YEAR DEGREE PROGRAM

(For the batches admitted from 2019-2020)

&

for B.TECH LATERAL ENTRY PROGRAM

(For the batches admitted from 2020-2021)

CHOICE BASED CREDIT SYSTEM

SREE VIDYANIKETHAN
Engineering college
(Autonomous)

SREE VIDYANIKETHAN ENGINEERING COLLEGE

(AUTONOMOUS)

(Affiliated to JNTU Anantapur, Approved by AICTE,
Accredited by NBA, NAAC with 'A' grade)
Sree Sainath Nagar, A.Rangampet, Near Tirupati - 517 102. A.P.

PROGRAM EDUCATIONAL OBJECTIVES

After few years of graduation, the graduates of B.Tech. (ECE) will be:

1. Enrolled or completed higher education in the core or allied areas of electronics and communication engineering or management.
2. Successful entrepreneurial or technical career in the core or allied areas of electronics and communication engineering.
3. Continued to learn and to adapt to the world of constantly evolving technologies in the core or allied areas of electronics and communication engineering.

PROGRAM OUTCOMES

On successful completion of the Program, the graduates of B.Tech. (ECE) Program will be able to:

1. Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES

On successful completion of the Program, the graduates of B. Tech. (ECE) program will be able to:

PSO1: Design and develop customized electronic circuits for domestic and industrial applications.

PSO2: Use specific tools and techniques to design, analyze and synthesize wired and wireless communication systems for desired specifications and applications.

PSO3: Apply suitable methods and algorithms to process and extract information from signals and images in Radar, Satellite, Fiber optic and Mobile communication systems.

I B.Tech. – I Semester

(19BT10341) **BASIC CIVIL AND MECHANICAL ENGINEERING**

(Common to ECE, EEE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --

COURSE DESCRIPTION: Overview of Civil Engineering; Surveying, Civil Engineering Materials, Mechanics of Materials, Building Components, Civil Engineering Infrastructure; Overview of Basic Mechanical Engineering; Internal Combustion Engines and Turbines, Mechanical Power Transmission Systems, Manufacturing Processes, Machining Processes, Non-Conventional Machining.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1: Apply the basic principles of civil engineering, Techniques and tools for analyzing civil structures and solve related problems.

CO2: Describe the working of principles of basic mechanical engineering and solve problems related to it.

DETAILED SYLLABUS:

Part – A: CIVIL ENGINEERING

UNIT –I: SURVEYING AND CIVIL ENGINEERING MATERIALS **(10 Periods)**

Overview of Civil Engineering: Civil Engineering contributions to the welfare of society, specialized sub disciplines in Civil Engineering.

Surveying: Objectives, classification and principles; Measurements – distances, angles, levels, areas and volumes; contouring; Illustrative examples.

Civil Engineering Materials: Bricks, stones, concrete, steel, glass, timber, composite materials.

Mechanics of Materials: Forces, system of forces, laws of mechanics ,moment of a force, equilibrium, resultant, Internal and External forces, Stress, Strain, Hooke's law and Elasticity.

ACADEMIC REGULATIONS

COURSE STRUCTURE

AND

DETAILED SYLLABI

OF

COMPUTER SCIENCE AND ENGINEERING

FOR

B.TECH REGULAR FOUR YEAR DEGREE PROGRAM

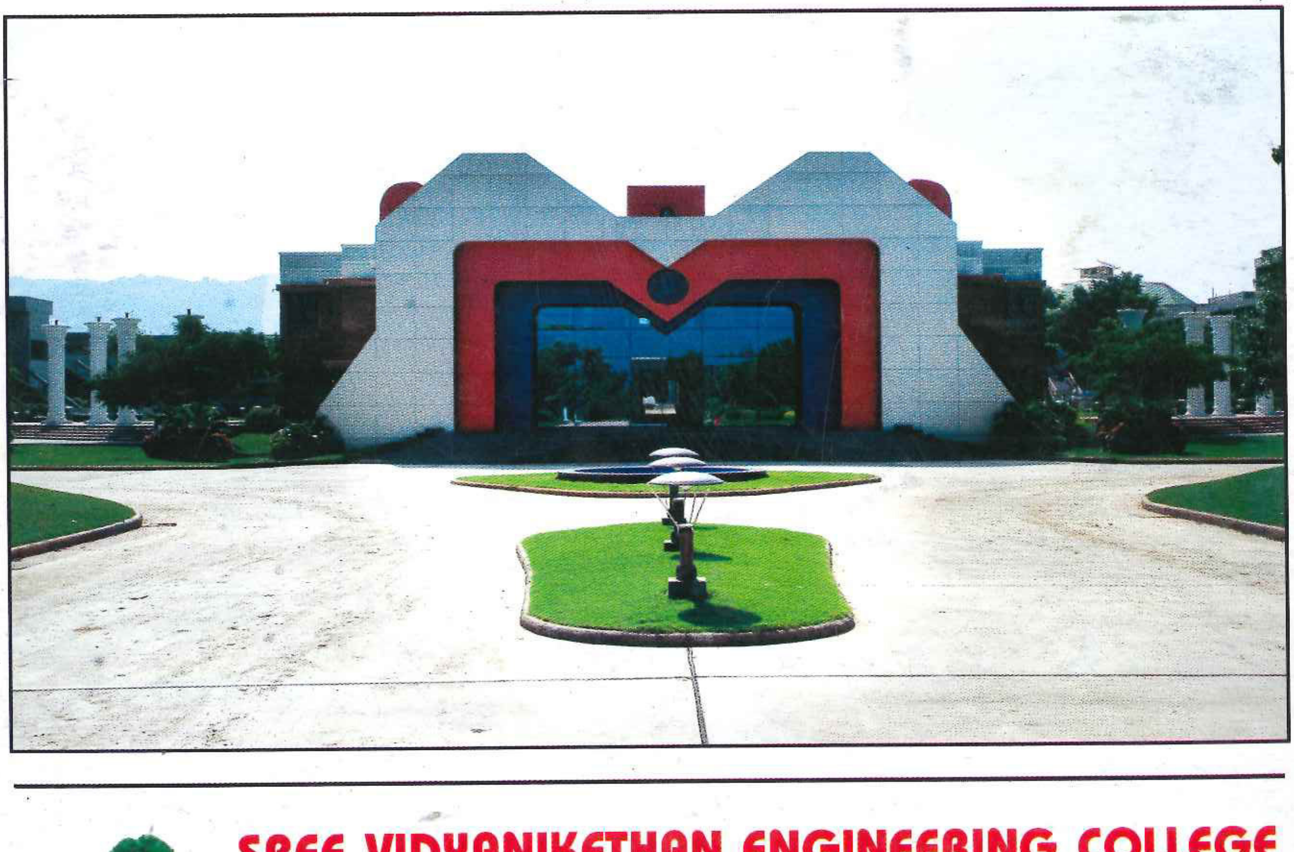
(For the batches admitted from 2019-2020)

&

for B.TECH LATERAL ENTRY PROGRAM

(For the batches admitted from 2020-2021)

CHOICE BASED CREDIT SYSTEM



SREE VIDYANIKETHAN ENGINEERING COLLEGE

(AUTONOMOUS)

(Affiliated to JNTU Anantapur, Approved by AICTE,

Accredited by NBA, NAAC with 'A' grade)

Sree Sainath Nagar, A.Rangampet, Near Tirupati - 517 102. A.P.

SREE VIDYANIKETHAN Engineering college (Autonomous)

PROGRAM EDUCATIONAL OBJECTIVES

After few years of graduation, the graduates of B.Tech. (CSE) will be:

1. Pursuing higher studies in Computer Science and Engineering and related disciplines.
2. Employed in reputed Computer and I.T organizations and Government or have established start-up companies.
3. Able to demonstrate effective communication, engage in team work, exhibit leadership skills, ethical attitude, and achieve professional advancement through continuing education.

PROGRAM OUTCOMES

On successful completion of the Program, the graduates of B. Tech. (CSE) Program will be able to:

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES

On successful completion of the Program, the graduates of B.Tech. (CSE) program will be able to:

PSO1: Use mathematical methodologies to model real-world problems, Employ modern tools and platforms for efficient design and development of computer-based systems

PSO2: Apply adaptive algorithms and methodologies to develop intelligent systems for solving problems from inter-disciplinary domains.

PSO3: Apply suitable models, tools and techniques to perform data analytics for effective decision making.

PSO4: Design and deploy networked systems using standards and principles, evaluate security measures for complex networks, apply procedures and tools to solve networking issues

UNIT V – TECHNICAL WRITING **(9 periods)**

Introduction – Language – Elements of Style – Techniques for Good Technical Writing – Paragraphs Construction – Essays: types, Steps to Essay Writing and Checklist – Précis Writing - Case study

Total Periods: 45

TEXT BOOKS:

1. Meenakshi Raman & Sangeetha Sharma, *Technical Communication*, Oxford University Press, New Delhi, 2012.
2. Ashraf Rizvi, *Effective Technical Communication*, McGraw-Hill Education (India) Pvt. Ltd., New Delhi, 2018.

REFERENCE BOOKS:

1. Sanjay Kumar & Pushp Lata, *Communication Skills*, Oxford University Press, New Delhi, 2013.
2. Rajendra Pal and J. S. Korlahalli, *Essentials of Business Communication*, Sultan Chand and Son, New Delhi, 2010.

ADDITIONAL LEARNING RESOURCES

1. https://www.skillsyouneed.com/ips/active-listening.html: A useful summary of what active listening skills are.
2. https://en.wikipedia.org/wiki/Active_listening: Wikipedia entry about active listening.
3. https://www.forbes.com/sites/womensmedia/2012/11/09/10-steps-to-effective-listening/#4b27a2503891: Ten steps to Active Listening (by Forbes magazine).
4. https://goo.gl/t1Uqrt: 20 tips for organizing a conference.
5. https://goo.gl/kPMr9u: 10 important issues for speakers at a conference.
6. https://goo/gl/C5bDvv: Wikihow guide to organizing a conference.

I B. Tech. – I Semester

(19BT10501) **PROGRAMMING FOR PROBLEM SOLVING**

(Common to CSE, CSSE, IT, CE & ME)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES: A course on Basic Mathematics

COURSE DESCRIPTION: Introduction to problem solving approach, Introduction to Python programming, control structures, sequences, sets, Dictionaries, Implementation of Data structures using Python, Modular programming, file handling, Data representation and Visualization.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on Python constructs to solve basic problems.

CO2. Develop and use Python modules to provide solutions to problems.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO PROBLEM SOLVING AND PYTHON PROGRAMMING

(10 Periods)

Problem Solving Aspect: top-down design, implementation of algorithms, building blocks of flow charts, program verification and efficiency of algorithms.

Python Programming: tokens, literals, identifiers, keywords, special symbols and operators; fundamental data types, expressions, type conversions, handling Input and output in Python.

UNIT-II: CONTROL STRUCTURES **(8 Periods)**

Selection Statements: if statement, if-else statement, if-elif-else statement, nested-if statement.

Iterative Statements: while loop, for loop, break statement, continue statement, pass and else statements used with loops.

ACADEMIC REGULATIONS
COURSE STRUCTURE
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OF
ELECTRONICS AND INSTRUMENTATION ENGINEERING
FOR
B.TECH REGULAR FOUR YEAR DEGREE PROGRAM

(For the batches admitted from 2019-2020)

&

for B.TECH LATERAL ENTRY PROGRAM

(For the batches admitted from 2020-2021)

CHOICE BASED CREDIT SYSTEM

SREE VIDYANIKETHAN ENGINEERING COLLEGE

(AUTONOMOUS)

(Affiliated to JNTU Anantapur, Approved by AICTE,

Accredited by NBA, NAAC with 'A' grade)

Sree Sainath Nagar, A.Rangampet, Near Tirupati - 517 102. A.P.

SREE VIDYANIKETHAN Engineering college (Autonomous)

PROGRAM EDUCATIONAL OBJECTIVES

After few years of graduation, the graduates of B. Tech. (EIE) Program will be:

1. Enrolled or completed higher education in the core or allied areas of electronics and instrumentation engineering or management.
2. Successful career in electronics and instrumentation enabled industries or software industries or be an entrepreneur in the domain area.
3. Constantly enhanced their knowledge on new developments in the core or allied areas of electronics and instrumentation engineering.

PROGRAM OUTCOMES

On successful completion of the Program, the graduates of B. Tech. (EIE) Program will be able to:

1. Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES

On successful completion of the Program, the graduates of B. Tech. (EIE) Program will be able to:

PSO1. Identify and apply suitable sensors and measuring instruments to acquire process variable to analyze the behavior of the system.

PSO2. Analyze, design and implement electronic systems for processing the signals for efficient and smart systems.

PSO3. Design controllers with domain specific tools and technologies for customized solutions.

I B. Tech. - II semester

(19BT2BS01) **TRANSFORMATION TECHNIQUES AND LINEAR ALGEBRA**

(EEE, ECE, EIE, CE, ME, CSE, CSSE & IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES: -

COURSE DESCRIPTION: Fourier Series and Fourier Transforms; Laplace Transforms; Inverse Laplace Transforms; Linear Algebra-I (Matrices); Linear Algebra-II (Vector Spaces).

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1: Apply the knowledge of Fourier and Laplace transform techniques to solve differential equations.

CO2: Analyze linear transformations and associated matrices to solve engineering problems by applying the knowledge of linear algebra.

DETAILED SYLLABUS:

UNIT- I: Fourier Series and Fourier Transforms **(9 Periods)**

Fourier series: Determination of Fourier coefficients, Euler's formulae, convergence of Fourier series (Dirichlet's conditions), Fourier series in $(0,2l),(-l,l)$; Fourier series of even and odd functions; Half-range Fourier sine and cosine expansions in $(0,l)$; Fourier integral theorem (statement only), Fourier sine and cosine integrals; Fourier transforms, Fourier sine and cosine transforms, Inverse Fourier transforms.

UNIT-II: Laplace Transforms **(9 Periods)**

Definition of Laplace transform, existence conditions, Laplace transform of standard functions, Properties of Laplace transforms, Laplace transforms of derivatives, Laplace transforms of integrals, multiplication by t^n, division by t, Laplace transform of periodic functions, Laplace transforms of unit step function and unit impulse function.

UNIT- III: Inverse Laplace Transforms **(9 Periods)**

Inverse Laplace transform by different methods; Convolution theorem (without proof), inverse Laplace transforms by convolution theorem; Applications of Laplace transforms to ordinary differential equations of first and second order with constant coefficients.

ACADEMIC REGULATIONS

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OF

INFORMATION TECHNOLOGY

FOR

B.TECH REGULAR FOUR YEAR DEGREE PROGRAM

(For the batches admitted from 2019-2020)

&

for B.TECH LATERAL ENTRY PROGRAM

(For the batches admitted from 2020-2021)

CHOICE BASED CREDIT SYSTEM

SREE VIDYANIKETHAN ENGINEERING COLLEGE

(AUTONOMOUS)

(Affiliated to JNTU Anantapur, Approved by AICTE,

Accredited by NBA, NAAC with 'A' grade)

Sree Sainath Nagar, A.Rangampet, Near Tirupati - 517 102. A.P.

PROGRAM EDUCATIONAL OBJECTIVES

After few years of graduation, the graduates of B. Tech. (IT) Program will be:

1. Enrolled or completed higher education in the core or allied areas of Computer Science and Information Technology or management.
2. Successful entrepreneurial or technical career in the core or allied areas of Computer Science and Information Technology.
3. Continued to learn and to adapt to the world of constantly evolving technologies in the core or allied areas of Computer Science and Information Technology.

PROGRAM OUTCOMES

On successful completion of the Program, the graduates of B. Tech. (IT) Program will be able to:

1. Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES

On successful completion of the program, the graduates of B.Tech. (IT) program will be able to:

PSO1: Design and develop database systems, apply data analytics techniques, and use advanced databases for data storage, processing and retrieval.

PSO2: Apply network security techniques and tools for the development of highly secure systems.

PSO3: Analyze, design and develop efficient algorithms and software applications to deploy in secure environment to support contemporary services using programming languages, tools and technologies.

PSO4: Apply concepts of computer vision and artificial intelligent for the development of efficient intelligent systems and applications.

I B. Tech. – II Semester

(19BT21501) **OBJECT ORIENTED PROGRAMMING THROUGH JAVA**

(Common to CSE, CSSE and IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: A course on Programming for Problem Solving

COURSE DESCRIPTION: Introduction to Object Oriented Programming, Classes and Objects; Inheritance, Packages, Interfaces; Exception handling, Multithreading; Collection Classes; Applets, Swings, Event handling.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on object oriented programming constructs to solve programming problems.

CO2. Analyze object oriented programming features – polymorphism, inheritance, exception handling and multithreading for reusability.

CO3. Develop user interfaces using GUI programming techniques.

DETAILED SYLLABUS:

UNIT I : INTRODUCTION **(9 Periods)**

Introduction to Object Oriented Programming, Java Buzzwords, History, Java Environment, Java Components, Programming Paradigms, Naming Conventions.

Classes and Objects: Introduction to classes, objects, Constructors, Garbage Collection, this keyword, Access Control, Features of Object Oriented Programming.

UNIT II: DATA TYPES, CONTROL STATEMENTS, POLYMORPHISM **(9 Periods)**

Data Types, Variables, Type Conversions (Boxing and Unboxing/Wrapping and Unwrapping) and Casting, Arrays, Operators, Decision Making Statements, Looping Statements, Methods, Recursion, Method Overloading, Constructor Overloading, Parameter Passing, String Class, Final Keyword.

Utility Classes: String Tokenizer, Scanner, Random, Bit Set.

UNIT III : INHERITANCE, PACKAGES, INTERFACES **(9 Periods)**

INHERITANCE: Introduction, Classification, Abstract Classes, Final keyword with Inheritance.

ACADEMIC REGULATIONS

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OF

COMPUTER SCIENCE AND SYSTEMS ENGINEERING

FOR

B.TECH REGULAR FOUR YEAR DEGREE PROGRAM

(For the batches admitted from 2019-2020)

&

for B.TECH LATERAL ENTRY PROGRAM

(For the batches admitted from 2020-2021)

CHOICE BASED CREDIT SYSTEM

SREE VIDYANIKETHAN ENGINEERING COLLEGE

SREE VIDYANIKETHAN Engineering college (Autonomous)

(AUTONOMOUS)

(Affiliated to JNTU Anantapur, Approved by AICTE,

Accredited by NBA, NAAC with 'A' grade)

Sree Sainath Nagar, A.Rangampet, Near Tirupati - 517 102. A.P.

PROGRAM EDUCATIONAL OBJECTIVES

After few years of graduation, the graduates of B. Tech. (IT) Program will be:

1. Enrolled or completed higher education in the core or allied areas of Computer Science and Information Technology or management.
2. Successful entrepreneurial or technical career in the core or allied areas of Computer Science and Information Technology.
3. Continued to learn and to adapt to the world of constantly evolving technologies in the core or allied areas of Computer Science and Information Technology.

PROGRAM OUTCOMES

On successful completion of the Program, the graduates of B. Tech. (IT) Program will be able to:

1. Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES

On successful completion of the program, the graduates of B.Tech. (IT) program will be able to:

PSO1: Design and develop database systems, apply data analytics techniques, and use advanced databases for data storage, processing and retrieval.

PSO2: Apply network security techniques and tools for the development of highly secure systems.

PSO3: Analyze, design and develop efficient algorithms and software applications to deploy in secure environment to support contemporary services using programming languages, tools and technologies.

PSO4: Apply concepts of computer vision and artificial intelligent for the development of efficient intelligent systems and applications.

I B. Tech. – II Semester
(19BT20501) **DIGITAL LOGIC DESIGN**
(Common to CSE, IT, CSSE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --

COURSE DESCRIPTION: Foundation in design and analysis of the operation of digital gates; Concepts of Boolean algebra, Minimization of logic circuits; Design and implementation of combinational and sequential logic circuits; Analysis and design of flip-flops, registers, and counters and comparison of their behavior and characteristics; Design digital systems using Programmable logic.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Apply knowledge of binary systems, logic gates and Boolean functions to minimize and implement digital circuits.

CO2. Develop digital systems using combinational and sequential logic to solve engineering problems.

DETAILED SYLLABUS:

UNIT- I: BINARY SYSTEMS AND BOOLEAN ALGEBRA (10 periods)

Introduction, Binary Numbers, Number Base Conversions, Error Detection and Correction, Complements of Numbers, Signed Binary Numbers, Binary Codes, Boolean Algebra, Boolean Functions, Canonical and Standard Forms, Digital Logic Gates.

UNIT-II: GATE LEVEL MINIMIZATION (9 periods)

The Map Method, Four Variable K-Map, Product-of-Sums and Sum-of-Products Simplification, Don't Care Conditions, NAND and NOR Implementations, Other Two Level Implementations, Exclusive–OR function.

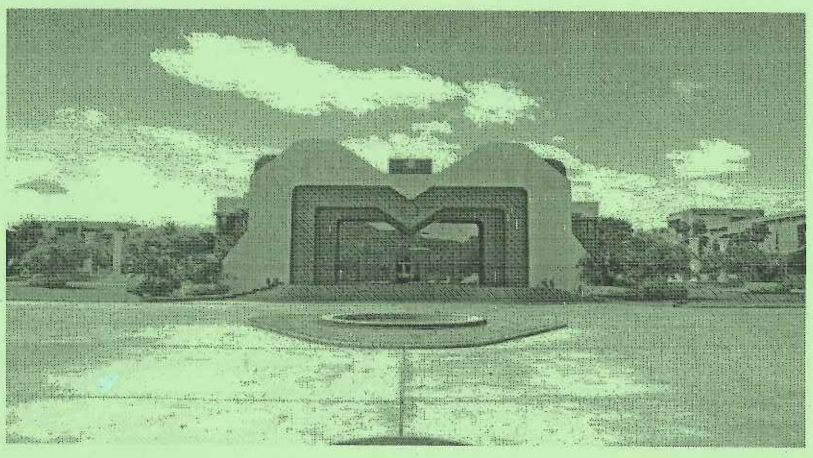
UNIT-III: COMBINATIONAL LOGIC (9 periods)

Combinational Circuits, Analysis of Combinational Circuits, Design Procedure, Binary Adder-Subtractor, Decimal Adder, Binary Multiplier, Magnitude Comparator, Decoders, Encoders, Multiplexers, De-Multiplexers.

ACADEMIC REGULATIONS
COURSE STRUCTURE
AND
DETAILED SYLLABI
For
MASTER OF TECHNOLOGY
In
VLSI

(For the batches admitted from 2019-2020)

CHOICE BASED CREDIT SYSTEM



SREE VIDYANIKETHAN ENGINEERING COLLEGE

(AUTONOMOUS)

(Affiliated to JNTU Anantapur, Approved by AICTE
Programs Accredited by NBA; NAAC with 'A' grade)
Sree Sainath Nagar, A.Rangampet, Near Tirupati - 517 102.A.P.

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

M. Tech. (VLSI)

PROGRAM EDUCATIONAL OBJECTIVES

After few years of graduation, the graduates of M. Tech. (VLSI) Program would have

PEO1. Enrolled or completed research studies in the core or allied areas of VLSI.

PEO2. Successful entrepreneurial or technical career in the core or allied areas of VLSI.

PEO3. Continued to learn and to adapt to the world of constantly evolving technologies in the core or allied areas of VLSI.

PROGRAM OUTCOMES

On successful completion of the Program, the graduates of M. Tech. (VLSI) will be able to:

PO1. Demonstrate mastery of knowledge in VLSI and other allied areas of the program.

PO2. Design and develop Integrated Circuits/systems/platforms for Digital, Analog and Mixed VLSI applications.

PO3. Select and apply appropriate modern tools, techniques and resources to provide engineering solutions in VLSI and allied areas.

PO4. Independently carry out research to deliver solutions for complex problems in VLSI.

PO5. Communicate effectively in written and oral formats.

PO6. Ability to continuously engage in life-long learning to enhance knowledge and competence.

M. Tech. I - Semester
(19MT15703) DIGITAL CMOS VLSI DESIGN

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES:

A Course on Digital IC Applications and VLSI Design at UG Level.

COURSE DESCRIPTION:

Introduction to MOS transistors; Characteristics of CMOS digital circuits; Transistor sizing; memory design; Design strategies; Design of subsystems.

COURSEOBJECTIVES:

CEO1: To impart in-depth knowledge in MOS transistor Integrated Circuits.
CEO2: To develop skills in design and development, analysis, problem solving and research in Digital Systems.

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

CO1. Analyze the characteristics of CMOS Inverter and Design combinational and sequential logic circuits using various design styles.
CO2. Analyze timing issues to improve the performance of sequential logic circuits.
CO3. Design memories and sub systems using CMOS logic for high speed networks.
CO4. Understand design methodologies and tools at various levels of abstraction.

DETAILED SYLLABUS:

Unit – I: CMOS Inverter Characteristics and Design Styles **(Hours: 09)**
MOS Inverters: Introduction, Definitions and Properties, Static CMOS Inverter, Static and Dynamic Power Dissipation, CMOS inverter delay time definitions and calculations
Designing Combinational Logic Gates in CMOS: Introduction, Static CMOS Design, Dynamic CMOS Design, Domino and NORA logic, Power Consumption in CMOS Gates.

Unit – II: Designing Sequential Logic Gates in CMOS **(Hours: 10)**
Introduction, Static Sequential Circuits, Dynamic Sequential Circuits, Non-Bistable Sequential Circuit, Logic Style for Pipelined Structures.
Timing Issues in Digital Circuits: Introduction, Clock Skew and Sequential Circuit Performance, Clock Generation and Synchronization.

Unit - III: High Speed Network and Memory Design **(Hours: 09)**
Methods of Logical Effort for transistor sizing - Power consumption in CMOS Gates, Low power CMOS design. CMOS Memory design – SRAM, DRAM.

Unit – IV: Subsystem Design Process **(Hours: 09)**
General arrangement of 4-bit Arithmetic Processor, Design of 4-bit shifter, Design of ALU sub-system, Implementing ALU functions with an adder, Multipliers, modified Booth's algorithm.

Unit - V: Design Methodology and Tools **(Hours: 08)**
Introduction, Structured Design Strategies, Design Methods, Design Flows, Design Economics, Data Sheets and Documentation.

Total Hours: 45

ACADEMIC REGULATIONS

COURSE STRUCTURE

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for

MASTER OF TECHNOLOGY

in

POWER ELECTRONICS AND DRIVES

(For the batches admitted from 2019-2020)

CHOICE BASED CREDIT SYSTEM

SREE VIDYANIKETHAN
Engineering College
(Autonomous)

SREE VIDYANIKETHAN ENGINEERING COLLEGE
(AUTONOMOUS)
(Affiliated to JNTU Anantapur, Approved by AICTE Programs Accredited by NBA; NAAC with 'A' grade)
Sree Sainath Nagar, A.Rangampet, Near Tirupati - 517 102. A.P.

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

PROGRAM EDUCATIONAL OBJECTIVES

After few years of graduation, the graduates of M.Tech. (PED) Program will

PEO1. Enroll in doctoral studies or engage in research activities of societal importance.

PEO2. Assume key positions in research divisions, industry and academia.

PEO3. Advance professionally through continuing education, ethics and values.

PROGRAM OUTCOMES

On successful completion of the Program, the graduates of M.Tech. (PED) will be able to

PO1. Demonstrate in-depth knowledge of power electronics and drives with an ability to practice, distinguish, evaluate and integrate the existing and advanced knowledge.

PO2. Investigate complex problem in power electronics and drives critically to design, evaluate and synthesize optimal solutions keeping in view of societal and environmental factors.

PO3. Select, learn and apply appropriate tools, techniques and resources to solve power electronics and drives problems.

PO4. Work independently or in groups to solve problems in power electronics and drives.

PO5. Communicate effectively on complex engineering activities with the engineering community and society at large through effective reports, documents and presentations adhering to appropriate standards.

PO6. Advance professionally through continuing education practicing professional ethics and values.

M. Tech. – II Semester

(19MT28305) SOLAR ENERGY CONVERSION SYSTEMS

(Program Elective - 3)

(Common to EPS and PED)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Courses on Power Electronic Converters.

COURSE DESCRIPTION: Solar energy conversion system; Types of photovoltaic systems – Stand-alone, hybrid and grid connected systems; Energy storage systems; Applications.

COURSE OUTCOMES: On successful completion of the course, students will be able to

CO1. Demonstrate knowledge on solar cell and analyze the behavior of solar cells for different irradiations.

CO2. Apply the knowledge of solar modules, energy storage system and MPTT to design the stand-alone and grid connected PV systems for various real time applications.

DETAILED SYLLABUS:

Unit - I: Photovoltaic Basics **(09 hours)**

Structure and working of Solar Cells - Types, Electrical properties and Behaviour of Solar Cells - Cell properties and design - PV Cell Interconnection and Module Fabrication - PV Modules and arrays – open circuit (Voc) and short circuit characteristics of a PV array- Basics of Load Estimation.

Unit - II: Stand Alone PV System **(09 hours)**

Solar modules – storage systems – power conditioning and regulation - MPPT- protection – stand alone PV systems design – sizing.

Unit - III: Grid Connected PV Systems **(09 hours)**

Schematics, Components, solar converters –state of charge characteristics (SOC) - Charge Conditioners, Interface Components - Balance of system Components - PV System in Buildings-Micro Grid structure.

Unit - IV: Design of PV Systems **(09 hours)**

Radiation and load data - Design of System Components for different PV Applications - Sizing and Reliability - Simple Case Studies.

UNIT - V: Applications **(09 hours)**

Water pumping, Battery chargers, Solar car, Direct-drive applications, Space and Telecommunications.

Total hours: 45

ACADEMIC REGULATIONS

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for

MASTER OF TECHNOLOGY

in

ELECTRICAL POWER SYSTEMS

(For the batches admitted from 2019-2020)

CHOICE BASED CREDIT SYSTEM

SREE VIDYANIKETHAN
Engineering College
(Autonomous)

SREE VIDYANIKETHAN ENGINEERING COLLEGE

(AUTONOMOUS)

(Affiliated to JNTU Anantapur, Approved by AICTE
Programs Accredited by NBA; NAAC with 'A' grade)
Sree Sainath Nagar, A.Rangampet, Near Tirupati - 517 102. A.P.

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

M. Tech – Electrical Power Systems

PROGRAM EDUCATIONAL OBJECTIVES

After few years of graduation, the graduates of M.Tech. (EPS) Program will

PEO1. Enroll in doctoral studies or engage in research activities of societal importance.

PEO2. Assume key positions in research divisions, industry and academia.

PEO3. Advance professionally through continuing education, ethics and values.

PROGRAM OUTCOMES

On successful completion of the Program, the graduates of M.Tech. (EPS) Program will be able to

PO1. Demonstrate in-depth knowledge of power systems with an ability to practice, distinguish, evaluate and integrate the existing and advanced knowledge.

PO2. Investigate complex power system scenarios critically to design, evaluate and synthesize feasible, optimal solutions keeping in view of societal and environmental factors.

PO3. Select, learn and apply appropriate tools, techniques and resources to solve power system problems.

PO4. Work independently or in groups to solve problems in power systems

PO5. Communicate effectively on complex engineering activities with the engineering community and society at large through effective reports, documents and presentations adhering to appropriate standards.

PO6. Advance professionally through continuing education practicing professional ethics and values.

M.Tech. - I Semester
(19MT18304) CONTROL SYSTEM DESIGN
(Program Elective - 1)
(Common to EPS and PED)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Control systems in UG Level

COURSE DESCRIPTION: Design of compensators and controllers; Controllability and observability of a system; Control systems design using state space; Nonlinear systems.

COURSEOUTCOMES: On successful completion of the course, students will be able to

CO1. Apply the knowledge of Lag, Lead and Lead-Lag compensators to analyze and design the systems in frequency and time domains for the given specifications.

CO2. Demonstrate the knowledge of PD, PI &PID Controllers to develop a suitable controller based on the required time and frequency domain specifications and analyze their performance.

CO3. Apply appropriate methods to solve linear and non-linear systems using state space approach.

CO4. Identify the attributes for analyzing the given non-linear systems.

DETAILED SYLLABUS:

Unit - I: Introduction to Design **(09 hours)**

The Design Problem, Preliminary considerations of classical design, Realization of Basic Compensators, Design of Lead, Lag and Lag-Lead compensators using root locus technique. Lead, Lag and Lag-Lead compensators design using Bode plot.

Unit - II: Controllers Design **(09 hours)**

Introduction to controllers, Types of controllers, Effect of P, PI and PID controllers. Design of PI, PD and PID controllers using bode plot and root locus technique.

Unit - III: Controllability and Observability **(09 hours)**

Review of state variable techniques – Concept of controllability and observability for Continuous Time Systems. Principles of Duality. Controllability and Observability of state models in Jordan canonical form and other canonical forms – effect of state feedback on controllability and observability.

Unit - IV: Design of Control Systems in State Space **(09 hours)**

Necessity of pole placement, design by pole placement, necessary and

ACADEMIC REGULATIONS
COURSE STRUCTURE
AND
DETAILED SYLLABI

For
MASTER OF TECHNOLOGY
in
COMPUTER SCIENCE

(For the batches admitted from 2019-2020)

CHOICE BASED CREDIT SYSTEM

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

SREE VIDYANIKETHAN ENGINEERING COLLEGE

(AUTONOMOUS)

(Affiliated to JNTUA, Ananthapuramu, Approved by AICTE,
Programs Accredited by NBA, Accredited by NAAC with 'A' grade)
Sree Sainath Nagar, A. Rangampet, Near Tirupati - 517102 A.P.

PROGRAM EDUCATIONAL OBJECTIVES

*After few years of graduation, the graduates of **M. Tech. (CS)** program would have:*

PEO1. Enrolled in advanced studies in the domain of Computer Networks, Database Systems, Data Mining, Software engineering and Interdisciplinary areas.

PEO2. Employed in academia, software development, Government and Research organizations or would have established startup companies.

PEO3. Effective communication and leadership skills in professional practice with ethical code, gain knowledge of contemporary and global issues and strive for continuous learning.

PROGRAM OUTCOMES

*On successful completion of the Program, the graduates of **M. Tech. (CS)** will be able to:*

PO1. Demonstrate knowledge with ability to select, learn and apply appropriate techniques, skills and modern engineering tools to solve engineering problems appropriate to the relevant discipline.

PO2. Analyze engineering problems critically, conceptualize, design, implement and evaluate potential solutions to contribute to the development of scientific/technological solutions in the context of relevant discipline.

PO3. Independently carry out research /investigation and development work to solve practical problems.

PO4. Function effectively as an individual and in a team to possess knowledge and recognize opportunities for career progression and research.

PO5. Communicate effectively in professional practice through verbal and written formats.

PO6. Recognize the need for self-motivated pursuit of knowledge to show commitment and competence in the broadest context of technological change.

M. Tech. (CS) - I Semester
(19MT10501) ADVANCED ALGORITHMS
(Common to CS and CNIS)

Internal Marks	External Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: A course on Design and Analysis of Algorithms.

COURSE DESCRIPTION:
Introduction to algorithm design techniques; Divide and conquer, greedy methods and dynamic programming; Backtracking, branch and bound techniques and NP-completeness; Methods of advanced graph theory; approximation algorithms and number theoretic algorithms; max flow and string matching algorithms and randomizing algorithms.

COURSE OUTCOMES:
On successful completion of the course, students will be able to:

CO1. Perceive and apply the concepts of different algorithmic techniques to find solutions for a specific problem.

CO2. Design solutions for societal problems by applying the concepts from dynamic programming, backtracking.

DETAILED SYLLABUS:

UNIT-I: The Role of Algorithms in Computing, Divide and Conquer, Greedy Methods (8 Hours)
The Role of Algorithms in Computing: Algorithms, Analyzing algorithms, Designing algorithms, Asymptotic notations.
Divide and Conquer: General method, Binary search, The maximum sub-array problem.
Greedy Method: General method, Job sequencing with deadlines, Knapsack problem, Huffman codes.

UNIT-II: Dynamic Programming, Back Tracking, Branch and Bound (10 Hours)
Dynamic Programming: Optimal binary search trees, 0/1 Knapsack problem, Traveling sales person problem.
Back Tracking: N–Queen's problem, Graph coloring, Sum of subsets problem, Hamiltonian cycles.
Branch and Bound: LC Search, LIFO and FIFO branch and bound solutions of 0/1 Knapsack problem.

UNIT-III: NP-Completeness and Approximation Algorithms (9 Hours)
NP-Completeness: Polynomial time, Polynomial time verification, NP-completeness and reducibility, NP-completeness proofs, NP-complete problems.
Approximation Algorithms: The vertex-cover problem, The traveling salesman problem, The set-covering problem, The subset-sum problem.

UNIT-IV: Max Flow and Number Theoretic Algorithms (9 Hours)
Max Flow: Flow networks, Ford-Fulkerson method, Maximum Bi-partite matching.
Number Theoretic Algorithms: Elementary number theoretic notions, Greatest common divisor, Modular arithmetic, Solving modular linear equations, The Chinese remainder theorem.

UNIT-V: String Matching Algorithms, Probabilistic and Randomized Algorithms (9 Hours)
String Matching: The Naive string-matching algorithm, The Rabin-Karp algorithm, String matching with finite automata, The Knuth-Morris-Pratt algorithm.
Randomizing Deterministic Algorithms: Monte Carlo and Las Vegas algorithms, Probabilistic numeric algorithms.

Total Hours: 45

TEXT BOOKS:

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, *Introduction to Algorithms*, PHI Learning, 3rd Edition, 2009.
2. Ellis Horowitz, Sartaj Sahni, and S Rajasekaran, *Fundamentals of Computer Algorithms*, Universities Press, 2nd Edition, 2008.

REFERENCE BOOKS:

1. Michael T. Goodrich, Roberto Tomassia, *Algorithm Design: Foundations, Analysis and Internet Examples*, Wiley, 2002.
2. Adrian J., Bondy, U.S.R.Murty, *Graph Theory*, Springer, 2008.

ACADEMIC REGULATIONS

COURSE STRUCTURE

AND

DETAILED SYLLABI

FOR

M.C.A REGULAR THREE YEAR POST GRADUATE PROGRAM

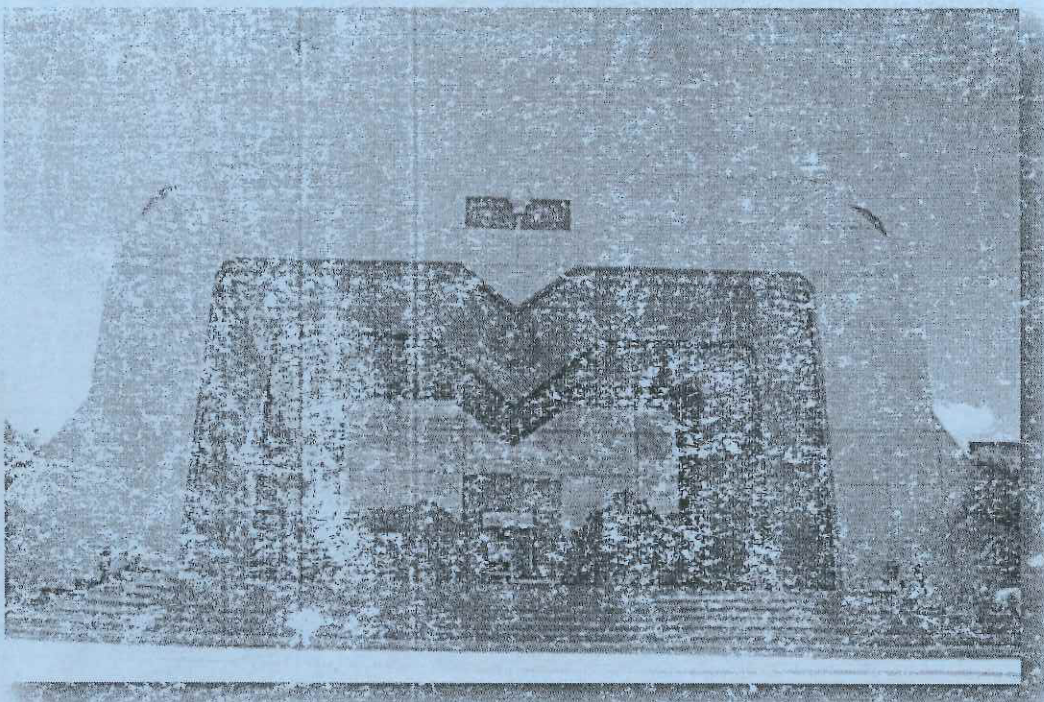
(for the batches admitted from 2019-2020)

&

M.C.A LATERAL ENTRY PROGRAM

(for the batches admitted from 2020-2021)

CHOICE BASED CREDIT SYSTEM



SREE VIDYANIKETHAN ENGINEERING COLLEGE

(AUTONOMOUS)

(Affiliated to JNTUA Ananthapuramu, Approved by AICTE)

SREE SAINATH NAGAR, TIRUPATI – 517 102

PROGRAM EDUCATIONAL OBJECTIVES (PEOS)

After few years of completion of the Program, the graduates of MCA would be:

PEO1: Enrolled or completed higher education/research studies in the core and allied areas of computer science.

PEO2: Successful entrepreneurs and professionally excelled in diverse application skills in the core or allied area of computer science of societal importance.

PEO3: Professionals in industry, academia and organizations with ability to adapt to evolving technologies in the core and allied areas of computer science.

PROGRAM OUTCOMES (POs)

After completion of the program, a successful student will be able to:

PO1. Apply knowledge of computing fundamentals, computing specialization, mathematics, and domain knowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements.

PO2. Identify, formulate, research literature, and solve complex computing problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines.

PO3. Design and evaluate solutions for complex computing problems, and design and evaluate systems, components, or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.

PO4. Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations.

PO6. Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practices.

PO7. Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional.

PO8. Demonstrate knowledge and understanding of the computing and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO9. Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations, and give and understand clear instructions.

MCA I-SEMESTER

(19MC10101) COMPUTER ORGANIZATION

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	4	-	-	4

PREREQUISITES: -

COURSE DESCRIPTION:

Digital logic circuits and its components; Types of data in circuits; Design of control unit; Organizations of Central Processing Unit(CPU), instruction formats, addressing modes, types of instructions; Design of basic computer; Types of peripheral devices, modes of transfers, interrupts, memory and mappings.

COURSE OUTCOMES:

After successful completion of this course, the student will be able to:

CO1: Design control unit using logic circuits and analyze central processing unit, instruction formats, addressing modes, types of instructions, modes of transfer for effective utilization of a system.

CO2: Apply boolean algebra and map simplification techniques to design logic circuits and basic computer using memory mappings, techniques of I/O and instruction sets.

DETAILED SYLLABUS:

UNIT I - DIGITAL LOGIC CIRCUITS AND DIGITAL COMPONENTS (11 Periods)

Digital Logic Circuits: Digital Computers, Logic Gates, Boolean Algebra, Map simplification, Combinational Circuits, Flip-Flops, Sequential Circuits.

Digital Components: Integrated Circuits, Decoders, Multiplexers, Registers, Shift Registers, Binary Counters.

UNIT II - DATA REPRESENTATION (10 Periods)

Data Representation: Data Types, Complements, Fixed-Point Representation, Floating-Point Representation, Binary Codes, Error Detection Codes.

UNIT III - MICRO PROGRAMMED CONTROL AND CENTRAL PROCESSING UNIT (12 Periods)

Micro programmed Control: Control Memory, Address Sequencing, Micro-program Example, Design of Control Unit.

Central Processing Unit: General Register Organization, Stack Organization, Instruction Formats, Addressing Modes, Data transfer and manipulation, Program control, Reduced Instruction Set Computer (RISC), Complex Instruction Set Computer (CISC).