SREE VIDYANIKETHAN ENGINEERING COLLEGE
(AUTONOMOUS)
Sree Sainath Nagar, Tirupati

Department of Electronics and Instrumentation Engineering

Supporting Document for 1.1.3

Courses having focus on

Employability/ Entrepreneurship/ skill Development

Program: B.Tech.- Electronics and Instrumentation Engineering

Regulations : SVEC-14

The Courses (with course outcomes) under SVEC-14 Regulations which focus on ***employability/ entrepreneurship/ skill development*** are highlighted with the following colours.

Skill

Employability

Entrepreneurship

B.Tech I Year

14BT1HS01 : TECHNICAL ENGLISH

(Common to All Branches of Engineering)

Int. Marks: 30; Ext. Marks: 70; Total Marks: 100

L	T	P	C
2	-	-	4

PREREQUISITE: Basic Grammar and Fundamentals of Writing Skills

COURSE DESCRIPTION: The course consists of lessons which include characters, speeches and short stories: 'My Early Days', 'Speech by N. R. Narayana Murthy', 'Dr. C.V. Raman: The Celebrated Genius', 'The Town by the Sea' and 'The Model Millionaire'. The course also covers the principles of Language and Communication Skills (Listening, Speaking, Reading and Writing Skills).

COURSE OUTCOMES: After completion of the course, the students will be able to**:**

1. Acquire fundamental and functional knowledge of English Language, grammar and communication skills.
2. Identify and analyze productive skills (speaking and writing) and receptive skills (listening and reading) of English Language proficiency for effective communication and practice.
3. Design and develop functional skills for professional practice through English.
4. Communicate effectively with the engineering community and society to comprehend and deliver effective solutions.
5. Inculcate an attitude to upgrade competence of English knowledge and communication to engage in independent and lifelong learning.

Detailed Syllabus:

UNIT – I: (10 periods)

My Early Days by **A. P. J. Abdul Kalam** from **All About English** by Cambridge University Press India Pvt Ltd. 2014.

Communication: Importance of Communication – Language as a tool of Communication – Communicative Skills (Listening, Speaking, Reading and Writing) – Effective Communication – Verbal and Non-Verbal Communication.

UNIT – II: **(10 periods)**

A Speech by N. R. Narayana Murthy from **All About English** by Cambridge University Press India Pvt Ltd, 2014.

Listening: Meaning and Art of Listening – Importance of Listening – Traits of a Good Listener – Reasons for Poor Listening – Types of Listening– Barriers to Effective Listening

UNIT – III: **(10 periods)**

The Town by the Sea by Amitav Ghosh from **All About English** by Cambridge University Press India Pvt Ltd, 2014.

Speaking: Achieving Confidence, Clarity, and Fluency – Paralinguistic Features – Types of Speaking – Barriers to Speaking.

UNIT – IV: **(10 periods)**

Sir. C. V. Raman: The Celebrated Genius from **All About English** by Cambridge University Press India Pvt. Ltd, 2014.

Reading: Reading and Interpretation – Intensive and Extensive Reading– Critical Reading – Reading Comprehension – Techniques for Good Comprehension – SQ3R Reading Technique

UNIT – V: **(10 periods)**

The Model Millionaire by **Oscar Wilde** from **All About English** by Cambridge University Press India Pvt. Ltd, 2014.

Writing: Characteristics – Language – Elements of Style – Techniques for Good Technical Writing – Avoiding Plagiarism - Referencing and Styling.

Total Periods: 50

TEXT BOOKS:

1. **All About English***,* Cambridge University Press India Pvt. Ltd., First Edition, 2014.
2. Meenakshi Raman and Sangeetha Sharma, **Technical Communication**, Oxford University Press, New Delhi, 2012.

REFERENCE BOOKS:

1. M. Ashraf Rizvi, **Effective Technical Communication**, Tata McGraw–Hill, Publishing Company Limited, First Edition, 2005.
2. Martin Hewings, **Advanced English Grammar: A Self Study Reference and Practice Book for Advanced South Asian Students,** Cambridge University press, First South Asian Edition, New Delhi, 1999.

B.Tech. I Year

14BT1BS01: ENGINEERING PHYSICS

(Common to All Branches of Engineering)

Int. Marks: 30 Ext. Marks: 70 Total Marks: 100

L	T	P	C
2	1	-	4

PREREQUISITE: Intermediate/Senior Secondary Physics

COURSE DESCRIPTION: The course deals with different lasers, optical fibers and holograms, theory of relativity, acoustics of buildings, crystallography, principles of quantum mechanics, band theory of solids, properties of dielectric materials, semiconductors, properties and application of magnetic materials, nanomaterials, and superconductors.

COURSE OUTCOMES :

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

1. Acquire basic knowledge of lasers, optical fibers, holography, theory of relativity, acoustics, crystallography, quantum mechanics, dielectrics, magnetic materials, semiconductors, superconductors and nanomaterials.
2. Develop skills in designing of lasers, fiber optic cable, holograms, acoustically good hall, semiconductor devices and nanomaterials.
3. Develop problem solving skills in engineering context.

Detailed syllabus:

UNIT-I: LASERS, FIBER OPTICS AND HOLOGRAPHY (18 periods)

Lasers: Introduction, characteristics of laser, principles of lasing action, spontaneous and stimulated emission of radiation, Einstein's coefficients, population inversion, Ruby laser, Helium-Neon laser, semiconductor laser, applications of lasers.

Fiber optics: Introduction, construction and working principle of optical fiber, acceptance angle, acceptance cone and numerical aperture, types of optical fibers and refractive index profiles, attenuation and losses in fibers, optical fiber communication system, applications of optical fibers in sensors and medicine.

Holography: Introduction, construction of a hologram, reconstruction of image from hologram, applications.

UNIT-II: SPECIAL THEORY OF RELATIVITY, ACOUSTICS OF BUILDINGS AND CRYSTALLOGRAPHY (16 periods)

Special Theory of Relativity: Introduction, absolute frame of reference, time dilation, length contraction, addition of velocities, mass-energy equivalence, energy-momentum relation.

Acoustics of Buildings: Introduction, basic requirement of acoustically good hall, reverberation and time of reverberation, Sabine's formula for reverberation time (qualitative treatment), absorption coefficient of sound and its measurement, factors affecting the architectural acoustics and their remedies.

Crystallography: Introduction, crystal planes, crystal directions and Miller indices, separation between successive (hkl) planes, X-ray diffraction by crystal planes, Bragg's law, Laue and powder methods.

UNIT-III :PRINCIPLES OF QUANTUM MECHANICS AND BAND THEORY OF SOLIDS (17 periods)

Principles of Quantum Mechanics: Black body radiation – Wien's law, Rayleigh-Jeans law and Planck's law (qualitative treatment), waves and particles, matter waves, de-Broglie's hypothesis, G.P. Thomson experiment, Heisenberg's uncertainty principle, Schrödinger's one dimensional wave equation (time independent), significance of wave function, particle in a one dimensional potential box, Fermi-Dirac distribution and effect of temperature (qualitative treatment), scattering-source of electrical resistance.

Band Theory of Solids: Electron in a periodic potential, Kronig-Penney model (qualitative treatment), origin of energy band formation in solids, effective mass of electron, distinction between metals, semiconductors and insulators based on band theory.

UNIT-IV: DIELECTRIC PROPERTIES OF MATERIALS AND SEMICONDUCTORS (17 periods)

Dielectric Properties of Materials: Introduction, dielectric constant, electronic, ionic and orientation polarizations (qualitative treatment), local field, Clausius-Mossotti equation, frequency dependence of polarisability (qualitative treatment), ferro and piezo electricity.

Semiconductors: Introduction, intrinsic and extrinsic semiconductors, carrier concentration, electrical conductivity in semiconductors, drift and diffusion currents, Einstein's relation, Hall effect, direct and indirect band gap semiconductors, p-n junction, energy band diagram of p-n diode, diode equation (qualitative), LED, photo diode and solar cell.

UNIT-V :MAGNETIC PROPERTIES OF MATERIALS, SUPERCONDUCTIVITY AND NANOMATERIALS (17 periods)

Magnetic Properties of Materials: Introduction, origin of magnetic moment, classification of magnetic materials into dia, para, ferro, anti-ferro and ferri magnetism, hysteresis, soft and hard magnetic materials.

Superconductivity: General properties, Meissner effect, penetration depth, Type-I and Type-II superconductors, flux quantization, Josephson effects, BCS theory, applications of superconductors.

Nanomaterials: Introduction, surface area to volume ratio, quantum confinement, properties of nanomaterials, synthesis of nanomaterials by ball milling, plasma arcing, pulsed laser deposition and sol-gel methods, carbon nanotubes-properties and applications, applications of nanomaterials.

Total :85 periods

TEXTBOOKS :

1. S. Mani Naidu, **Engineering Physics**, Pearson Education, 2013.
2. P. K. Palaniswamy, **Engineering Physics**, Scitech Publications

REFERENCE BOOKS:

1. R. K. Gaur and S. L. Gupta, **Engineering Physics,** DhanpatRai Publications (P) Ltd., 8th Edition, 2001.
2. M. R. Srinivasan, **Engineering Physics,** New Age International (P) Limited, Publishers, 1st Edition,2010.

B.Tech. I Year

14BT1BS02 : ENGINEERING CHEMISTRY

(Common to All Branches of Engineering)

Int. Marks: 30 Ext. Marks: 70 Total Marks: 100

L	T	P	C
2	1	-	4

PRE REQUISITE: Intermediate/Senior Secondary Chemistry

COURSE DESCRIPTION: This course deals with various engineering materials, electro-chemical cells, corrosion, water technology, fuel technology, lubricants, nano chemistry, and green chemistry.

COURSE OUTCOMES:

After successful completion of the course the student is able to:

1. Acquire basic knowledge in liquid crystals, conducting Polymers, Composites, Chemical sensors, insulators, Electro chemical cells, corrosion phenomenon, fuels, Nanomaterials and principles of Green Chemistry and Green Engineering.
2. Develop analytical skills in:
   a. Determination of hardness of water.
   b. Determination of viscosity, flame and fire points, cloud and pour points.
   c. Determination of calorific value of fuels.
3. Develop skills in design of:
   a. Methods for control of corrosion
   b. Chemical methods for the synthesis of Nanomaterials.
4. Develop skills for providing solutions through:
   a. Mitigation of hardness of water.
   b. Control of corrosion
   c. Newer Nanomaterials for specific applications
5. Acquire awareness to societal issues on:
   a. Chemical materials utility and their impact.
   b. Quality of water.
   c. Phenomenon of corrosion.

6. Imbibe attitude to practice engineering in compliance to environmentally benign techniques such as:
    a. Green computing
    b. Green construction
    c. Green manufacturing systems

Detailed syllabus:

UNIT – I: CHEMISTRY OF ENGINEERING MATERIALS (18 periods)

Liquid Crystals – Introduction, chemical structure, classification, engineering applications.

Conducting Polymers – Definition, types of conducting polymers and their engineering applications. **Composites** – Introduction, advantages of composites, constituents of composites, types of composites, applications of composites. **Sensors** - Introduction, types of sensors, electrochemical sensors, applications. **Insulators** – Definition, characteristic properties of insulators and classification of insulators.

UNIT–II: WATER TECHNOLOGY (15 periods)

Introduction, types of water, impurities in water and their consequences. Hardness of water, units of hardness, measurement of hardness by EDTA method, disadvantages of hardness. Softening methods – Ion exchange process, Zeolite process-Municipal water treatment. Boiler Troubles. Desalination of brackish water by Electro dialysis and Reverse osmosis. Numerical problems on measurement of hardness of water.

UNIT–III: ELECTROCHEMICAL CELLS AND CORROSION (17 periods)

Electrode potential, Nernst's equation, Electrochemical cells, EMF of an electrochemical cell. Reference electrodes- Standard Hydrogen Electrode (SHE), Calomel electrode.

Batteries: Introduction, types of Batteries. Ni-Cd battery, lithium – ion battery-applications.

Fuel Cells: Definition, $H_2 - O_2$ fuel cell, phosphoric acid fuel cells, proton exchange membrane fuel cells, solid oxide fuel cells. Applications of fuel cells.

Corrosion: Introduction, definition, types of corrosion, galvanic corrosion, concentration cell corrosion, control of corrosion – Electroplating method (Nickel electroplating).

UNIT–IV: LUBRICANTS AND FUEL TECHNOLOGY (18 periods)

Lubricants: Definition, functions of lubricants, mechanism of lubrication, classification of lubricants, properties of lubricants – viscosity, flash and fire points, cloud and pour points, aniline points, neutralization number and mechanical strength.

Fuel Technology: Introduction, classification, characteristics of a good fuel, calorific value, liquid fuels, petroleum, refining of petroleum, knocking, octane number, cetane number, power alcohol, synthetic petrol, gaseous fuels, important gaseous fuels.

UNIT–V: NANO CHEMISTRY AND GREEN CHEMISTRY (17 periods)

Nano Chemistry: Introduction, classification of nanomaterials, properties of nanomaterials, methods of synthesis – sol-gel process, Chemical Vapour Deposition (CVD), Plasma Enhanced Chemical Vapour Deposition (PECVD). Applications of nanomaterials.

Green Chemistry: Introduction, tools of Green chemistry, principles of green chemistry, examples of Green chemistry, principles of Green Engineering, Green computing, Green construction, Green manufacturing systems. **Total Periods : 85**

TEXT BOOKS:

1. P.C.Jain & Monika Jain, **Engineering Chemistry**, Dhanpat Rai Publishing Company (P) Ltd, New Delhi, 17th edition, 2013.
2. K.N. Jayaveera, G.V. Subba Reddy & C. Ramachandraiah **Engineering Chemistry**, Mc. Graw-Hill Higher Education, Hyderabad, 1st edition, 2013.

REFERENCE BOOKS:

1. A.K. Bandyopadhyay, **Hand book of Nanostructured materials and Nanotechnology**, New Age international publishers, 2nd edition, 2010.
2. Paul T. Anastas, John C Warner, **Green Chemistry: Theory and practice,** Oxford University Press, 2000.

B.Tech. I Year

14BT1BS03 : ENGINEERING MATHEMATICS

(Common to All Branches of Engineering)

Int. Marks: 30 ; Ext. Marks: 70 ; Total Marks: 100

L	T	P	C
3	1	-	6

PRE REQUISITE: Intermediate/ Senior Secondary Mathematics

COURSE DESCRIPTION: Engineering mathematics is an application oriented course for various fields of engineering. In this course, Differential equations, partial differentiation as applied to various engineering problems; Integration and its applications to find lengths, areas and volumes of objects, Laplace transforms and their applications, fundamentals of vector calculus are presented.

COURSE OUTCOMES:

After the completion of this course, a successful student is able to

1. Acquire knowledge in Differential equations, finding maximum and minimum values attained by functions of several variables, evaluating double and triple integrals, Laplace transforms and differentiation and integration of vector functions.
2. Develop analytical skills in solving problems involving
   (a) Non homogeneous linear differential equations
   (b) Flux and fluid mechanics by vector methods.
   (c) Complex integrations using Laplace transforms.
   (d) the length of curves, areas , surfaces and volumes of revolutions.
3. Develop skills in designing Mathematical models for
   (a) L-C and R-C circuits.
   (b) Newton's Law of cooling and heat transfer.
4. Develop skills in providing solutions for
   (a) problems involving L-R-C oscillatory circuits
   (b) linear, surface and volume integrals by vector methods
   (c) work done, flux through vector integrations

Detailed syllabus:

UNIT-I : DIFFERENTIAL EQUATIONS- APPLICATIONS (20 periods)

Ordinary differential equations – Linear and Bernoulli type – exact equations and reducible to exact. Orthogonal trajectories (both cartesian and polar forms). Newton's Law of cooling, Law of natural growth and decay. Non-homogeneous linear differential equations of second and higher order with constant coefficients. Methods of finding the particular integrals for Q(x) = e^{ax}, $\sin ax$, $\cos ax$, x^n, $e^{ax}V(x)$, $x\,V(x)$. Method of variation of parameters . Applications to L-R-C circuits.

UNIT-II: PARTIAL DIFFERENTIATION & APPLICATIONS OF DERIVATIVES (22 periods)

Functions of two or more variables – Homogeneous functions – total derivatives – derivatives of implicit function – Jacobian – maxima and minima of functions of two variables with and without constraints – Lagrange's method of undetermined multipliers. Radius ,centre and circle of curvature, tracing of curves in cartesian, parametric and polar forms.

UNIT-III: APPLICATIONS OF INTEGRATION (18 Periods)

Applications of integration to – length of curves, area of surfaces of revolution and volume of solids of revolution – Double integrals – change of variables and change of order of integration. Evaluation of Triple integrals -volume as double integral.

UNIT-IV: LAPLACE TRANSFORMS- APPLICATIONS (20 periods)

Laplace transforms of standard functions – Properties of Laplace transforms–First and second shifting Theorems. Laplace transforms of derivatives and integrals–Laplace transforms of periodic functions – Unit step function – Dirac delta function – Inverse transforms–Convolution theorem. Applications of Laplace transforms to linear differential equations with constant coefficients.

UNIT-V : VECTOR CALCULUS (20 periods)

Vector differentiation – gradient, divergence, curl and vector identities. Laplacian Operator. **Vector integration**: Line integrals independent of path – work done, conservative field and scalar potential functions. Surface integrals, flux and volume integrals. Verifications and applications of vector integral theorems: Greens theorem, Stokes theorem and Gauss divergence theorem (without proof).

Total periods : 100

TEXT BOOK:

1. T.K.V. Iyengar, B. Krishna Gandhi, S. Ranganatham and M.V.S.S.N. Prasad, **Engineering Mathematics, Vol. 1**, S. Chand & Company, 12/e ,2013.

REFERENCE BOOKS:

1. Grewal, B.S., **Higher Engineering Mathematics**, Khanna Publishers, 42/e,2012.
2. Kreyszig, E., **Advanced Engineering Mathematics**, John Wiley and Sons, 8/e.2006

B.Tech. I Year

14BT1BS04 : MATHEMATICAL METHODS

(Common to CSE, CSSE, IT, ECE, EIE and EEE)

Int. Marks: 30; Ext. Marks: 70; Total Marks: 100

L	T	P	C
3	1	-	6

PRE REQUISITE: Intermediate/ Senior Secondary Mathematics

COURSE DESCRIPTION: This course deals with obtaining the numerical solutions for algebraic and transcendental equations. Fundamentals of matrix theory including introduction to Eigen values, Cayley- Hamilton's theorem, numerical solutions to differential equations, transformation techniques for solving engineering problems and applications of partial differential equations are presented.

COURSE OUTCOMES:

After the completion of this course, a successful student is able to

1. Acquire basic knowledge in
   (a) solving linear equations through matrix methods.
   (b) solving algebraic and transcendental equations by various mathematical methods.
   (c) fitting of various types of curves to the given data
   (d) finding the numerical values to derivatives and integrals through different mathematical methods.
   (e) solving differential equations numerically through various methods.
   (f) solving difference equations using z –transforms.
2. Develop analytical skills in
   (a) evaluating the properties of functions through Fourier series and Fourier transforms.
   (b) solving boundary value problems in engineering using Fourier transform
3. Design novel mathematical methods for
   (a) fitting geometrical curves to the given data.
   (b) for solving the differential equations.
   (c) the problems involving heat transformations.
   (d) constructing the interpolating polynomials to the given data and drawing inferences.

Detailed syllabus:

UNIT–I: MATRIX THEORY AND APPLICATIONS (20 periods)

Rank of a matrix, echelon form, normal form, inverse of a matrix by normal form. Homogenous and non-homogenous linear systems, consistency and solutions of linear system of equations. Solutions of equations by Gauss elimination method. Eigen values, Eigen vectors and properties. Cayley– Hamilton Theorem (without proof), inverse and powers of a matrix using Cayley– Hamilton Theorem, diagonalization of a matrix, quadratic forms, nature of quadratic form and reduction of quadratic form to its normal form.

UNIT-II: NUMERICAL SOLUTIONS, CURVE FITTING AND INTERPOLATION (19 periods)

Solutions of Algebraic and Transcendental equations by bisection method, Regula – Falsi method, Newton – Raphson method. Curve fitting by the principle of least squares, fitting of a straight line, parabola and exponential curves. Interpolation, forward difference operator, backward difference operator, central difference operator. Relationship between different operators. Interpolation using Newton's forward formula, Newton's backward formula, Lagrange's interpolation formula.

UNIT-III: NUMERICAL DIFFERENTIATION AND INTEGRATION, SOLUTIONS OF O D E (20 periods)

Numerical differentiation using Newton's forward formula, Newton's backward formula. Numerical integration using trapezoidal rule, Simpsons 1/3 rule, Simpsons 3/8 rule. Numerical solutions of first order ordinary differential equations using Taylor series, Euler's method modified Euler's method, Runge – Kutta method (4^{th} order only).

UNIT-IV : TRANSFORMATION TECHNIQUES (25 periods)

Fourier series , Dirichlets conditions, determination of Fourier coefficients (Euler's formulae), even and odd functions. Half-range Fourier sine and cosine expansions. Fourier integral theorem (statement only), Fourier sine and cosine integrals, Fourier sine and cosine transforms, inverse transforms. Z – transforms, inverse Z– transform, properties, damping rule, shifting rule, initial and final value theorems. Convolution theorem, solution of difference equations by Z– transforms.

UNIT – V: APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS (16 periods)

Formation of partial differential equations . Method of separation of variables for second order partial differential equations – solutions of one dimensional wave equation – heat equation -Laplace equation.

Total periods: 100

TEXTBOOK:

1. T.K.V. Iyenger, B. Krishna Gandhi, S. Ranganadham and M.V.S.S.N. Prasad, **Mathematical Methods**, S.Chand and Company, 8/e, 2013.

REFERENCE BOOKS:

1. B.S. Grewal, **Higher Engineering Mathematics**, Khanna publishers, 42/e, 2012.
2. S.S.Sastry, **Introductory Methods of Numerical Analysis**, Prentice Hall of India, 4/e, 2005.

B.Tech. I Year

14BT1ES01: PROGRAMMING IN C & DATA STRUCTURES

(Common to ECE, EEE, EIE, ME and CE)

Int. Marks: 30; Ext. Marks: 70; Total Marks: 100

L	T	P	C
3	1	—	6

PREREQUISITE: - - -

COURSE DESCRIPTION: This course deals with fundamentals of programming in C language such as syntax of C, mechanisms of input and output processing, derived data types like arrays, strings and pointers. Also file in C and data structures are discussed.

COURSE OUTCOMES:

After the completion of this course, a successful student is able to

1. Gain knowledge on developing algorithms and programming techniques.
2. Gain analytical skills on
    a. Searching and sorting
    b. File management functions.
    c. Various Data Structures
3. Design various applications using basic data structures like linked list, stacks and queues
4. Gain competence to represent and solve real time problems using tree data structures.

DETAILED SYLLABUS

Unit-I **(15 periods)**

Programming Languages- Compiler, Interpreter, Loader, and Linker- Program execution- Classification of programming-Algorithms and flowcharts .

Basics of C: Introduction, Standardizations of C language, Developing Programs in C, Structure of C program, Variables, Data Types, Declaration, Token, Operators and expressions, L values and R values, Type Conversion in C.

Unit-II **(20 periods)**

Input and Output: Basic screen and key board I/O in C , Non formatted input and output , Formatted Input and output. Control Statements: Specifying Test Condition for Selection and Iteration, Writing Test Expressions, Conditional Execution and Selection, Iterative and Repetitive Execution, GOTO Statement, Special Control statements, Nested loops.

Unit-III **(20 periods)**

Arrays and Strings: One dimensional Array, Strings: One-Dimensional Character Arrays, Multidimensional Arrays, Arrays of Strings. Functions: Concept of function, Call by Value Mechanism, passing arrays to Functions, Scope and extent, Storage classes, Inline function, Recursion, Searching and sorting.

Unit-IV **(25 periods)**

Pointers: Introduction, Understanding Memory Address, Address Operators, pointer, Void pointer, Null pointer, use of pointers, arrays and pointers, Pointer and strings, pointer arithmetic, pointers to pointers, pointer to arrays, Pointers to functions, Dynamic memory allocation, Pointer and const Qualifier. User-defined data types and variables: Structures, union, Enumerations types, Bitfields.

Files in C: Working with text files, Binary files, Random Access files, other file management functions, Command line arguments, C preprocessor, Type qualifier.

Unit-V **(20 periods)**

Linked Lists: Singly Linked Lists, Circular Linked lists, Doubly Linked list Applications of Linked Lists. Stacks and Applications, Queues, Other Variations of Queues, Applications, Tree-Binary tree, Traversals, Kinds of binary tress, Binary Search tree, Application of tree.

Total periods: 100

TEXT BOOK:

1. PradipDey and Manas Ghosh, "**Programming in C**,"Second Edition, Oxford University Press, New Delhi, 2007

REFERENCE BOOKS:

1. D. Samanta, "**Classic Data Structures**", Second Edition, PHI Learning, New Delhi, 2004
2. Behrouz A. Forouzan and Richard F. Gilberg, "**A Structured Programming Approach using C**,"Third Edition, Cengage Learning, New Delhi, 2007.

B.Tech. I Year

14BT1ES03: COMPUTER AIDED ENGINEERING DRAWING

(Common to All Branches of Engineering)

Int. Marks: 25; Ext. Marks: 50; Total Marks: 75

L	T	P	C
-	1	3	3

PREREQUISITE: - - -

COURSE DESCRIPTION: This course deals with the concepts of computer-aided sketching, and orthographic and isometric 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 :

1. Produce different views and projection in drawing.
2. Use modern CAD software for different designs.
3. Create multi-view drawings suitable for presentation to a general audience.

Detailed Syllabus:

UNIT I – INTRODUCTION TO COMPUTER AIDED SKETCHING

(20 periods)

Introduction, Drawing Instruments and their uses, BIS conventions, Lettering, Dimensioning, Different types of lines, Material conventions and free hand practicing, Definitions of Principle planes and other planes. Computer screen, layout of the software, Creation of 2D/3D environment, Selection of drawing size and scale, Standard tool bar/menus, Coordinate system, and description of most commonly used toolbars, Navigational tools, Commands and creation of Lines, Co-ordinate points, axes, poly-lines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet, curves, constraints viz. tangency, parallelism, inclination and perpendicularity.

UNIT II – ORTHOGRAPHIC PROJECTIONS (20 periods)

Introduction, Definitions- Planes of projection, reference line and conventions employed, Projections of points in all the four quadrants, Projections of straight lines (located in First quadrant/first angle only), Projection of lines inclined to one plane, inclined to both the planes, finding true lengths and true inclinations (No application problems).

UNIT III – ORTHOGRAPHIC PROJECTIONS OF PLANE SURFACES (20 periods)

Introduction, Definitions-projections of plane surfaces-triangle, square, rectangle, rhombus, pentagon, hexagon and circle, planes in different positions by change of position method only (Simple problems inclined to any one plane only)

UNIT IV – PROJECTIONS OF SOLIDS (20 periods)

Introduction, Projections of right regular prisms, pyramids, cylinders and cones in different positions. (Simple problems inclined to any one plane only). Isometric projections and isometric views.

UNIT V – SECTIONS AND DEVELOPMENT OF LATERAL SURFACES OF SOLIDS (20 periods)

Introduction, Section planes and sectional views of right regular solids - prisms, cylinder, pyramids and cone resting with base on HP. True shapes of the sections.

Development of Surfaces: Right regular solids – prisms, cylinder, pyramids, cone and their sectional parts.

Total Periods: 100

TEXT BOOKS:

1. D.M. Kulkarni, A.P. Rastogi and A.K. Sarkar, **Engineering Graphics with Auto CAD**, PHI Learning Private Limited, Revised Edition, August 2010.
2. N D Bhat & V M Panchal, **Engineering Drawing**, Charotar Publishing House, Gujarat, 51st edition, 2013.

REFERENCE BOOKS:

1. Sham Tickoo, **AutoCAD 2013 For Engineers And Designers**, Dreamtech Press, 2013
2. T Jeyapoovan, **Engineering Drawing and Graphics Using Autocad**, Vikas Publishing House, 3rd Edition, 2010.
3. Jolhe, **Engineering Drawing**, Tata McGraw Hill Education Private Limited, 1st Edition, 2007.
4. Basant Aggarwal, **Engineering Drawing**, Tata McGraw Hill Education Private Limited, 1st Edition, 2008.

B.Tech. I Year

14BT1BS05: ENGINEERING PHYSICS & ENGINEERING CHEMISTRY LABORATORY

(Common to All Branches of Engineering)

Int. Marks: 25 Ext. Marks: 50 Total Marks: 75

L	T	P	C
-	-	3	3

PREREQUISITE: Intermediate Physics & Chemistry

COURSE DESCRIPTION:

Engineering Physics: The course deals with experimental verification of characteristics of p-n junction diode, photodiode, LED, and semiconductor laser diode. It also covers experimental determination of energy gap and carrier concentration of a semiconductor material, wave length of a laser source, rigidity modulus of a material, size of fine particle, dielectric constant, numerical aperture of optical fibre, frequency of electrically vibrating tuning fork and magnetic field along axial line of a current carrying coil. Verification of transverse laws of stretched string is also included.

Engineering Chemistry: This course deals with the estimation of hardness, alkalinity and dissolved oxygen of water samples by volumetric methods. It provides hands-on experience on different instrumental methods such as conductivity meter, potentiometer, pH meter, and colorimeter. This course also deals with the methods of synthesis of nano metal-oxides and novalac resin.

COURSE OUTCOMES:

Engineering Physics:

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

1. Acquire analytical skills in the determination of

   a) Wave length of laser.

   b) Divergence angle for laser beam.

   c) Numerical aperture of an optical fibre.

   d) Hall coefficient for semiconductor material.

   e) Energy gap of semiconductor material.

   f) Verifying the laws of stretched string.

   g) Characteristics of p.n. junction diode, and light emitting diode.

Engineering Chemistry:

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

1. 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.
2. Acquire analytical skills in the determination of P^H of a solution, EMF of a solution, spectrophotometric determination of iron and estimation of iron in cement through instrumental methods of analysis.
3. Develop skills in the designing of synthetic methods for the preparation of polymers and Nanomaterials.

List of experiments :

Engineering Physics:

Conduct a minimum of any **Ten** of the following experiments.

1. Determination of wavelength of a laser source using diffraction grating
2. Determination of numerical aperture of an optical fiber
3. I-V Characteristics of a p-n junction diode
4. Characteristics of LED source.
5. Hall effect
6. Photo diode – characteristics
7. Energy gap of a material of a p-n Junction
8. Magnetic field induction along the axis of a current carrying coil-Stewart and Gee's method
9. Melde's experiment - transverse & longitudinal modes
10. Verification of transverse laws of stretched string - Sonometer
11. Determination of dielectric constant
12. Characteristics of laser source.
13. Determination of particle size by using a laser source
14. Determination of the rigidity modulus of the material of wire using torsional pendulum

Engineering Chemistry:

List of Experiments:

A minimum of any **Ten** experiments are to be conducted among the following:

1. Estimation of Hardness of water by EDTA method.
2. Estimation of alkalinity of Water.
3. Estimation of Dissolved Oxygen in water.
4. Estimation of Ferrous Iron by Dichrometry.
5. Conductometric titration of strong acid Vs strong base
6. Determination of P^H of a given solution by P^H metry.
7. Estimation of Ferrous ion by Potentiometry.
8. Estimation of Ferric iron in cement by Colorimetric method.
9. Preparation of Novalac Resin.
10. Synthesis of Nano metal-oxide using sol– gel process.
11. Determination of the capacity of the given cation-exchange Resin.
12. Measurement of viscosity by Redwood viscometer.

Duration: 3 Periods for each experiment

Total periods: 30

TEXT BOOKS:

1. **Physics Laboratory Manual**
2. K. Mukkanti, **Practical Engineering Chemistry**, BS Publications, 2013.
3. K.N. Jayaveera, K.B. Chandra Sekhar, **Chemistry laboratory manual**, S.M. Enterprises Limited, 2013.

B.Tech. I Year

14BT1ES04: PROGRAMMING IN C & DATA STRUCTURES LAB

(Common to ECE, EEE, EIE, ME and CE)

Int. Marks: 25 Ext. Marks: 50 Total Marks: 75

L	T	P	C
-	-	3	3

PREREQUISITE: - - -

COURSE DESCRIPTION: This course provides programming practice in C language specifically syntax of C, input-output processing, derived data types, file processing, and data structures.

COURSE OUTCOMES:

After the completion of this course, a successful student is able to

1. Design, code, test, debug and execute programs in C.
2. Implement and use common features found in C programs – arrays, pointers, strings, stacks and queues.
3. Select the appropriate data structure and algorithm design method for a specified problem.

Week 1:

a. Write a C program to print the string "SVEC" at four corners and center of the screen using single printf statement.

b. Mr. Gupta deposits Rs.1000 in a bank. The bank gives simple interest of 15% per annum. Write a program to determine the amount in Mr. Gupta's account at the end of 5 years. (Use the formula I=PTR/100)

c. Write a program to exchange the values of two variables without using the third variable.

Week 2:

a. A cashier has currency notes of denominations Rs.10, Rs. 50 and Rs. 100. If the amount to be withdrawn is input in hundreds, find the total number of notes of each denomination the cashier will have to give to the withdrawer.

b. In a town, the percentage of men is 52. The percentage of total literacy is 48. If total percentage of literate men is 35 of the total population, write a program to find the total number of illiterate men and women if the population of the town is 8000.

c. Assume that any month is of 30 days. Input total days through keyboard. Find out the exact number of Years, Months & Days.

Week-3

a. Write a program that reads in a number, then reads in a single digit and determines whether the first number contains the digit. If it does, the program should display how many times the digit occurs in the number.

b. Write a program to print Pythagoras triplets a = m* n , $b=(n^2 + m^2)/2$, $c=(n^2-m^2)/2$ where m = 1,3, 5 ……; n = m + 2, m + 4 ……

c. Write a program to produce the following pattern:

a.
```
1 2 3 4 5 6 7 8 9 10
1 2 3 4 5 6 7 8 9
1 2 3 4 5 6 7 8
1 2 3 4 5 6 7
1 2 3 4 5 6
1 2 3 4 5
1 2 3 4
1 2 3
1 2
1
```

b.
```
1 2 3 4 5 6 7 8 9 10
  2 3 4 5 6 7 8 9 10
    3 4 5 6 7 8 9 10
      4 5 6 7 8 9 10
        5 6 7 8 9 10
          6 7 8 9 10
            7 8 9 10
              8 9 10
                9 10
                  10
```

Week-4

a. Write a C program to generate Pascal's triangle.

b. Write a C program to construct a pyramid of numbers.

Week-5

a. The formula used to calculate the amount of interest on a bank account that compounds interest daily is

$$i = p (1 + r)^d - p$$

where:

i is the total interest earned,

p is the principal (the amount originally deposited in the account),

r is the rate of interest as a decimal less than 1 (for example, 15 percent is expressed as 0.15), and

d is the number of days the money is earning interest.

Write a program that accepts values for p, r and d and calculates the interest earned.

b. A character is entered through keyboard. Write a program to determine whether the character entered is a capital letter, a small case letter, a digit or a special symbol. The following table shows the range of ASCII values for various characters.

Characters	ASCII values
A - Z	65 - 90
a - z	97- 122
0 - 9	48 - 57
Special Symbols	0 - 47, 58 - 64, 91- 96, 123 - 127

c. Write a C program to convert a given decimal number into its equivalent

i. Binary Number

ii. Octal Number

iii. Hexadecimal Number

iv. Quinary Number(base 5)

Week-6

a. Write a program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, %, use switch statement)
b. Write a program to find the sum of individual digits of a positive integer.
c. A Fibonacci sequence is defined as follows: The first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a program to generate the first N terms of the sequence.
d. Write a program to generate all the prime numbers between 1 and N, where N is a value supplied by the user.

Week 7:

a. Write a program to find the largest and smallest number in a list of integers.
b. Write a program to perform the following:
   i) Addition of two matrices.
   ii) Multiplication of two matrices.

Week-8

a. Write a C program that uses functions to perform the following operations:
   i) To insert a sub-string in to given main string from a given position.
   ii) To delete n Characters from a given position in a given string.
b. Write a C program to determine if the given string is a palindrome or not
c. Write a C Program to implement all string operations.
   1. Find the length of string 2. Reverse the string.
   3. Comparing the two strings. 4. Copy the string .

Week -9:

a. 2's complement of a number is obtained by scanning it from right to left and complementing all the bits after the first appearance of a 1. Thus 2's complement of 11100 is 00100. Write a C program to find the 2's complement of a binary number.
b. Write a C program to convert a Roman numeral to its decimal equivalent.

Week 10:

a. Write a C program to count the lines, words and characters in a given text.
b. Write a program that simulates a password entry.
c. Write a program to read a five letter word and generate all possible combinations of two-letter words using those five letters.

Week 11:

Write a program to perform the following:
   i) Linear search ii) Binary search

Week 12:

Write a program to perform the following:
   i) Selection sort ii) Insertion sort
   iii) merge Sort iv) Quick sort

Week 13:

Write programs to perform the following using recursion

i) To find the factorial of a given integer.

ii)To solve Towers of Hanoi problem

Week-14

a. Write a C Program to return a substring from a main string using pointers.

b. Write a C program to return character frequency count in a text using pointers

Week-15

a. Write a C program that uses functions to perform the following operations:

i) Reading a complex number

ii) Writing a complex number

iii) Addition of two complex numbers

iv) Multiplication of two complex numbers

(Note: represent complex number using a structure.)

b. Write a Program to enter records of students display in sorted order according to ID number.

c. Define a structure to store employee's data with the following specifications:

Employee-Number, Employee-Name, Basic pay, Date of Joining

i) Write a function to store 10 employee details.

ii) Write a function to implement the following rules while revising the basic pay.

If Basic pay <= Rs.5000 then increase it by 15%.

If Basic pay > Rs.5000 and <= Rs.25000 then it increase by 10%.

If Basic pay > Rs.25000 then there is no change in basic pay.

iii) Write a function to print the details of employees who have completed 20 years of service from the date of joining.

Week-16

a. Write a program which copies one text file to another.

b. Write a program to reverse the first N characters of a given text file.

Note: The file name and N are specified through command line.

c. Consider the following text file:

Input File:

S.No.	Customer_ID	Item No.	Qty.	Price Per Item (Rs.)
1.	C01	I1	2	10
2.	C02	I2	5	50
3.	C03	I2	5	50
4.	C04	I4	10	10

Write a program to print the output in following format by giving the Customer_ID as an input.

Output:

S.V. PROVISION STORES TIRUPATI Customer_ID: C01		Date: 12-08-2010
Item	Qty	Price
I1	2	20
Total		20

Week - 17:

Write a program to implement the following operations on Singly Linked List

a. List Creation b. Insertion c. Deletion d. Display

Week -18:

Write a program to implement the following operations on Circular Linked List

a. List Creation b. Insertion c. Deletion d. Display

Week -19 :

Write a program to implement the following operations on Doubly Linked List

a. List Creation b. Insertion c. Deletion d. Display

Week- 20:

Write a program to implement stack operations using:

i) Arrays ii) Pointers

Week -21 :

Write a program to implement linear queue operations using:

i) Arrays ii) Pointers

Week -22:

a) Write a program to implement circular queue operations using arrays

b) Write a program to implement traversals of a Binary tree

i. Preorder ii. Post order iii. Inorder

Week- 23

Write a program to implement insertion and deletion in a binary search tree.

REFERENCE BOOKS:

1. Behrouz A. Forouzan and Richard F. Gilberg, "**A Structured Programming Approach using C**," Third Edition, Cengage Learning, New Delhi, 2007.
2. PradipDey and Manas Ghosh, "**Programming in C**", Second Edition, Oxford University Press, New Delhi, 2007
3. D. Samanta, "**Classic Data Structures**", Second Edition, PHI Learning, New Delhi, 2004.

B.Tech. I Year

14BT1ES06: ENGINEERING & IT WORKSHOP

(Common to All Branches of Engineering)

Int. Marks: 25 Ext. Marks: 50 Total Marks: 75

L	T	P	C
-	-	3	3

PREREQUISITE: - - -

COURSE DESCRIPTION:

Engineering Workshop: The course provides hands-on training in the trades Carpentry, Fitting, House-wiring, Tin Smithy, Foundry. Overview of metal cutting processes, plumbing and welding is provided through live demonstrations.

IT Workshop: This course deals with practice sessions on PC hardware, Internet, World Wide Web, MS-Word, Excel, Power Point and Publisher. 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:

ENGINEERING WORKSHOP:

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

1. Utilize workshop tools for engineering practice.
2. Employ skills for the production a component for real time applications.
3. Appreciate the hard work and intuitive knowledge of the manual workers.

IT WORKSHOP:

After the completion of the course the student will be able to:

1. Acquire 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. Gain effective communication skills through IT tools.
5. Update knowledge and skills in PC maintenance and usage of latest Operating Systems and Office automation tools.

DETAILLED SYLLABUS:

ENGINEERING WORKSHOP:

1. Trades for Exercise:

Any TWO jobs from each trade should be performed.

a)	**Carpentry Shop**	:	Cross lap joint, mortise and tenon, T-joint, dove tail joint.
b)	**Fitting Shop**	:	Square fit and V-fit, semi circular fit, dove tail fit.
c)	**Sheet Metal Shop**	:	Trapezoidal tray, square tin, funnel, cylinder.
d)	**House wiring**	:	Wiring for two lamps (bulbs) with independent switch controls with or without looping, wiring for stair case lamp, tube light connection, godown wiring.
(e)	**Foundry**	:	Preparation of casting using single piece pattern, Preparation of casting using split piece pattern

2. Trades for Demonstration:

a) Welding

b) Metal Cutting

c) Plumbing

In addition to the above, hand tools, hand machines, models of jobs, materials with names such as different woods, wood faults, plastics, steels, meters, gauges, equipment, first-aid and shop safety shall be demonstrated through charts, layouts, figures, circuits, CDs/DVDs.

IT WORKSHOP:

a) PC Hardware

Week 1: Identify the peripherals of a personal computer, components in a Central Processing Unit (CPU) and its functions, block diagram of CPU along with the configuration of each peripheral.

Week 2: Demonstrating assembling and disassembling of the Personal Computer.

Week 3: Introduction to Operating Systems, Components of OS, Installation of Microsoft Windows-XP Operating System.

Week 4: Introduction to LINUX OS, Installation of LINUX OS, Basic DOS commands – mkdir, cd, cls, del, copy, attrib, date, path, type, format, exit. Basic commands in LINUX - cat, ls, pwd, rm, rmdir, cd, cp, mv, who, date, cal, clear, man, wc.

Week 5: Hardware & Software Troubleshooting: Diagnosis of PC malfunction, types of faults, common issues and how to fix them. Basic Hardware & Software Troubleshooting steps, PC diagnostic tools.

b) MS-Office:

MS Word

Week 6: Introduction to MS-Word, Importance of Word as Word Processor, Overview of toolbars, Saving, Accessing files, Using help and resources.

Create a word document using the features: Formatting fonts, Drop cap, Applying text effects, Using character spacing, Borders and shading, Inserting headers and footers, Using date and time option.

Week 7: Create a word document in MS-Word using the features: Inserting tables, Bullets and numbering, Changing text direction, Hyperlink, Images from files and Clipart, Drawing toolbar and Word art.

Week 8: Create an invitation using Mail Merge in MS-Word

MS Power Point:

Week 9: Introduction to MS-Power Point, Utilities, Overview of toolbars, PPT orientation, slide layouts, Types of views.

Create a Power Point Presentation using the features: Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows.

Week 10: Create a Power Point Presentation using the features: Auto content wizard, Hyperlinks, Inserting images, Clip art, Audio, Video, Custom animation, Slide hiding, Tables and Charts.

MS Excel:

Week 11: Introduction to MS-Excel as a Spreadsheet tool, Overview of toolbars, accessing, Saving excel files, Using help and resources.

Create a spreadsheet using the features: Gridlines, Format cells, Summation, Auto fill, Formatting text, Formulae in Excel Charts.

Week 12: Create a spreadsheet using the features: Split cells, Sorting, Conditional formatting, Freeze panes, Pivot tables, Data validation.

MS Publisher & World Wide Web

Week 13: Introduction to MS-Publisher, Overview of toolbars, Saving files, Templates, Layouts.

Create a website using the features: Home page, About us, Department, Contact page.

Internet & Computer Security

Week 14: Search Engines and Cyber Hygiene: Introduction to computer networking, Demonstration on network components, Drivers loading and Configuration settings, Mapping of IP addresses, Configuration of Internet and Wi-Fi. Bookmarks, Search toolbars and pop up blockers. Types of search engines and how to use search engines, Awareness of various threats on Internet, Types of attacks and how to overcome. Installation of antivirus software, Configuration of personal firewall and Windows update on Computers.

Total Periods: *48*

REFERENCE BOOKS:

ENGINEERING WORKSHOP:

1. V. Ramesh Babu, **Engineering Work shop practice**, VRB Publishers Private Limited, 2009.
2. P.Kannaiah and K.L.Narayana, **Work shop Manual**, SciTech Publishers, 2009.
3. K. Venkata Reddy, **Workshop Practice Manual**, BS Publications, 2008

IT WORKSHOP:

1. Vikas Gupta, "**Comdex Information Technology Course Tool Kit**," 2nd Edition, WILEY Dreamtech, New Delhi, 2006.
2. ITL Education, "**Introduction to Information Technology**," 2nd Edition, Pearson Education, New Delhi, 2005.
3. **IT Workshop Laboratory Manual**, Department of IT, SVEC, 2014.

B.Tech. I Year

14BT1HS02: ENGLISH LANGUAGE COMMUNICATION SKILLS LABORATORY

(Common to All Branches of Engineering)

Int. Marks: 25; Ext. Marks: 50; Total Marks: 75

L	T	P	C
-	-	3	3

PREREQUISITE: Basic Speaking and Listening Skills.

COURSE DESCRIPTION: The course contains practice sessions which are classified into software based learning, grammar and activities. English Speech Sounds and Phonemic Transcription, Word Stress and Sentence Stress, Accent, Rhythm and Intonation, Paralinguistic Features, Vocabulary Building, are aided by software. Grammar sessions include Functional Grammar: Tenses, Speech, Voice, Error Correction and Essay Writing. Just a Minute, Impromptu Speech and Elocution, Role Plays, Telephonic Etiquette, Listening Skills, Describing People, Places and Objects, Presentation Skills and Information Transfer are activity oriented.

COURSE OUTCOMES:

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

1. Gain practical knowledge in
   - English Speech Sounds
   - Stress Patterns in word and sentence
   - Intonation Patterns
   - Paralinguistic Features
   - Vocabulary Enrichment
2. Analyse the functional part of the grammatical elements for writing grammatically correct English in various academic and personal practices.
3. Develop various language functions to fulfil the purpose of speaking and writing in academic, professional and personal contexts.
4. Apply the knowledge of the usage of various language software for enhancing the language skills more and more thereby acquiring unconsciously the language functions and elements that are commonly used in various contexts.
5. Communicate effectively with engineering community and society in various formal, informal and neutral situations.

6. Demonstrate various language functions by participating in
   - Just A Minute
   - Impromptu Speech
   - Elocution
   - Role Plays
   - Presentations
7. Engage in lifelong learning for the development of the communicative competence
   for meeting the global challenges.

Detailed list of experiments / Lab practice Sessions:

1. English Speech Sounds and Phonemic Transcription
2. Word Stress and Sentence Stress
3. Accent, Rhythm and Intonation
4. Paralinguistic Features.
5. Vocabulary Building
   a. Importance of Vocabulary Enrichment in Speaking: Spelling
   b. Synonyms–Antonyms–Prefix–Suffixes–One Word Substitutes
   c. Idioms and Phrases–Homophones–Homonyms–Homographs.
6. Functional Grammar
   a. Parts of Speech
   b. Tenses
   c. Change of Speech
   d. Change of Voice
   e. Word Order and Error Correction
   f. Essay Writing
7. Just a Minute, Impromptu Speech and Elocution
8. Role Plays
9. Telephonic Etiquette
10. Listening Skills
11. Describing People, Places and Objects
12. Presentation Skills
13. Information Transfer

REFERENCES:

1. Departmental Lab Manual

SUGGESTED SOFTWARE:

1. Mastering English: Vocabulary, Grammar, Punctuation and Composition.
2. Dorling Kindersley Series of Grammar, Punctuation, Composition etc.
3. Language in Use 1, 2 and 3
4. Learning to Speak English 8.1, the Learning Company – 4 CDs.
5. English in Mind, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.
6. English Pronunciation Dictionary by Daniel Jones
7. Speech Solutions
8. Cambridge Advanced Learner's Dictionary - 3rd Edition
9. Centronix - Phonetics
10. Rosetta Stone
11. Let's Talk English, Regional Institute of English South India.

II B. Tech. – I Semester

14BT3BS02: SPECIAL FUNCTIONS AND COMPLEX ANALYSIS

(Common to ECE, EEE and EIE)

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

PRE REQUISITE: Engineering Mathematics

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

COURSE OUTCOMES: After completion of the course the student 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 analytical skills in **providing solutions** for problems involving

- Fluid, Electrical and Magnetic Potential functions
- Integration of complex functions
- Improper real integrals

CO3. Develop skills in **analyzing**

- The properties exhibited by complex functions in Argand plane.
- The properties of complex functions by expressng them in power series and graphs.
- Properties of improper integrals through residue theory.

Detailed syllabus:

UNIT-I: SPECIAL FUNCTIONS (10 periods)

Beta and gamma functions - properties - relationship between beta and gamma functions. Applications - evaluation of improper integrals using beta and gamma functions. Bessel function - generating function (without proof) - recurrence relations - orthogonality.

UNIT-II: ANALYTIC FUNCTIONS (10 periods)

Function of a complex variable - limits and continuity of functions. Differentiability - analyticity, Cauchy – Riemann equations (both cartesian and polar). Conjugate and harmonic conjugate functions - Milne Thompson method. Potential functions.

UNIT-III: COMPLEX INTEGRATION AND POWER SERIES (08 periods)

Line integral - Evaluation of line integrals along curves and closed contours - Cauchy's Integral theorem (without proof) - Cauchy's integral formula - Derivatives of analytic function - Generalized integral formula- Evaluation of integrals using integral formula. Taylor's theorem (without proof) - Laurent's theorem (without proof) - Power series expansion of complex functions.

UNIT-IV: RESIDUE THEOREM – APPLICATIONS (09 periods)

Zeros and Singularities – Types of singularities - Residues – Evaluation of Residues at poles- Pole of order m and pole at infinity- Residue theorem- Evaluation of integrals using residue theorem – Evaluation of improper and real integrals of the type.

i) $\int_0^{2\pi} f(\cos\theta, \sin\theta)\, d\theta$ ii) $\int_{-\infty}^{\infty} f(x)\, dx$ iii) $\int_{-\infty}^{\infty} e^{imx} f(x)\, dx$

UNIT-V: CONFORMAL MAPPINGS (08 periods)

Definition, examples and mappings defined by $w = e^z, \log z, z^2, \sin z, \cos z.$ Translation, Rotation, Inversion. Bilinear transformation - Properties - Fixed points, Cross ratio. Invariance of circles under bilinear transformation. Determination of bilinear transformation using three given points.

Total Periods: 45

TEXT BOOK:

1. T.K.V. Iyenger, B. Krishna Gandhi,... etal, Text book of Engineering Mathematics, Vol - III, S. Chand & Company, 8th Edition, 2011.

REFERENCE BOOKS:

1. Grewal, B.S, Higher Engineering Mathematics, Khanna Publishers, Delhi, 42th Edition, 2012.
2. Shahnaz Bathul, Special Functions and Complex Variables, PHI Learning, 2nd Edition, 2010.

II B.Tech. - I Semester

14BT3HS01: ENVIRONMENTAL SCIENCES

(Common to ECE, EEE and EIE)

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

PRE-REQUISITES: Engineering Physics and Engineering Chemistry

COURSE DESCRIPTION: Introduction to environment, Need for public awareness; Natural resources, conservation and management; Ecology and ecosystems; Biodiversity, conservation and management; Environment pollution and Control; Social issues and environment; Human population and environment; Field study and analysis.

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

CO1. Acquire knowledge in
- Diverse components of environment and natural resources.
- Ecosystem and biodiversity & its conservation methods.
- Population growth and human health.
- Green technology.

CO2. Identify and resolve the issues related to sources of different types of pollutions.

CO3. Provide solutions to individuals, industries and government for sustainable development of natural resources.

CO4. Create awareness on environmental degradation and to bring best management practices to protect environment.

CO5. Develop skills in analyzing reports on environment for sustainable development.

CO6. Apply environmental ethics in protection of diversified eco systems.

Detailed Syllabus:

UNIT-I: MULTIDISCIPLINARY NATURE OF ENVIRONMENT AND NATURAL RESOURCES (11 periods)

Multidisciplinary nature of environment: Definition, scope and importance of multidisciplinary nature of environment, segments of environment-lithosphere, hydrosphere, atmosphere and biosphere, need for public awareness. **Natural Resources:** Renewable and Non-renewable resources and associated problems- (a) forest resources: use and over exploitation, deforestation-causes, effects and remedies, case studies, (b) waterresources-use and over utilization of surface & ground water, conflicts over water-benefits and problems of large dams, case studies,

(c) mineral resources- mining, adverse effects, case studies, (d) food resources-world food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problem, water logging and salinity, case studies, (e) energy resources-growing needs, renewable energy resources–solar, wind, hydropower, hydrogen fuel and non-renewable energy resources-coal, natural gas, nuclear energy, role of an individual in conservation of natural resource and equitable use of resources for sustainable lifestyles.

UNIT-II: ECOSYSTEMS AND BIODIVERSITY (10 periods)

Ecosystems: Definition and concept of an ecosystem, structure and function of an ecosystem-producers, consumers and decomposers, food chains, food webs and ecological pyramids-introduction, types, characteristic features, structure and functions of forest ecosystem, desert ecosystem, aquatic ecosystem-ponds, lakes & oceans, energy flow in the ecosystem, ecological succession. **Biodiversity:** Definition, concept and value of biodiversity, role of biodiversity in addressing new millennium challenges, hot spots of biodiversity, threats to biodiversity–habitat loss, poaching of wildlife, man-wild life conflicts, endemic, endangered and extinct species of India, conservation of biodiversity–in-situ and ex-situ.

UNIT-III: ENVIRONMETAL POLLUTION AND CONTROL (8 periods)

Definition, causes, adverse effects and control measures of: (a) air pollution (b) water pollution (c) soil pollution (d) noise pollution (e) thermal pollution (f) nuclear pollution, solid waste management–causes, effects and control measures of urban and industrial wastes, hazards and disaster management–floods, earthquakes, tsunamis, case studies.

UNIT-IV: SOCIAL ISSUES AND THE ENVIRONMENT (8 periods)

From unsustainable to sustainable development, urban problems related to energy, environmental ethics-issues and possible solutions, global warming, acid rain, ozone layer depletion, nuclear accidents and case studies, wasteland reclamation, consumerism and waste products, environment protection act, air (prevention and control of pollution) act, water (prevention and control of pollution) act, wildlife protection act, forest conservation act, issues involved in enforcement of environmental legislation, public environmental awareness.

UNIT-V: HUMAN POPULATION AND THE ENVIRONMENT (8 periods)

Population growth, population characteristics and variation among nations, population explosion, family welfare programme, environment and human health, human rights, value education, HIV/AIDS, women and child welfare, role of information technology in environment and human health, case studies.

Field work: visit to a local area to document environmental assets-pond/forest/grassland/hill/mountain/Environment Impact Assessment procedures for local environmental issues or assignment/seminar.

Total Periods: 45

TEXT BOOKS:

1. A.Kaushik and C.P. Kaushik, *Environmental Studies*, New Age International (P) Ltd Publications, 4th edition, 2014.
2. Erach Barucha, *Environmental Studies*, Orient Blackswan, 2nd edition, 2013.

REFERENCE BOOKS:

1. R. Rajagopalan, *Environmental Studies*, Oxford University Press, 2nd Edition, 2011.
2. Benny Joseph, *Environmental Studies*, Tata McGraw-Hill, 2nd Edition, 2009.
3. Dr. B S Chauhan, *Environmental Studies*, University Science Press, 1st Edition, 2008.
4. M. Anji Reddy, *Textbook of Environmental Sciences and Technology*, BS Publications, 2007.
5. Larry W Canter, *Environmental Impact Assessment*, McGraw-Hill Education, 2nd Edition, 1996.

II B.Tech. - I Semester

14BT31001: PRINCIPLES OF ELECTRICAL MEASUREMENTS

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

PREREQUISITES: Network Analysis, Engineering Physics.

COURSE DESCRIPTION: Science of Measurement; Construction and principle of operation of Ammeters, Voltmeters, Ohmmeters; Potentiometers; Power meter; Power Factor meter; Energy Meters; Design of Bridges : AC, DC.

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

CO1. Demonstrate knowledge in
- Construction and Principle of operation of different instruments used for Measurement of Voltage, Current and Resistance.
- The measurement of Power, Power factor, Energy.

CO2. Analyse, Identify and select instruments suitable for various electrical parameter measurements.

CO3. Design instruments and circuits for measurement of Power, Energy, Power factor, Voltage, Current, Resistance, Capacitance and Inductance.

Detailed Syllabus:

UNIT I: SCIENCE OF MEASUREMENT (9 periods)

Measurement systems, Significance of Measurements, Methods of Measurements: Direct and Indirect Methods; Classification of Instruments, Deflection and Null Type instruments, Elements of a Generalized Measurement System, Types of errors: Gross Error, Systematic Error, Random Error; Units: Fundamental and Derived Units, CGS System of Unit, Practical Units, M.K.S System, S.I Units; Standards and their Classification: Electrical Standards, Resistance Standards, Current Standards, Inductance Standards and Capacitance Standards.

UNIT-II: AMMETERS AND VOLTMETERS (11 periods)

Classification of analog instruments, Principle of operation of analog instruments, operating forces of electromechanical indicating instruments: deflecting, control and damping; Permanent Magnet Moving Coil (PMMC): Construction, working principle, Expression of torque equation, Errors in PMMC Instruments, Advantage and Disadvantages of PMMC Instruments; Moving Iron Instruments: Classification of Moving Iron Instruments, Construction, working principle and Expression of torque equation; Ammeter: Ammeter shunt, Effect of Temperature Change in Ammeter, Multi-range Ammeters; Voltmeter: Voltmeter Multipliers, Effect of Temperature Change in Voltmeters, Multi-range Voltmeter.

UNIT-III: OHMMETERS AND POTENTIOMETERS (9 periods)

Ohmmeters: Series type ohmmeter, shunt type ohmmeter, Multimeter.
DC Potentiometers: Basic potentiometer circuit, standardization, Compton's Potentiometers, Multiple-range potentiometer, applications: Calibration of Voltmeter, Calibration of Ammeter, Measurement of Resistance.
AC Potentiometers: Standardization, Types of A.C Potentiometers: Polar types, Coordinate types, applications: Voltmeter Calibration, Ammeter Calibration, Measurement of Self reactance of a coil.

UNIT-IV: POWER & ENERGY METERS (8 periods)

Power in D.C Circuits, Power in A.C Circuits, Electrodynamometer wattmeter: Construction, working principle, Torque equation, Errors in Electrodynamometer wattmeter, Three Phase Wattmeter.
Electrodynamometer Power Factor Meter: Single Phase, Three Phase.
Energy Meter: Single Phase Induction Type Energy Meter: Construction, Working Principle, Errors in Single Phase energy meter; Polyphase energy meters: Two element energy meter.

UNIT-V: BRIDGES (8 periods)

Measurement of Resistance: Medium Resistance Measurement: Wheatstone bridge, Kelvin Bridge; Low Resistance Measurement: Kelvin double bridge; High Resistance Measurement: Direct deflection methods.
Measurement of Inductance: Maxwell Bridge, Hay's Bridge and Anderson Bridge.
Measurement of capacitance: De Sauty's Bridge and Schering bridge, Q-meter.

Total Periods : 45

TEXT BOOK:

1. A.K.Sawhney, *A Course in Electrical and Electronics Measure ments and Instrumentation*,Dhanpat Rai and Sons, New Delhi, 19th Revised Edition, 2013.

REFERENCE BOOKS:

1. E.W. Golding & F.C. Widdis, *Electrical Measurements and Measuring Instruments*, 5th Edition, Wheeler Publishing.
2. Doeblin, E.O., *Measurement Systems: Applications and Design*, 4th Edition, TMH, 2003.
3. H.S. Kalsi, *Electronic Instrumentation*, TMH, 2002.

II B. Tech. - I Semester

14BT31002: SENSORS AND TRANSDUCERS

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

PREREQUISITE: Engineering Physics, Engineering Mathematics

COURSE DESCRIPTION: Performance characteristics of transducers; Working principle of resistive, inductive, capacitive, self-generating and other sensors; Applications of sensors.

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

CO1. Demonstrate the principles of sensors and transducers with their technical characteristics.
CO2. Apply analytical skills to determine the response of sensors for change in physical parameters.
CO3. Identify and choose sensor for the specific problem.

Detailed Syllabus:

UNIT – I: CHARACTERISTICS OF TRANSDUCERS (9 Periods)
Principle of transducer, Classification of transducer, Static Characteristics: Calibration, accuracy, precision, sensitivity, linearity, threshold, resolution, hysteresis, dead space, reproducibility, span. Dynamic characteristics: Dynamic error, Fidelity, Measuring lag, Speed of response, Mathematical model of measuring system, Transfer function of Zero order system, First order system and Second order system. Step response, impulse response and frequency response of first order system and second order system. Factors influencing the choice of transducers.

UNIT – II: RESISTIVE SENSORS (9 Periods)
Potentiometers, Metal and semiconductor strain gauges, Resistance temperature detectors, Thermistors, Magnetoresistors, Light dependent resistors, Hot-wire resistive transducer, Resistive hygrometer.

UNIT–III: CAPACITIVE AND INDUCTIVE SENSORS (9 Periods)
Capacitive sensors: Change in overlapping area, dielectric constant and distance between the plates of variable and differential capacitor. Frequency response of capacitive sensors.
Inductive sensors: Variable reluctance sensors, Eddy current sensors, Linear variable differential transformers, Synchros, Resolvers, Electromagnetic sensors based tachogenerator, Hall Effect sensors.

UNIT – IV: SELF-GENERATING SENSORS (9 Periods)

Thermoelectric sensors: Thermoelectric effects, Thermocouple laws, common thermocouples. Piezoelectric sensors: Piezoelectric effect, deformation modes, equivalent circuit, materials. Pyroelectric Sensors: Pyroelectric effect, materials. Photoelectric sensors: photovoltaic effect, materials. Magnetostrictive transducers, Electrochemical Sensors: Ion selective electrodes, Solid state electrodes.

UNIT – V: DIGITAL AND OTHER SENSORS (9 Periods)

Digital transducers: Tachometer encoder, incremental encoder, absolute encoder. Semiconductor sensors: Basics, techniques. Film sensors: Thin film sensors, Thick film sensors. Fiber optic sensors: Basics, sensor technology. Ultrasonic sensors: Basics, sensing methods. Micromachining concept of MEMS, Basics of SMART sensors.

Total Periods: 45

TEXT BOOKS:

1. Ramon Pallas-Areny and John G. Webster, Sensors and Signal Coditioning, John Wiley & Sons, Inc., 2nd edition, 2001.
2. A.K.Sawhney, A Course in Electrical and Electronic Measurements and Instrumentation, Dhanpat Rai & Co., 19th Revised Edition, 2013.

REFERENCE BOOKS:

1. D. V. S Murty, Transducers and Instrumentation, PHI Learning Private Limited, 2nd edition, 2011.
2. D. Patranabis, Sensors and Transducers, PHI Learning Private Limited, 2nd edition, 2003.
3. John P. Bentley, Principles of Measurement Systems, Pearson Education, 4th edition, 2005.
4. Doebelin E.0, Measurement Systems - Application and Design, Tata McGraw-Hill, 4th Edition, 2003.

II B. Tech. – I Semester

14BT30232: NETWORK ANALYSIS

(Common to ECE & EIE)

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

PRE-REQUISITES: Engineering Physics and Engineering Mathematics

COURSE DESCRIPTION: Basic concepts of electric circuits; voltage – current relationship of basic circuit elements; mesh and nodal analysis; AC circuits; transient analysis; two port network parameters; filters; network theorems.

COURSE OUTCOMES: After completion of the course the student 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 two port networks and filters.
- Various network theorems.

CO2. Analyze
- A circuit using mesh and nodal concepts.
- A two port network for various network parameters.
- Various types of filter networks.
- The transient behavior of the circuits.

CO3. Design single phase circuits and filters to meet the required specifications.

CO4. Solve
- Electrical circuits for voltage, current and power using Conventional circuit analysis methods and network theorems.
- Transient responses.
- Two port networks and filters.

Detailed Syllabus:

UNIT–I: INTRODUCTON TO ELECTRICAL CIRCUITS (10 periods)
Concepts of charge, current, voltage, power, circuit elements, Ohm's law, Kirchoff's Laws, network reduction techniques, voltage and current division rules, series-parallel circuits, star-delta and delta-star transformations, source transformation, nodal analysis, mesh analysis – problems.

UNIT–II: SINGLE PHASE AC CIRCUITS (8 periods)

Introduction to AC quantities, basic definitions: cycle, time period, frequency, amplitude, determination of average value, rms value, form factor and peak factor for different alternating waveforms, phase and phase difference, phase relation in R, L, C circuits, series and parallel circuits, impedance and power triangle, power factor. Series and parallel resonance – quality factor and bandwidth. Current locus diagram – problems.

UNIT–III: TRANSIENT ANALYSIS (8 periods)

Transient response of R-L, R-C and R-L-C for DC excitation – transient response of R-L, R-C and R-L-C for sinusoidal excitation, solution by using differential equation and Laplace Transforms method – problems.

UNIT–IV: TWO PORT NETWORKS AND FILTERS (10 periods)

Impedance parameters, admittance parameters, transmission (ABCD) parameters, hybrid parameters, conversion of one parameter to another, conditions for reciprocity and symmetry, interconnection of two port networks in series, parallel and cascaded configurations – problems.

FILTERS: Classification of filters, filter networks and equations of filter networks, classification of pass band and stop band, characteristic impedance in the pass band & stop bands, constant - k Low pass filter, high pass filter, m-derived high pass and low pass filter, band pass filter and band elimination filter- problems.

UNIT–V: NETWORK THEOREMS (9 periods)

Superposition theorems, Thevenin's, Norton's, maximum power transfer, Tellegen's, Millman's, reciprocity, compensation theorem for D.C. and sinusoidal excitation- applications and problems.

Total Periods: 45

TEXT BOOKS:

1. A. Sudhakar, S.P.Shyam Mohan, *Circuits and Networks analysis and synthesis*, 4th edition, Tata McGraw Hill publishing company Ltd., New Delhi, 2007.
2. A.Chakrabarthi, *Circuit Theory (analysis and synthesis)*, 6thedition, Dhanpat Rai & Co, New Delhi, 2014.

REFERENCE BOOKS:

1. M.E. Van Valkenberg, *Network Analysis,* Pearson Publications, 3rd edition, New Delhi 2006.
2. W H Hayt, J E Kemmerly, S M Durbin, *Engineering Circuit Analysis*, Tata McGrawHill publishing company Ltd., New Delhi, 6th Edition, 2008.

II B. Tech. - I Semester

14BT30402: SEMICONDUCTOR DEVICES AND CIRCUITS

(Common to ECE, EEE & EIE)

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

PRE-REQUISITES: 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: After completion of the course the student will be able to

CO1. Demonstrate fundamental 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 pur pose 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 like
- BJT and FET biasing circuits
- BJT and FET amplifiers

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

Detailed Syllabus:

UNIT-I:PN JUNCTION DIODE, RECTIFIERS AND REGULATORS **(12 Periods)**

PN-Junction Diode:

p-n Junction as a diode, *p-n* Junction diode equation, Volt-Ampere (V-I) characteristics, temperature dependence of *p-n* characteristics, diode resistance-static and dynamic resistances, transition and diffusion capacitances, break down mechanisms in semiconductor diodes, Zener diode characteristics.

Rectifiers and Regulators:

Half-Wave rectifier and Full-Wave rectifiers (Qualitative and quantitative analysis), Harmonic components in a rectifier circuit, Inductor filter, Capacitor filter, L - section filter, - Π section filter, comparison of various filter circuits in terms of ripple factors. Simple circuit of a regulator using Zener diode. Problems on rectifier circuits.

UNIT-II: BIPOLAR JUNCTION TRANSISTOR, BIASING AND STABILIZATION (9 Periods)

Transistor construction, BJT Operation, Transistor currents and their relations, Input and Output Characteristics of a Transistor in Common Emitter, Common Base and Common Collector Configurations, BJT specifications, Transistor Operating Point, DC and AC Load Lines, Importance of Biasing, Fixed Bias, Emitter Feedback Bias, Collector to Base Feedback Bias, Voltage Divider Bias, Bias Stability, Transistor as an amplifier, Thermal Runaway, Problems on biasing circuits.

UNIT-III: SMALL SIGNAL ANALYSIS OF BJT AMPLIFIERS (10 Periods)

BJT Modeling, Hybrid Modeling, Determination of h-Parameters from Transistor Characteristics,Measurement of h-Parameters, Millers Theorem, Analysis of CE, CB and CC configurations using simplified Hybrid Model, Comparison of CB, CE and CC configurations.

UNIT-IV: FIELD EFFECT TRANSISTOR (9 Periods)

Construction, Principle of operation and characteristics of JFET and MOSFET (Enhancement & Depletion), Biasing of FET, Small Signal Model of JFET, Common Source and Common Drain Amplifiers using JFET, Generalized FET Amplifier, FET as Voltage Variable Resistor, Comparison of BJT and FET.

UNIT-V: SPECIAL PURPOSE ELECTRONIC DEVICES (5 Periods)

Principle of Operation and Characteristics of Tunnel Diode, Uni-Junction Transistor (UJT), Varactor Diode, Silicon Controlled Rectifier (SCR). Principle of operation of Schottky Barrier Diode.

Total Periods: 45

TEXT BOOK:

1. J. Millman, Christos C. Halkias and Satyabrata Jit, *Electronic Devices and Circuits,* TMH, 3rd Edition, 2010.

REFERENCE BOOKS:

1. R.L. Boylestad and Louis Nashelsky, *Electronic Devices and Circuits,* PHI, 10th Edition, 2009.
2. David A. Bell, *Electronic Devices and Circuits,* Oxford University press, 5th Edition, 2014.
3. S. Salivahanan, N. Suresh Kumar, *Electronic Devices and Circuits*, Mc-Graw Hill, 3rd Edition 2013.

II B. Tech. – I Semester

14BT31021: MEASUREMENTS AND TRANSDUCERS LAB

Int.Marks	Ext. Marks	Total Marks	L	T	P	C
25	50	75	-	-	3	2

PRE-REQUISITE: Sensors and Transducers, Electrical Measurements

COURSE DESCRIPTION: Measurement of parameters like voltage, resistance, inductance, capacitance, displacement, pressure, force, temperature and shaft speed.

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

CO1. Carry out analysis of instrument in terms of accuracy, Linearity and Calibration.

CO2. Design and develop measuring circuits for voltage, current and resistance .

LIST OF EXPERIMENTS:

Minimum of 11 Experiments to be conducted

1. Measurement of AC parameters (Voltage & Current) using D'Arsonval Galvanometers
2. Conversion of D'Arsonval Galvanometer into ohmmeter (Series & Shunt)
3. Measurement of unknown resistance, inductance and capacitance using bridge circuits
4. Measurement of resistance, inductance, capacitance and quality factor of the coil using Q meter
5. Calibration and testing of single phase energy meter
6. Linear displacement measurement using LVDT
7. Temperature measurement using RTD
8. Strain measurement using Strain Gauges
9. Angular displacement using capacitive transducer
10. Transfer characteristics of thermocouple and Determination of Time Constant
11. Determination of Capacitance of a RC Circuit
12. Study of Piezoelectric Transducer
13. Measurement of shaft speed using stroboscope
14. Pressure measurement using Bourdon tube

II B. Tech. – I Semester

14BT30421: SEMICONDUCTOR DEVICES AND CIRCUITS LAB

(Common to ECE, EEE & EIE)

Int.Marks	Ext. Marks	Total Marks	L	T	P	C
25	50	75	-	-	3	2

PRE-REQUISITES: Semiconductor Devices and Circuits.

COURSE DESCRIPTION: Identification and testing of active and passive components; RPS, DMM, Function Generator, CRO; Diode characteristics; Rectifiers; Transistor and FET characteristics; UJT and SCR characteristics; BJT and FET amplifiers.

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

CO1. Analyze the characteristics of different electronic devices, like

- Diode
- Zener Diode
- Transistor
- FET and UJT

CO2. Design and analyze the electronic circuits like transistor and FET amplifiers

CO3. Solve engineering problems and arrive at solutions pertaining to electronics.

LIST OF EXPERIMENTS:

PART A: (Only for viva voce Examination)

Electronic Workshop Practice (in 3 lab sessions):

1. Identification, Specifications, Testing of R, L, C Components (Colour Codes), Potentiometers, Switches (SPDT, DPDT, and DIP), Coils, Gang Condensers, Relays, Bread Boards, PCBs.
2. Identification, Specifications and Testing of Active Devices, Diodes: BJTs, Low-power JFETs, MOSFETs, Power Transistors, LEDs, LCDs, Optoelectronic Devices, SCR, UJT, DIACs, TRIACs, Linear and Digital ICs.

3. Study and operation of
   - Multimeters (Analog and Digital).
   - Function Generator.
   - Regulated Power Supplies.
   - CRO.

PART B: (Minimum of 10 experiments to be conducted)

1. Forward and Reverse bias characteristics of PN Junction diode.
2. Zener diode characteristics and Zener as Voltage Regulator.
3. Input and Output characteristics of Transistor in CB Configuration.
4. Input and Output characteristics of Transistor in CE Configuration.
5. Half wave Rectifier with and without filters.
6. Full wave Rectifier with and without filters.
7. FET characteristics .
8. Measurement of h - parameters of transistor in CE configuration.
9. Frequency response of CE Amplifier.
10. Frequency response of CC Amplifier.
11. Frequency response of Common Source FET Amplifier.
12. SCR Characteristics.
13. UJT Characteristics.

II B. Tech. - II Semester

14BT4HS02: PROFESSIONAL ETHICS

(Common to ECE, EEE & EIE)

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

COURSE DESCRPTION: Engineering Ethics, Moral autonomy and Moral dilemmas – Professional and Ideal Virtues, Professional Responsibility and Moral Leadership – Engineering as Social Experimentation, Conscientiousness and Law of Engineering - Responsibilities and Rights, Whistle Blowing – Global Issues, Managerial Ethics.

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

CO1. Apply the principles of ethics to solve engineering problems.

CO2. Analyze the problems in the implementation of moral autonomy and resolve through Consensus.

CO3. Responsible to follow the codes of ethics.

CO4. Practice professionalism in Engineering and assess the issues pertaining to moral dilemmas.

CO5. Function as a member, consultant, Manager, Advisor and Leader in multi–disciplinary teams.

CO6. Write reports without bias and give instructions to follow ethics.

Detailed syllabus:

UNIT I: ENGINEERING ETHICS (8 Periods)

Scope and Aim of Engineering Ethics–Senses of Engineering Ethics– Variety of Moral Issues–Types of Inquiry– Moral Dilemmas– Moral Autonomy– Kohlberg's Theory, Gilligan's theory, Consensus and Controversy.

UNIT II: PROFESSIONAL IDEALS AND VIRTUES (10 Periods)

Theories about Virtues, Professions, Professionalism – characteristics, expectations, Professional Responsibility, Integrity, Self–respect, Sense of "Responsibility". Self–interest, Customs and Religion– Self–interest and Ethical Egoism, Customs and Ethical Relativism, Religion and Divine Command Ethics. Use of ethical theories– resolving moral dilemmas and moral leadership.

UNIT III: ENGINEERING AS SOCIAL EXPERIMENTATION

(9 Periods)

Engineering as experimentation– Similarities to standard experiments, learning from the past and knowledge gained. Engineers as Responsible Experimenters–Conscientiousness, moral autonomy and accountability. The challenger case, codes of ethics and limitations. Industrial standards, problems with the law of Engineering.

UNIT IV: RESPONSIBILITIES AND RIGHTS **(9 Periods)**

Collegiality and Loyalty, Respect for authority, collective bargaining, confidentiality, conflict of interests, occupational crime. Rights of Engineers– Professional rights, whistle–blowing, the bart case, employee rights and discrimination.

UNIT V: GLOBAL ISSUES **(9 Periods)**

Multinational corporations–Professional ethics, environmental ethics, computer ethics, Engineers as Consultants, Witnesses, Advisors and Leaders. Engineers as Managers – Managerial ethics applied to Engineering Profession, moral leadership.

Total Periods: 45

TEXT BOOKS:

1. Mike W. Martin, Roland Schinzinger, *Ethics in Engineering*, 3rd Edition, Tata McGraw–Hill, 2007.
2. Govindarajan M, Nata Govindarajan. M, Natarajan. S, Senthilkumar. V.S, *Engineering Ethics*, Prentice Hall of India, 2004.

REFERENCE BOOKS:

1. Dr. S. Kannan, K. Srilakshmi, *Human Values and Professional Ethics*, Taxmann Allied Services Pvt Ltd., 2009.
2. Edmund G. Seebauer and Robert L. Barry, *Fundamental of Ethics for Scientists and Engineers*, 1st Edition, Oxford University Press, 2001.
3. Charles F. Fledderman, *Engineering Ethics*, Pearson Education, 2004.
4. R. Subramanaian, *Professional Ethics*, Oxford Higher Education, 2013.

II B. Tech. II Semester

14BT50201: CONTROL SYSTEMS

(Common to ECE and EIE)

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

PRE-REQUISITES: Electrical Circuits / Network Analysis

COURSE DESCRIPTION: Concepts of control system; transfer function of various physical systems; time response analysis; frequency response analysis; compensators; stability analysis; state space analysis.

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

CO1. Demonstrate knowledge on

- Modelling of physical systems.
- Time and frequency domain specifications used for stability analysis.
- Various methods of determining the stability of the system.
- Realization of various compensators.
- Concept of controllability and observability.

CO2. Analyze the stability of the system in time and frequency domains.

CO3. Demonstrate problem solving skills in

- Deriving the transfer function using block diagram reduction technique.
- Evaluating the system stability in time and frequency domains.
- Solving the state equations of a system.
- Evaluating controllability and observability of a system.

Detailed Syllabus:

UNIT – I: CONTROL SYSTEMS CONCEPTS (9 periods)

Classification of control systems, effects of feedback. Mathematical models –mechanical and electrical systems, analogous systems. Block diagram reduction methods, signal flow graph, Mason's gain formula, transfer function of DC servo motor, AC servo motor, synchros.

UNIT - II: TIME RESPONSE ANALYSIS (8 periods)

Test signals, time response of first and second order systems, transient response of second order systems, time domain specifications, steady state response, steady state error, error constants and generalized error coefficients, response with proportional, integral and derivative controllers.

UNIT – III: STABILITY ANALYSIS IN TIME DOMAIN (9 periods)

The concept of stability, Routh's stability criterion, difficulties in the formation of Routh table, application of R-H criterion. Root locus concept, construction of root loci, effects of adding poles and zeros to G(s)H(s) on the root loci, relative stability analysis.

UNIT – IV: FREQUENCY RESPONSE ANALYSIS (9 periods)

Frequency domain specifications, Bode plots, determination of frequency domain specifications and transfer function from the Bode plot, stability analysis from Bode plots, Polar plots, phase margin and gain margin. Nyquist stability criterion, stability analysis. Compensation techniques – realization of Lag, Lead and Lag-Lead compensators.

UNIT – V: STATE SPACE ANALYSIS OF CONTINUOUS SYSTEMS (10 periods)

Concepts of state, state variables and state model, derivation of state models from physical systems, diagonalization, solution of state equations- state transition matrix and it's properties. Concept of controllability and observability, Kalman's test only.

Total Periods: 45

TEXT BOOKS:

1. A. Anand kumar, *Control Systems*, PHI learning Pvt Ltd., 2nd Edition, 2014.
2. I. J. Nagrath and M. Gopal, *Control Systems Engineering*, New Age International (P) Limited, 5th Edition, 2007.

REFERENCE BOOKS:

1. K. Ogata, *Modern Control Engineering*, Prentice Hall of India, 4th Edition, 2006.
2. A. NagoorKani, *Control Systems,* RBA Publications, 2nd Edition, 2006.

II B. Tech. – II Semester

14BT30231: ELECTRICAL TECHNOLOGY

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

PRE-REQUISITES: Network Analysis, Engineering Physics

COURSE DESCRIPTION: DC Machines; Three phase systems; operation and performance of a transformer, Three phase induction motor, Alternators and special machines.

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

CO1. Gain knowledge on
- Construction & operation of various types of electrical machines.
- Necessity of starter.
- Three phase circuits.

CO2. Analyze the characteristics of various electrical machines.

CO3. Evaluate the performance of electrical machines.

CO4. Select suitable machines for real time applications.

Detailed Syllabus:

UNIT - I: DC MACHINES (10 periods)

DC Generator: construction and working principle, types, EMF equation, losses, open circuit and load characteristics, applications – problems.

DC Motor: working principle, torque equation, characteristics, applications, speed control of shunt motor, Swinburne's test, three point starter– problems.

UNIT - II: SINGLE PHASE TRANSFORMER (10 periods)

Working principle of single phase transformer, constructional features, EMF equation, equivalent circuit, losses, efficiency and regulation of transformer , OC and SC test, predetermination of efficiency and regulation - problems.

UNIT - III: THREE PHASE CIRCUITS (8 periods)

Introduction to polyphase systems, advantages of polyphase system, generation of three phase voltages, phase sequence, star and delta connections, relationship between phase and line quantities in three phase balanced circuits, power measurement in three phase systems using two wattmeter method - problems.

UNIT - IV: THREE PHASE INDUCTION MOTOR AND ALTERNATOR (8 periods)

Induction motor: principle of operation, construction and types, slip, rotor frequency, torque, torque - slip characteristics – problems.

Alternators: principle of operation, constructional features, types, EMF equation.

UNIT - V: SPECIAL MACHINES (9 periods)

Single phase induction motors – construction, principle of operation (double field revolving theory) and applications of split phase induction motor, capacitor motor, shaded-pole motor. Construction, principle of operation and applications of universal motors and stepper motors.

Total Periods: 45

TEXT BOOKS:

1. B.L. Theraja and A.K. Theraja, A Text Book of Electrical Technology in S.I.Units, Vol.2, S.Chand Company Ltd, New Delhi, 2012.
2. V.K. Mehta, Rohit Mehta, Principles of Electrical Engineering and Electonics, S.Chand Company Ltd, New Delhi, 2010.

REFERENCE BOOKS:

1. H. Cotton, Electrical Technology, CBS Publishers & Distributors, 2004.
2. M.S. Naidu and S. Kamakshaiah, Electrical Technology, Tata McGraw-Hill Publishing company Ltd, New Delhi, 2007.
3. A.Sudhakar and Shyammohan, Principles of Electrical Engineering, Tata McGraw Hill Education Private Limited, New Delhi. 2012.

II B. Tech. – II Semester

14BT40402: ELECTRONIC CIRCUIT ANALYSIS AND DESIGN

(Common to ECE and EIE)

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

PRE-REQUISTES: Semiconductor Devices and Circuits

COURSE DESCRIPTION: BJT - Multi Stage amplifiers; Frequency Response; Feedback Amplifiers; Oscillators; Large Signal Amplifiers; Tuned Amplifiers; FET amplifiers.

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

CO1. Demonstrate knowledge in

- Multi Stage Amplifiers.
- BJT Frequency Response.
- FET Amplifiers.
- Feedback Amplifiers.
- Oscillators.
- Power Amplifiers.
- Tuned Amplifiers.

CO2. Perform analysis of electronic circuits.

CO3. Design and develop electronic sub-systems such as Feedback Amplifiers, oscillators and Power amplifiers with given specifications.

CO4. Solve problems arising due to poor circuit design by choosing the appropriate design.

Detailed Syllabus:

UNIT - I: MULTI STAGE AMPLIFIERS (8 periods)

Introduction, Distortion in amplifiers, n-stage cascaded amplifier, Methods of inter-stage coupling, Analysis of RC Coupled Amplifier, Direct and Transformer Coupled Amplifier, Darlington Pair, CE-CC amplifier, Cascode amplifier.

UNIT - II: BJT FREQUENCY RESPONSE (11 periods)

Frequency response of BJT amplifier, Analysis at low and high frequencies, Effect of coupling and bypass capacitors Hybrid -Π Common Emitter transistor model, CE short circuit current gain, CE current gain with resistive load, Single - stage CE transistor amplifier response, Gain - Bandwidth Product, Multistage Frequency Effects.

FET AMPLIFIERS
FET Small signal Model, Low - frequency Common - Source and Common - Drain Amplifiers, High - frequency Common - Source and Common - Drain Amplifiers.

UNIT - III: BJT FEEDBACK AMPLIFIERS AND OSCILLATORS (10 periods)
Concept of feedback, Classification of feedback amplifiers, general characteristics of negative feedback amplifiers, Effect of feedback on amplifier characteristics, voltage series, voltage shunt, current series and current shunt feedback configurations.Conditions for oscillations, Classification of oscillators, RC phase shift oscillator, Wien bridge oscillator, Generalized analysis of LC oscillators – Hartley and Colpitts oscillators, Piezoelectric crystal oscillator, Frequency and Stability of oscillators.

UNIT - IV: POWER AMPLIFIERS (8 periods)
Classification of power amplifiers, Class A large - signal amplifiers, Series - fed and transformer - coupled Class A audio power amplifier, Efficiency of Class A amplifier, Class B amplifier, Transformer - coupled Class B push - pull amplifier, Complementary symmetry Class B push - pull amplifier, Efficiency of Class B amplifier, Distortion in power amplifiers, Transistor power Dissipation, Thermal stability and Heat sinks.

UNIT - V: TUNED AMPLIFIERS (8 periods)
Introduction, Q - factor, Small signal single tuned amplifiers, Double tuned amplifiers, Effect of cascading single and double tuned amplifiers on bandwidth, Stagger tuned amplifiers, Class - C tuned amplifiers.

Total Periods: 45

TEXT BOOKS:

1. Jacob Millman and Christos C. Halkias, *Integrated Electronics,* Tata McGraw-Hill, 2nd Edition, 2010.
2. Robert L. Boylestad and Louis Nashelsky, *Electronic Devices and Circuits Theory*, Pearson Education, 10th Edition, 2009.
3. K. Lal Kishore, *Electronic Circuit Analysis*, BS Publications, 2nd Edition, 2003.

REFERENCE BOOK:

1. Donald A. Neamen, *Electronic Circuit Analysis and Design*, Tata McGraw-Hill, 3nd Edition, 2007.

II B. Tech. – II Semester

14BT40404: SIGNALS AND SYSTEMS

(Common to ECE & EIE)

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

PRE-REQUISITES: Engineering Mathematics, Mathematical Methods

COURSE DESCRIPTION: Analysis of signals and systems; Representation of signals using Fourier series and Fourier transform and their properties; 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 and their properties.

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

CO1. Demonstrate fundamental knowledge in

- Trigonometric and exponential Fourier series representation of periodic signals.
- Fourier transform of signals.
- Convolution and correlation of functions.
- Sampling Process.
- Laplace transforms, ROC for Laplace Transform.
- Z-Transform of discrete sequences and ROC for Z-Transform.

CO2. Perform time and frequency domain analysis of various continuous and discrete time signals and systems

CO3. Develop solutions to stable and causal systems

CO4. Solve engineering problems critically in the area of signal processing

Detailed Syllabus:

UNIT - I: SIGNALS AND SYSTEMS (10 periods)

Elementary signals - Unit Impulse and Unit Step Functions, Exponential and Sinusoidal Signals. Classification of Continuous - Time and Discrete - Time Signals, Basic operations on signals, Classification of Continuous - Time and Discrete - Time Systems, Basic System Properties, Linear Time Invariant Systems, Discrete - Time LTI Systems - The Convolution Sum, Continuous - Time LTI Systems - The Convolution Integral, Properties of Linear Time - Invariant Systems.

UNIT - II: FOURIER SERIES & FOURIER TRANSFORM OF CONTINUOUS - TIME SIGNALS (10 periods)

The Response of LTI Systems to Complex Exponentials. Fourier Series Representation of Continuous - Time Periodic Signals, Convergence of the Fourier Series, Properties of Continuous - Time Fourier Series Representation of aperiodic Signals, the Continuous - Time Fourier Transform.

The Fourier Transform for Periodic Signals, Properties of the Continuous - Time Fourier Transform, The Convolution Property, Fourier Properties and Basic Fourier Transform Pairs, Systems characterized by Linear constant coefficient differential equations. The Magnitude - Phase Representation of the Fourier Transform, The Magnitude - Phase Representation of the Frequency Response of LTI Systems

UNIT - III: CORRELATION OF SIGNALS & SAMPLING (11 periods)

Cross correlation and auto correlation of functions, properties of correlation function, Energy density spectrum, Parseval's theorem, Power density spectrum, Relation between auto correlation function and energy / power spectral density function. Relation between convolution and correlation, Detection of periodic signals in the presence of noise by correlation, Extraction of signal from noise by filtering.

Spectral Characteristics of System Response: Power density spectrum of response, Cross-power spectral density of input and output of a linear system.

Sampling: Representation of a Continuous - Time Signal by its Samples - Sampling Theorem, Reconstruction of a Signal from its Samples using Interpolation. Effect of under sampling: Aliasing, Discrete - Time Processing of Continuous - Time Signals.

UNIT - IV: LAPLACE TRANSFORMS (7 periods)

The Laplace Transform, The Region of Convergence for Laplace Transforms, The Inverse Laplace Transform, Geometric Evaluation of the Fourier Transform from the Pole-Zero Plot, Properties of the Laplace Transform, Some Laplace Transform Pairs, Analysis and Characterization of LTI Systems Using the Laplace Transform, System Function Algebra and Block Diagram Representations, Unilateral Laplace Transform.

UNIT - V: Z - TRANSFORMS (7 periods)

The Z - Transform -Region of Convergence for the z - Transform, The Inverse z - Transform, Geometric Evaluation of the Fourier Transform from the Pole - Zero Plot, Properties of the z - Transform, Some Common z - Transform Pairs, Analysis and Characterization of LTI Systems Using z - Transforms, System Function Algebra and Block Diagram Representations, Unilateral z - Transforms.

Total Periods: 45

TEXT BOOKS:

1. Alan V. Oppenheim, Alan S. Willsky, & S. Hamid, *Signals and Systems*, Pearson Higher Education, 2nd Edition , 2008.
2. B.P. Lathi, *Principles of Linear Systems and Signals*, Oxford University Press, 2nd Edition, 2013.

REFERENCE BOOKS:

1. Simon Haykin and B. Van Veen, *Signals & Systems*, John Wiley, 2nd Edition, 2010.
2. A. Anand Kumar, *Signals & Systems*, PHI, 2011.

II B.Tech – II Semester

14BT40405: SWITCHING THEORY AND LOGIC DESIGN

(Common to ECE, EEE & EIE)

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

PRE-REQUISITES: Basic algebra.

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

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

CO1. Demonstrate 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.
- Design of combinational and sequential circuits.
- Realization of Boolean functions using PLDs.

CO2. Perform the analysis of reduction of Boolean function and implementation using PLDs.

CO3. Design and develop various combinational and sequential circuits.

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

Detailed Syllabus:

UNIT - I: NUMBER SYSTEM & BOOLEAN ALGEBRA (8 periods)
Digital systems, Binary Numbers, Number base conversions, Complements of numbers, Signed binary numbers, Binary codes, Error detection and correction codes. Boolean Algebra - Basic definition, Basic theorems and properties, Boolean Functions, Canonical & Standard forms, logical operations & Logic gates.

UNIT - II: GATE LEVEL MINIMIZATION (8 periods)
The map method, four variable, Five variable K - map, POS & SOP Simplification, Don't care conditions, NAND & NOR Implementation, Other two level Implementation, Exclusive - OR Function, Tabular Method - Simplification of Boolean function using tabulation Method.

UNIT - III: ANALYSIS AND SYNTHESIS OF COMBINATIONAL CIRCUITS (9 periods)

Combinational circuits, Analysis & Design procedure, Binary Adder-subtractor, Decimal Adder, Binary Multiplier, Magnitude comparator, Decoder, Encoders, Multiplexers.

UNIT - IV: ANALYSIS AND SYNTHESIS OF SEQUENTIAL CIRCUITS (11 periods)

Sequential Circuits, Latches, Flip - Flops, Analysis of Clocked sequential circuits, State Reduction & Assignment, Design procedure, Registers & Counters – Registers, Shift Registers, Synchronous counters and Asynchronous counters.

UNIT V: ASYNCHRONOUS SEQUENTIAL LOGIC & PROGRAMMABLE MEMORIES (9 periods)

Introduction, Analysis procedure, Circuits with Latches, Design Procedure, Reduction of State and flow tables, Race - free State Assignment, Hazards, ROM, PLA, PAL.

Total Periods: 45

TEXT BOOK:

1. M.Morris Mano, Digital Design, Pearson, 3rd Edition, 2001.

REFERENCE BOOKS:

1. Zvi Kohavi and Niraj K.Jha, Switching theory and Finite Automata Theory, Tata McGraw-Hill, 2nd Edition, 1978.
2. Charles H. Roth, Fundamentals of Logic Design, Thomson Publications, 5th Edition, 2004.
3. A Anand Kumar, Switching Theory and Logic Design, PHI, 2008.

II B.Tech. - II Semester

14BT50405: PULSE AND DIGITAL CIRCUITS

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

PRE-REQUISITES: Semiconductor Devices and Circuits, Network Analysis.

COURSE DESCRIPTION: Analysis of Linear and non-linear Wave shaping circuits; switching characteristics of Diode and Transistor; multivibrators; sweep circuits; Pulse synchronization; sampling and logic gates.

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

CO1. Demonstrate knowledge in
- Responses of High-pass and low-pass RC circuits for different inputs.
- Clipping and clamping operations.
- Methods of generating the Time-base waveforms.
- Operating Principles of Sampling gates.
- Realization of logic gates using Diodes and Transistors.

CO2. Perform the analysis of Linear and non - linear Wave shaping circuits.

CO3. Design and develop Multivibrator Circuits.

CO4. Solve engineering problems pertaining to pulse and Digital circuits.

Detailed Syllabus :

UNIT - I: LINEAR WAVE SHAPING (9 Periods)

High-pass, low-pass RC circuits, their response for step, pulse, square and ramp inputs. High pass RC network as a Differentiator and Low pass RC network as an Integrator, Parallel RLC circuit and its response for step input, Ringing circuit, attenuators and its application as a CRO probe.

UNIT - II: NON - LINEAR WAVE SHAPING (8 Periods)

Diode Switching times, Diode clippers, Transistor clipper, Clipping at two independent levels, Comparators, Clamping operation, Clamping circuit taking source and Diode resistances into account, Clamping circuit theorem, Practical clamping circuits, effect of Diode characteristics on Clamping voltage, Synchronized Clamping.

UNIT - III: MULTIVIBRATOR CIRCUITS (9 Periods)

Transistor as a switch, Transistor switching times, Analysis and Design of Fixed-Bias Bistable, Monostable, Astable Multivibrators (Collector-Coupled), Symmetrical and Asymmetrical triggering, Schmitt trigger Circuit.

UNIT - IV: TIME - BASE GENERATORS (10 Periods)

General features of a Time - Base signal, methods of generating Time-Base waveform, Miller and Bootstrap Time - Base generators - basic principles, Transistor Miller Time - Base generator, Transistor Bootstrap Time - Base generator. Transistor Current Time - Base generators, Methods of linearity improvements.

SYNCHRONIZATION AND FREQUENCY DIVISION: Pulse Synchronization of Relaxation Devices, Frequency Division in the sweep circuit, Stability of Relaxation Devices, Astable Relaxation circuits, Synchronization of a sweep circuit with symmetrical signals.

UNIT - V: SAMPLING GATES AND DIGITAL LOGIC CIRCUITS (9 Periods)

SAMPLING GATES: Basic operating principles of sampling gates, Unidirectional and Bidirectional sampling gates, Reduction of pedestal in gate circuits, Four Diode Sampling gate, Six diode gate, Applications of sampling gates.

DIGITAL LOGIC CIRCUITS: Realization of Logic gates (OR, AND & NOT) using diodes & transistors**,** Analysis of RTL, DTL, TTL and CMOS Logic families and Comparison between the logic families.

Total Periods: 45

TEXT BOOKS:

1. Jacob Millman, Herbert Taub and Suryaprakash Rao Mothiki, *Pulse, Digital and Switching Waveforms*, TMH, 3rd Edition, 2014.
2. David A. Bell, *Pulse, Switching and Digital Circuits*, Oxford University Press, 5th Edition, 2015.

REFERENCE BOOKS:

1. A. Anand Kumar, *Pulse and Digital Circuits*, PHI, 2nd Edition, 2012.
2. R.Venkataraman, *Pulse, Digital Circuits and Computer Fundamentals*, Dhanapat Rai Publications, 3rd Edition, 2009.

II B.Tech. - II Semester

14BT41021: ANALOG AND DIGITAL CIRCUITS LAB

Int.Marks	Ext. Marks	Total Marks	L	T	P	C
25	50	75	-	-	3	2

PRE - REQUISITES: Switching theory and logic design, Pulse and digital circuits, Electronic circuit analysis.

COURSE DESCRIPTION: Design of BJT - Small signal single stage & Multistage amplifiers Frequency Response; Design of Oscillator; Linear and Non linear wave shaping circuits; sampling gates; Multivibrator; Verification of logic gates and flip-flops.

COURSEOUTCOMES: After completion of the course the student will be able to

CO1. Analyse simple electronic circuits in terms of theoretical and practical performance.
CO2. Design and develop circuits using discrete components and ICs.
CO3. Apply any simulation tool to analyze the electronic circuits.

LIST OF EXPERIMENTS:

Minimum of 11 experiments to be conducted (At least three experiments from each part).

Part-A

I) **Design and Simulation in Simulation Laboratory using Any Simulation Software:**

1. Common Emitter amplifier.
2. Common Source amplifier.
3. A Two Stage RC Coupled Amplifier.
4. RC Phase Shift Oscillator using BJT.
5. Complementary Symmetry Push - Pull Amplifier.

Part - B

I) Pulse and Digital Circuits:

1. Linear wave shaping – Differentiator & Integrator.
2. Non - Linear wave shaping – Clippers & Clampers.
3. Astable Multivibrator.
4. Sampling Gates.
5. Bootstrap sweep circuit.

Part - C

II) Digital Design

1. Verification of logic gates.
2. Verification of combinational circuits.
3. Verification of Flip-flops.
4. Design of counters.
5. Verification of Multiplexer / Demultiplexer.

II B.Tech. - II Semester

14BT30222: ELECTRICAL TECHNOLOGY LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
25	50	75	-	-	3	2

PRE-REQUISITES: Network analysis and Electrical Technology

COURSE DESCRIPTION: Determination of Two port network parameters, verification of network theorems; Response of RLC circuits; Performance characteristics of AC and DC Machines.

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

CO1. Analyze the performance of electrical machines.
CO2. Design various types of passive filters and resonant circuits.
CO3. Solve complex problems in electrical circuits and machines.

LIST OF EXPERIMENTS:

Any SIX experiments from each part to be conducted

PART-A

1. Series and parallel resonant circuits.
2. Time response of first order RL / RC network for periodic non Sinusoidal inputs.
3. Determination of Z and Y parameters for a given Two - port network.
4. Determination of ABCD and h - parameters for a given Two - port Network.
5. Verification of Superposition and Reciprocity theorems.
6. Verification of maximum power transfer theorem for both DC and AC excitation.
7. Verification of Thevenin's and Norton's theorems.
8. Design of low pass and high pass filters.

Part - B

1. Magnetization characteristics of a DC generator.
2. Swinburne's test on a DC shunt machine.
3. Brake test on a DC shunt motor.
4. Speed control of DC shunt motor by
    a. Field flux control method.
    b. Armature voltage control method.
5. OC and SC tests on a single - phase transformer.
6. Load test on a single phase transformer.
7. Brake test on a three - phase induction motor.
8. External characteristics of DC shunt generator.

III B. Tech. - I Semester

14BT4HS01: BUSINESS COMMUNICATION AND PRESENTATION SKILLS

(Common to ECE, EEE and EIE)

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

PRE-REQUISITES: Basic grammar and fundamentals of Listening, Speaking, Reading and writing skills.

COURSE DESCRIPTION: Nature and Scope of Communication; Non - Verbal Communication; Writing Business Documents; Business Presentations and Public Speaking; Careers and Resume.

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

CO1. Acquire knowledge in
- Managerial Communication.
- Corporate Communication.
- Business Writing.
- Presentation Skills.
- Career Building.

CO2. Analyze and judge the situation through non - verbal communi cation for effective organizational communication.

CO3. Achieve personal excellence and ability to work in groups.

CO4. Develop effective communication to meet professional needs.

Detailed Syllabus:

UNIT – I : NATURE AND SCOPE OF COMMUNICATION (9 periods)

Introduction - Functions of Communication - Roles of a Manager - Communication Basics - Communication Networks - Informal Communication - Tips for Effective Internal Communications - Interpersonal Communication - Communication Barriers - Effective Managerial Communication - Strategies for Improving Organizational Communication.

UNIT – II : NON - VERBAL COMMUNICATION (9 periods)

Introduction - Significance of Non - verbal Communication in Organizations - Forms of Non-verbal Communication - Types of Non - verbal Communication - Cross Cultural Communication: Introduction - Concept of Cross cultural Communication - Different Communication Styles - Cross - cultural Communication Strategies - Corporate Communication: Introduction - Crisis Management / Communication - Case Study.

UNIT – III : WRITING BUSINESS DOCUMENTS

(10 periods)

Business Writing: Introduction - Importance of Written Business Communication - Five Main Stages of Writing Business Messages; Business Letter Writing: Common Components of Business Letters - Strategies for Writing the Body of a Letter - Kinds of Business Letters; Business Reports - Kinds of Reports - Characteristics of Business Reports - Steps in Writing a Routine Business Report - Corporate Reports.

UNIT – IV : BUSINESS PRESENTATIONS AND PUBLIC SPEAKING

(10 periods)

Introduction - Business Presentations Speeches - Introduction to a presentation - Main Body - Conclusion - Effective Sales Presentations - Case Study; Group Discussions: Introduction - Work Place GD Guidelines - Functional and Non - functional Roles in Group Discussions; Team Presentations: Benefits of Team Presentations - Purpose of Team Presentations - Case Studies.

UNIT – V : CAREERS AND RESUME **(7 periods)**

Introduction - Career Building: Understanding Yourself - Setting a Career Goal - Resume Writing: Resume Formats; Interviews: Introduction - Fundamental Principles of Interviewing - General Preparation for an Interview - Success in an Interview - Types of Interviewing Questions - Important Non - verbal Aspects - Types of Interviews - Styles of Interviewing - Case Interviews.

Total Periods: 45

TEXT BOOK:

1. Meenakshi Raman and Prakash Singh, *Business Communication*, Oxford University Press, New Delhi, Second Edition, 2012.

REFERENCE BOOKS:

1. M K Sehgal and Vandana Khetarpal*, Business Communication*, Excel Books, New Delhi, 2011.
2. M Ashraf Rizvi, *Effective Technical Communication***,** Tata McGraw – Hill, 2009.

III- B. Tech. - I semester

14BT5HS01: MANAGERIAL ECONOMICS AND PRINCIPLES OF ACCOUNTANCY

(Common to ECE, EEE and EIE)

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

PRE-REQUISITE: Nil

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

COURSE OUTCOMES: After completion of the course the student 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.
- Using advanced tools like tally and SAP.
- Significance of Economics and Accountancy.

CO2. Develop skills in analyzing problems for
- Managerial decisions of an organization.
- Demand & Supply, Production & Cost and Markets & Price through Economic theories.

CO3. Develop effective communication in Business and Accounting transactions.

Detailed syllabus:

UNIT – I: INTRODUCTION TO MANAGERIAL ECONOMICS, DEMAND & SUPPLY ANALYSIS (9 Periods)

Definition, Nature and Scope of Managerial Economics. Demand**:** Determinants of demand – Demand function - Law of demand, assumptions and exceptions - Elasticity of demand – Types of elasticity of demand - Demand forecasting and methods of demand forecasting, supply**-** Determinants of Supply and Supply function.

UNIT – II: THEORY OF PRODUCTION AND COST ANALYSIS (9 Periods)

Production Function: Isoquants and Isocosts – Input-output relationship - Law of returns.

Cost Concepts: Total, Average and Marginal Cost **-** Fixed vs. Variable costs – Opportunity Costs Vs Outlay Costs – Separable Costs Vs Joint Costs, Urgent Costs Vs Postponable Costs - Avoidable Costs vs Unavoidable Costs.

Break Even Analysis (BEA)–Assumptions, Merits and demerits - Determination of Break Even Point (Simple problems).

UNIT – III: INTRODUCTION TO MARKETS AND PRICING **(9 Periods)**

Market Structure: Types of Markets - Features of perfect competition - Monopoly and monopolistic competition - Price and Output determination in perfect competition and monopoly.

Pricing: Objectives and policies of pricing – Sealed bid pricing - Marginal cost pricing - Cost plus pricing - Going rate pricing - Market penetration – Market skimming - Block pricing – Peak load pricing - Cross subsidization.

Capital: Significance - Types of capital – Sources of Capital.

UNIT – IV: INTRODUCTION AND PRINCIPLES OF ACCOUNTING **(9 Periods)**

Accountancy**:** Introduction – Concepts – Conventions – Accounting Principles - Double Entry Book Keeping – Journal – Ledger - Trial Balance (Simple problems).

UNIT – V: FINAL ACCOUNTS **(9 Periods)**

Introduction to Final Accounts - Trading account - Profit and Loss account and Balance Sheet with simple adjustments (Simple problems).

Computerization of Accounting System : Manual Accounting *Vs* Computerized Accounting – Advantages and Disadvantages of Computerized Accounting.

Total Periods: 45

TEXT BOOKS:

1. A.R. Aryasri, *Managerial Economics and Financial Analysis***,** Tata Mc Graw Hill, New Delhi, 3rd Edition, 2007.
2. R.Cauvery, U.K. Sudhanayak, M. Girija and R. Meenakshi, *Managerial Economics*, S. Chand and Company, New Delhi, 2nd Edition, 2010.

REFERENCE BOOKS:

1. Vershaney and Maheswari, *Managerial Economics,* Sultan Chand and Sons, New Delhi, 19th Edition, 2005.
2. H. Craig Petersen and W. Cris Levis, *Managerial Economics,* Pearson Education, 4th Edition, 2009.
3. Lipsy and Chrystel, *Economics,* Oxford University Press, New Delhi, 12th Edition, 2011.
4. S.P. Jain and K.L. Narang, *Financial Accounting*, Kalyani Publishers, Ludhiana, 6th Edition, 2002.

III B. Tech. - I Semester

14BT51001: ELECTRONIC INSTRUMENTATION

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

PRE-REQUISITES: Engineering Physics.

COURSE DESCRIPTION: Voltage and Current Measurement; Frequency and Time Measurement; Oscilloscope; Analyzers and Recorders; Display systems; Microprocessor based Instruments; Protection circuits for various instruments and Hazards free environment.

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

CO1. Demonstrate knowledge in
- Working Principle and operation of different instruments. used for Measurement of Analog & Digital values.
- The measurement of Frequency & Time.
- Usage and function of Oscilloscope, Analyzers and Recorders.
- Instrument using Microprocessor & Protection circuits.

CO2. Analyze and Identify Instruments and their suitability for different application.

CO3. Design and Implement of measurement setups.

Detailed Syllabus:

UNIT-I: ELECTRONIC INSTRUMENTS (9 Periods)

Analog voltmeter - AC voltmeter using rectifiers, true RMS Voltmeter, Considerations in choosing an analog voltmeter; Multimeter; Digital voltmeters: Ramp type, Dual Slope Integrating type DVM, Integrating type DVM, Staircase ramp DVM and successive approximation DVM; $3^1/_2$ Digit; Resolution and Sensitivity of Digital Meters.

UNIT-II: FREQUENCY AND TIME MEASUREMENTS (9 Periods)

Digital Frequency Meter - Basic Circuit, Time Base Selector, Start and Stop gate; Circuit for Measurement of Frequency; Simplified Composite Circuit for a Digital Frequency Meter; High Frequency Measurement, Frequency synthesizer; Period Measurement; Ratio and Multiple Ratio Measurements; Time Interval Measurements; Universal Counter Timer.

UNIT - III: OSCILLOSCOPES (10 Periods)

Introduction, Block diagram of CRO, Cathode Ray Tube – Electron Gun, Electrostatic Focusing, Electrostatic Deflection, Screen for CRTs; Time base Generator, Amplifiers – Horizontal and Vertical, Attenuators; Dual Trace Oscilloscopes; Dual Beam Oscilloscopes; Sampling Oscilloscope; Storage Oscilloscopes – Analog, Digital; CRO probes; Lissajous figures.

UNIT - IV: ANALYZERS AND RECORDERS (9 Periods)

Introduction, Wave analyzers - Frequency selective wave analyzer, Heterodyne wave analyzer; Harmonic Distortion Analyzers, Total Harmonic Distortion; Spectrum analyzers; Recorders - Strip Chart recorders, x-y recorders, Magnetic tape recorders, CD/DVD Recorders; Display devices: LED, LCD, Seven segment, Dotmatrix displays and display systems.

UNIT - V: PROTECTION CIRCUITS (8 Periods)

Grounding and Shielding: Introduction - concept of earth ground, examples of current return path symbols, shock hazard protection using Earth Ground, grounding considerations, basic grounding practices and examples. Practical guide lines for shielding and examples.

Total Periods: 45

TEXT BOOKS:

1. A.K.Sawhney, *A Course in Electrical and Electronics Measurements and Instrumentation*, Dhanpat Rai and Sons, New Delhi, 1995.
2. M.M.S.Anand., Electronic Instruments and Instrumentation Technology, PHI, 2005.

REFERENCE BOOKS:

1. Cooper W.D & Hlefrick A.D., *Electronic Instrumentation & Measurement Technique*, 3rd Edition, PHI, 1991.
2. H.S. Kalsi, *Electronic Instrumentation*, TMH, 2002.

III B. Tech. - I Semester

14BT51002: INDUSTRIAL INSTRUMENTATION - I

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

PRE-REQUISITE: Sensors and Transducers, Electrical Measurement, Electronic Instruments.

COURSE DESCRIPTION: Metrology; Measurement of physical quantities like Force, Weight, Torque, Power, Pressure, Velocity, Acceleration, Moisture, Viscosity, Density and Sound.

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

CO1. Demonstrate knowledge on science of measurement and measurement techniques.
CO2. Identify and formulate instruments to measure Physical parameters, like Torque, Pressure etc.,
CO3. Design and implement suitable setup using instruments to measure force, torque, pressure, speed, density and viscosity.

Detailed Syllabus:

UNIT - I: METROLOGY (8 Periods)
Measurement of Length - Calipers, Micrometer, Diameter - Keilpart Gage, Ball on wire, Telescopic Internal Gage, Angle - Bevel Protractor, sine Bar, Area – Graphical, Numerical methods, Planimeter (Mechanical), Comparators, Fundamental requirements of a Comparators, Comparator types – Mechanical comparators, Pneumatic comparators, Electrical comparators, Optical comparators.

UNIT - II: FORCE, TORQUE AND POWER MEASUREMENT (9 Periods)
Force Measurement: Analytical balance, Weighing systems and weighers balance, Spring Balance, Load cell types – Hydrostatic, Pneumatic, Magnetoelastic, Piezoelectric, Elastic. Torque Measurement: Load Cell method, Strain gauge method, Wiedmann Magentostrictive, Relative angular twist. Shaft Power Measurement: Electrical Type Dynamometer – Eddy current, Motor generator Dynamometer.

UNIT - III: PRESSURE MEASUREMENT (10 Periods)
Dead weight gauges, Manometer and its Type, Elastic transducers - Bourdon tube, Diaphragm, Bellows, Electrical Types – Resistive, Inductive and Capacitive, Force balance & Vibrating Cylinder, High pressure measurement

– Very high pressure transducer (Bulk modulus Gage), Low Pressure (Vacuum) measurement – McLeod Gage, Knudsen Gage, Momentum transfer gage, Thermal conductivity gage, Ionization gage. Sound level meter, Microphone.

UNIT - IV: VELOCITY & ACCELERATION MEASUREMENT (8 Periods)

Electromagnetic Type, Revolution counter, Tachometers – Capacitive type, Drag cup type, Tachogenerators - AC, DC, Stroboscope.

Acceleration Measurement: Reluctance type, Potentiometric type, Photo cell type, piezoelectric type, Null Balance, Gyroscopes & its types.

UNIT - V: HUMIDITY, DENSITY AND VISCOSITY MEASUREMENT (10 Periods)

Humidity: Psychrometer, hygrometer & Types, Dew point device.

Density: Introduction, Pressure head type, Displace type, Float type, Buoyancy effect densitometer method, Hot wire gas bridge type, Vibration type, Radioactive method.

Viscosity: Introduction, Friction tube viscometer, Saybolt's viscometer, Rotameter viscometer, Searle's rotating cylinder, Cone and Plate viscometer. Consistency meter – Rotating vane type and Oscillating type.

Total Periods: 45

TEXT BOOKS:

1. Patranabis.D, Principles of Industrial Instrumentation, TMH, 1997.
2. Doeblin E.O., Measurement Systems – Applications & Design, McGraw - Hill International, 4th Edition, 1990.

REFERENCE BOOKS:

1. *Bela G Liptak, Instrument Engineers Hand Book - Process Measurement and Analysis, 3rd Edition, Butterworth Heinemann.*
2. RK Jain, *Mechanical & Industrial Measurements*, Khanna Pub lishers, 1986.
3. A. K. Sawhney, *A Course in Electrical and Electronics Measurements and Instrumentation,* Dhanpat Rai and Sons, New Delhi, 1995.
4. Jon Wilson, *Sensor Technology Handbook,* 2004.

III B. Tech. - I Semester

14BT51003: LINEAR & DIGITAL IC APPLICATIONS

(Common to EEE and EIE)

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

PRE-REQUISITE: Semiconductor Devices & Circuits, Switching Theory & Logic Design

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 Verilog.

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

CO1. Demonstrate Knowledge on Op-Amp and its Characteristics, Digital logic families, programming in VERILOG.
CO2. Apply analytical skills to determine the op-amp parameters, logic of digital circuits.
CO3. Design Linear and nonlinear systems using op-amp, Digital circuits using logic families.
CO4. Develop skills for programming of digital circuits using VERILOG.

Detailed Syllabus:

UNIT – I: OPERATION AMPLIFIER (9 Periods)

Op-amp block diagram, Differential Amplifier, Level Translator, Output stage. Transfer Characteristics, IC 741 Op-Amp, Basic information of Op-Amp. Ideal & Practical Operational Amplifier - Inverting, non - Inverting & Difference Amplifier, Voltage follower.

DC Characteristics - Input Bias Current, Input Offset Current, Input Offset Voltage, Total Output Offset Voltage. AC Characteristics - Frequency Response, Frequency Compensation, Slew Rate. CMRR, PSRR& Thermal Drift.

UNIT – II: LINEAR & NON LINEAR APPLICATIONS, FILTERS (9 Periods)

Linear Applications - Integrator and differentiator, Instrumentation amplifier, AC amplifier, V to I, I to V converters.

Non - Linear Applications - Comparators & its applications, Log and Antilog amplifiers.

Filters: First - Order LPF, HPF, Butterworth Filters, Second Order LPF, HPF.

UNIT – III: IC 555 TIMER, PLL & CONVERTERS (9 Periods)

Introduction to 555 timer, functional diagram, monostable and astable operations and applications. PLL - introduction, block schematic, principles and description of individual blocks. Voltage Controlled Oscillator (IC 566). Applications of PLL – frequency multiplication, frequency translation.

D-A Converters: R-2R ladder & Inverted R-2R ladder. A-D converters: Flash type, Successive Approximation type and Dual slope ADC.

UNIT – IV: CMOS & BIPOLAR LOGIC (8 Periods)

Introduction to logic families, CMOS logic, CMOS steady state electrical behavior, CMOS dynamic electrical behavior. Bipolar Logic – TTL & ECL, Low voltage CMOS Logic & CMOS/TTL interfacing, Comparison of logic families.

UNIT – V: MODELING & DESIGN OF DIGITAL CIRCUITS USING VERILOG (10 Periods)

Introduction to Verilog: HDL based design flow, program structure, language elements, operators, User defined primitives, data flow modeling, behavioral modeling, structural modeling.

Design & Programming using Verilog: 74x283 adder, 74x151 multiplexer, 74x138 decoder, 74x148 encoder, Flip-flops- SR & JK, 74x163 Counter

Total Periods: 45

TEXTBOOKS:

1. D. Roy Chowdhury, *Linear Integrated Circuits*, 4th Edition, New Age International Pvt. Ltd., 2010.
2. John F. Wakerly, *Digital Design Principles & Practices*, 4th Edition, Pearson Education, Asia 2009.
3. T.R. Padmanabhan, B. Bala Tripura Sundari, Design through Verilog HDL, Wiley India, 2004.

REFERENCE BOOKS:

1. Ramakanth A. Gayakwad, *Op-Amps & Linear ICs*, 3rd Edition, PHI, 1987.
2. J. Bhasker, *VERILOG Primer*, 2nd Edition, BS Publications, 2001.
3. Stephen Brown, Zvonko Vranesic, *Fundamentals of Digital Logic with VERILOG Design*, 2nd Edition, TMH, 2007.

III B. Tech. – I Semester

14BT50202: COMPUTER ORGANIZATION AND ARCHITECTURE

(Common to EEE and EIE)

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

PRE-REQUISITES: Switching theory and logic design

COURSE DESCRIPTION: Basic structure of computers; register transfer language and micro operations; micro programmed control; memory system; architecture, programming and interfacing of 8085 microprocessor.

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

CO1. Demonstrate knowledge on

- Internal details of a computer.
- Various memories, their hierarchy and significance in a computer.
- Architecture, instruction set, addressing modes and in terfacing of 8085 microprocessor.

CO2. Critically analyze the requirements to meet the specifications.

CO3. Design and develop hardware to meet the requirements.

CO4. Exhibit programming skills to solve engineering problems.

Detailed Syllabus:

UNIT - I: BASIC STRUCTURE OF COMPUTERS AND COMPUTER ARTHMETIC (9 periods)

Basic structure of computers: Computer types, functional units, basic operational concept, bus structures, software, performance, multiprocessors and multicomputers.

Computer arithmetic: Addition, subtraction, multiplication and division algorithms.

UNIT - II: REGISTER TRANSFER AND MICROOPERATIONS (9 periods)

Register transfer language, register transfer, bus and memory transfers, arithmetic microoperations, logic microoperations, shift microoperations, arithmetic logic shift unit, instruction codes, computer registers, computer instructions, instruction cycle, Reduced Instruction Set computer.

UNIT - III: MICROPROGRAMMED CONTROL AND MEMORY SYSTEM (10 periods)

Microprogrammed Control: Control memory,address sequencing, design of control unit, hard wired control, microprogrammed control.

Memory System: Semiconductor RAM memories: Internal organization of memory chips, SRAM, DRAM. Read-only memories, cache memory: mapping functions, replacement algorithms.Performance considerations, virtual memory.

UNIT - IV: 8085 ARCHITECTURE (9 periods)

Microprocessor evolution and types, introduction to 8085 architecture, pin description, register organization, timing diagram – T-state, Machine cycle, instruction cycle, instruction set – data transfer, arithmetic and logic, branch control, I/O and machine control instructions, addressing modes.

UNIT - V: PROGRAMMING, INTERRUPTS AND INTERFACING (8 periods)

Simple programs, interrupts of 8085 – types, response, enabling and disabling, interfacing – memory, I/O devices - memory mapped I/O and I/O mapped I/O.

Total Periods: 45

TEXT BOOKS:

1. M.Moris Mano, *Computer System Architecture*, Pearson Education, 3rd edition, 2006.
2. Ramesh S Goankar, *Microprocessor – Architecture, Programming and Applications with the 8085*, 5th edition, Penram International Publishing Private Limited.

REFERENCE BOOK:

1. V.Carl Hamacher, Zvonko G. Varanesic and Safat G. Zaky, *Computer Organization*, 6th edition, McGraw - Hill.

III B. Tech. – I Semester

14BT60401: DIGITAL SIGNAL PROCESSING

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

PRE-REQUISITES: 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; Multirate systems and some of the Signal processing applications.

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

CO1. Demonstrate knowledge in
- Digital signals, sequences and systems.
- DFT and FFT transforms.
- Analog & Digital Filters Design.
- Digital Filters Realization.
- DSP Processors.

CO2. Perform Frequency analysis of discrete time signals in suppressing unnecessary frequency components.

CO3. Design and develop digital filters to optimize system performance and their realization.

CO4. Solve problems in processing of signals through digital systems and applying them in signal processing.

Detailed Syllabus:

UNIT - I: INTRODUCTION TO DIGITAL SIGNAL PROCESSING **(10 periods)**

Review of Discrete - time signals, systems and their classification. Discrete - Time systems described by difference equations.

Frequency analysis of Discrete - Time signals:
Fourier series for DT periodic signal and power density spectrum, the Fourier transform of DT aperiodic signals and energy density spectrum, convergence of Fourier transforms. Review of Z - transform, Applications, solution for difference equations of digital filters.

UNIT - II: DISCRETE AND FAST FOURIER TRANSFORMS **(9 periods)**

DFS representation of periodic sequences, properties of Discrete Fourier Series.

Discrete Fourier Transforms (DFT): Properties of DFT, linear filtering methods based on DFT, Relationship of FT to Z - Transform, frequency analysis of signals using DFT.
Fast Fourier transforms (FFT): Radix-2 Decimation in time (DIT) and Decimation in frequency (DIF) FFT algorithms, Inverse FFT.

UNIT - III: IIR DIGITAL FILTERS (8 periods)
Design of IIR digital filters from analog filters - IIR filter design by approximation of derivatives, impulse invariance and bilinear transformation. Characteristics of commonly used analog filters, Frequency transformations. Structural realization of IIR systems - direct, cascade and parallel form structures, Transposed form.

UNIT - IV: FIR DIGITAL FILTERS (8 periods)
Symmetric and anti-symmetric FIR filters, Design of linear phase FIR digital filters using windowing techniques, Frequency sampling technique, Comparison of IIR and FIR filters. Structural realization of FIR filters - direct form, cascade form structures and linear phase structures.

UNIT - V: INTRODUCTION TO DSP PROCESSORS (10 periods)
Introduction to programmable DSPs: Multiplier and Multiplier Accumulator (MAC), Modified Bus Structures and Memory Access schemes in P - DSPs, Multiple access memory, multiported memory, VLIW Architecture, Pipelining, Special addressing modes, On-Chip Peripherals.
Architecture of TMS 320C6X: Introduction, Features of C6X Processors, Internal Architecture, CPU, General-Purpose Register Files, Functional Units and Operation, Data Paths , Control Register File.

Total Periods: 45

TEXT BOOKS:

1. John G. Proakis, Dimitris G. Manolakis, *Digital Signal Processing, Principles, Algorithms and Applications*, Pearson Education/PHI, 4th edition, 2007.
2. Alan.V. Oppenheim, Ronald.W. Schafer, John R Buck, *Discrete Time Signal Processing*, Prentice Hall, 2nd edition, 2006.
3. B.Venkataramani, M. Bhaskar, *Digital Signal Processors – Architecture, Programming and Applications,*, TATA McGraw - Hill, 2nd edition, 2010.

REFERENCE BOOK:

1. Tarun Kumar Rawat, *Digital Signal Processing*, Oxford University Press, 2015.

III B. Tech. - I Semester

14BT51021: LINEAR & DIGITAL IC APPLICATIONS LAB

Int.Marks	Ext. Marks	Total Marks	L	T	P	C
25	50	75	-	-	3	2

PRE-REQUISITE: Linear & Digital IC Applications

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 VHDL.

COURSE OUTCOMES: After completion of course the students will be able to:

CO1. Apply analytical skills to determine the op-amp parameters.

CO2. Design Linear & Nonlinear applications of op-amps, Digital circuits using logic families.

CO3. Develop skills for programming and simulation of digital circuits using VHDL.

LIST OF EXPERIMENTS:

(Minimum of eleven experiments to be conducted)

PART – A: Linear IC's (Minimum of 5 experiments to be done)

1. Op-Amp based comparator & Schmitt Trigger.
2. Op-Amp applications – (integrator / differentiator).
3. Applications of 555 timer (Monostable / Astable Multivibrator).
4. Design of I to V and V to I converter.
5. IC 566 – VCO.
6. Design of active filter (LPF / HPF).
7. D-A converter(R-2R ladder).

PART: B (Minimum of 5 experiments to be done)

Simulate the internal structure of the following Digital IC's using Verilog

1. Adder and Subtractor – Structural, Data flow and behavioral.
2. Decoder & encoder.
3. Multiplexer.
4. J-K, T, D Flip-flops
5. 4-Bit shift register – Right / Left.
6. Mod Counter.

III B. Tech. - I Semester

14BT51022: SIGNAL PROCESSING LAB

Int.Marks	Ext. Marks	Total Marks	L	T	P	C
25	50	75	-	-	3	2

PRE-REQUISITE: Signals and Systems

COURSE DESCRIPTION: Basics of MATLAB programming; Operations on Signals & sequences; Convolution and correlation; Pole-zero mapping; Power Spectral Density; Filter designing; Real-time signal processing using DSP processor kits.

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

CO1. Demonstrate fundamental Knowledge in simulation of basic concepts and algorithms such as convolution, Correlation, DFT,FFT and Sampling rate conversion in signal processing.

CO2. Design and simulation of filters such as IIR and FIR.

CO3. Use

- MATLAB Toolboxes to solve the complex engineering problems in the domain of Signal processing.
- DSP Processor kit to implement algorithms like FFT.

LIST OF EXPERIMENTS:

(Minimum of eleven experiments to be conducted)

1. Generation of Various signals and Sequences (Periodic and Aperiodic), Such as Unit Impulse, Unit Step, Square, Sawtooth, Sinusoidal, Ramp, Sinc function.
2. Operations on Signals and Sequences such as Addition, Multiplication, Scaling, Shifting, Folding.
3. Convolution and correlation of signals and sequences.

4. Verification of Sampling Theorem.
5. Locating the zeros and poles and plotting the pole zero maps in s-plane and z-plane for the given transfer function.
6. Generation of Gaussian Noise (real and complex), computation of its mean, M.S.Value and its skew, kurtosis, and PSD, Probability Distribution Function.
7. Implement N-point DFT & IDFT.
8. Design of FIR filter (LPF, HPF & BPF) using windowing method.
9. Design of Butterworth filter (LPF, HPF & BPF).
10. Design of Chebyshev filter (LPF, HPF & BPF).
11. Design of IIR filter (LPF, HPF & BPF / Bilinear Transformation and Impulse Invariant Transformation).
12. Sampling rate conversion of any given arbitrary sequence.
13. To study the architecture of DSP chips – TMS 320C 5X/6X Instructions.
14. To verify N-point FFT algorithm on DSP Processors.

III B. Tech. – II Semester

14BT5HS02: MANAGEMENT SCIENCE

(Common to EEE and EIE)

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

PRE-REQUISITES: -NIL-

COURSE DESCRIPTION: Concepts of Management, Evolution of thought of Management, Functions of Management, Environmental Scanning, SWOT analysis, Social Responsibility of Management, Operations Management, Forecasting Methods, Work study, Method Study, Work measurement, Statistical Quality Control, Inventory Management, Marketing, Marketing functions, Human Resource Management, Job evaluation, merit rating, Theories of motivation, Project Management, CPM, PERT, Project cost analysis, Project crashing, Entrepreneurship, Entrepreneur vs Manager, Contemporary Management practices, Just-in-time, Enterprise Resource Planning, Business Process Outsourcing, Intellectual property rights and Supply chain management.

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

CO1. Employ fundamental knowledge on 'Management Thought' and ' Management of a business organization'.
CO2. Apply various Managerial concepts & contexts to attain 'Optimum Utilization of available organizational resources'.
CO3. Contribute to the group, as an individual, in accomplishing the stated objective of the business organization.
CO4. Apply gained knowledge on Management to establish and run his/her own organization, if he/she deserve to be an 'Entrepreneur'.
CO5. Imbibe contemporary practices in applying Management and exercise discernment in implementing managerial decisions for ethical, safe, and sustainable operations of the business

Detailed Syllabus:

UNIT – I: INTRODUCTION TO MANAGEMENT AND ORGANIZATION (9 Periods)

Concepts of management and organization - Nature and Importance of management - Evolution of management thought - Functions of management - Contributions of F.W. Taylor and Henri Fayol to the management - Systems approach to management - Managerial skills -- Elements of corporate planning process - Environmental scanning - SWOT

Analysis - Social responsibilities of management. Basic concepts related to organization- Objectives, Procedure and Principles; Types of organizations – Merits, demerits and adoptability to modern firms.

UNIT – II: OPERATIONS MANAGEMENT (12 Periods)

Principles and types of plant layout - Methods of production - Forecasting - Forecasting methods - Work study - Basic procedure involved in method study and work measurement - Statistical quality control: Factors affecting quality - Quality control using control charts (simple problems) - Acceptance sampling. Materials management objectives; Inventory - Types of inventory – Classical EOQ model - - ABC analysis - Purchase procedure - Stores management.

Marketing: Functions of marketing - Marketing mix - Channels of distribution.

UNIT – III: HUMAN RESOURCES MANAGEMENT(HRM) (6 Periods)

Nature and scope of HRM - Functions of HRM - Role of HR Manager in an organization, Job evaluation and merit rating - Maslow's theory of human needs - McGregor's theory X and theory Y - Herzberg's two-factor theory.

UNIT – IV: PROJECT MANAGEMENT (PERT/CPM) AND ENTREPRENEURSHIP (9 Periods)

Network analysis - Program evaluation and review technique (PERT) - Critical path method (CPM) - Probability of completing the project within given time - Project cost analysis - Project crashing.

Introduction to entrepreneurship - Entrepreneurial traits - Entrepreneur vs. manager - Role of entrepreneurship in economic development - Women as an entrepreneur.

UNIT – V: CONTEMPORARY MANAGEMENT PRACTICES (9 Periods)

Basic concepts of Just-In-Time (JIT) system - Total quality management (TQM) - Value chain analysis - Enterprise resource planning (ERP) - Business process outsourcing (BPO) – Globalization-Management challenges - Intellectual property rights - Supply chain management - Role of information technology in managerial decision making.

Total Periods: 45

TEXT BOOKS:

1. O.P. Khanna, *Industrial Engineering and Management,* Dhanpat Rai and Sons, 2010.
2. Stoner, Freeman and Gilbert, *Management,* 6th Edition, Pearson Education, New Delhi, 2005.

REFERENCE BOOKS:

1. Kotler Philip and Keller Kevin Lane, *Marketing Mangement,* 12th Edition, PHI, New Delhi, 2007.
2. Koontz and Weihrich, *Essentials of Management,* 6th Edition, TMH, New Delhi, 2007.
3. N.D. Vohra, *Quantitative Techniques in Management,* 2nd Edition, TMH, New Delhi.
4. Heinz Weihrich and Harold Koontz*, Management- A Global Perspective,* 10th Edition, McGraw-Hill International.

III B. Tech. - II Semester

14BT61001: INDUSTRIAL INSTRUMENTATION - II

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

PRE-REQUISITE: Sensors and Transducers, Principles of Electrical Measurements, Electronic Instruments and Industrial Instrumentation - I

COURSE DESCRIPTION: Instruments used to measure Temperature, Flow, Level and Environmental pollution. Designing of signal conditioning circuits; Electrical and intrinsic safety.

COURSE OUTCOME: After completion of the course the student will be able to

CO1. Demonstrate knowledge on measurement techniques for measurement of Temperature, Flow, Level and environmental pollution.
CO2. Identify and analyse suitable instrument for measurement of Temperature, Flow and Level.
CO3. Design suitable signal conditioning circuits for measuring instruments.

Detailed Syllabus:

UNIT - I: TEMPERATURE MEASUREMENT (9 periods)
Definition, Temperature measurement using change in physical properties – Solid expansion type, Fluid expansion type (Filled-in system), Electrical types – RTD, Thermistors, Thermo-emf thermometry – Laws, Thermoelectric characteristics of thermocouple, Processing and preparation, Cold junction Compensation, thermopiles, Radiation thermometry – Total radiation type, Optical Pyrometers. IC Temperature Sensor.

UNIT – II: FLOW MEASUREMENT (10 periods)
Introduction, Head types – Orifice, Venturi, Flow Nozzle, Dahl Tube, Pitot tube, Area Flow meter - Rotameter & types, Mass flow meters - Turbine Mass flow meter, Coriolis flow meter, Gyroscopic flow meter, Liquid bridge mass flow meter, Calorimetric flow meter. Positive Displacement type flow meters - Nutating Disc, Rotary Vane, Lobed Impeller, Reciprocating Piston type, Fluted Rotor.Electrical type flow meter – Turbo magnetic flow meter Electromagnetic flow meter, Ultrasonic flow meter, Hotwire anemometer type, Vertex Shedding type.

UNIT – III: LEVEL MEASUREMENT (8 periods)

Introduction, Gauge Glass technique, Float Types – Float–and– tape method, Float–and–shaft method, Magnetic float types. Displacer types, Hydrostatic types – Air-Purge type, Bubbler type. Thermal effect types, Electrical types – Resistance switch type, Inductive level gauge and Capacitance type level gauge. Ultrasonic Methods, bellow element type level transmitters, Fibre - optic type.

UNIT – IV: SIGNAL CONDITIONING (9 periods)

Measurement of Resistance, Voltage Dividers, Wheatstone Bridge: Balance and Deflection Measurements, Measurement of capacitance – Problems and Alternatives, AC Bridge – Sensitivity and Linearity, capacitive bridge analog linearization, electrostatic and driven shields, Chopper amplifier, auto zero amplifier, composite amplifier, charge amplifier.

UNIT – V: ENVIRONMENTAL POLLUTION INSTRUMENTS & SAFETY (9 periods)

Proximity sensors & limit switches: Proximity Sensors - Capacitive, Inductive, Magnetic, Hall-Effect, LVDT. Limit switches – Mechanical, Optical, Pneumatic, Ultrasonic, Digital outputs & Encoders.

Leak Detectors: Pressurization or Hydrostatic Tests, Bubble emissions paints & Dies, Combustible or toxic leaks, Ultrasonic Leak detectors, Thermal conductivity leak detectors, Halogen Leak detectors, Underground leakage detection.

Electrical & Intrinsic Safety: NEMA types, Fuses & Circuit breakers, Explosion hazards & intrinsic safety – Protection methods, Purging, pressurization, ventilation.

Total Periods: 45

TEXT BOOKS:

1. Patranabis.D, Principles of *Industrial Instrumentation*, TMH, 1997.
2. Ramon Pallás, Areny, John G. Webster, *Sensors and Signal Conditioning,* John Wiley and Sons, 2nd Edition 2000.

REFERENCE BOOKS:

1. Bela G Liptak, *Instrument Engineers Hand Book - Process Measurement and Analysis,* Butterworth Heinemann, 3rd Edition, .
2. RK Jain, *Mechanical & Industrial Measurements*, Khanna Publishers, 1986.
3. Doeblin E.O, *Measurement Systems – Applications & Design*, McGraw Hill International, 4th Edition, 1990.

III B. Tech. - II Semester

14BT61002: PROCESS CONTROL INSTRUMENTATION

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

PRE-REQUISITES: 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 and case studies.

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

CO1. Demonstrate knowledge about

- Mathematical modeling of different processes.
- Tuning of controllers for different processes.
- Selection of control valves for different processes.
- Different unit operations.
- Multi loop control.

CO2. Design and analyze the response of controllers for different processes.

Detailed Syllabus:

UNIT - I: PROCESS DYNAMICS AND P&ID SYMBOLS (9 periods)
Elements of process control, Process variables, Degree of freedom, Characteristics of electric system, liquid system, gas system and thermal system, Elements of process dynamics, Mathematical model of liquid process, gas process and thermal processes, Batch process and continuous process, Self regulation; Piping and Instrumentation Diagram symbols: Connecting lines, General instruments or functions, Actuator and process elements.

UNIT - II: CONTROL SCHEMES AND CONTROLLERS (9 periods)
Discontinuous controller modes: Two position, Multiposition, Floating control modes; Continuous controller modes: Proportional, Integral, Derivative; Composite controller modes:P - I, P - D, P - I - D; Electronic controllers: Design of discontinuous, continuous and composite controller modes. Pneumatic PID controller (displacement and force type), Hydraulic PI controller.

UNIT – III: CONTROLLER TUNING (9 periods)

One - Quarter decay ratio criteria, Time integral performance criteria, Process loop tuning: open-loop transient response method, Ziegler - Nichol's method, Cohen - Coon method, Direct synthesis method, Frequency response method.

UNIT - IV: FINAL CONTROL ELEMENTS (9 periods)

Pneumatic actuators, Hydraulic actuators, Electro pneumatic actuators, Electric motor actuators, Control valves: Types of control valves and its characteristics, Sliding - stem control valves, Rotating - shaft control valves, Selection of control valves, Control - valve sizing, Pneumatic valve positioner.

UNIT - V: COMPLEX CONTROL SCHEMES (9 periods)

Cascade control, Ratio control, Feed forward control, Over-ride, split range and selective control; Selected unit operations: Mixing, evaporation, drying, heat exchanger; Case study of control schemes of distillation column: constant top product, constant bottom product and reflux rate, constant reflux rate and steam rate.

Total Periods: 45

TEXT BOOKS:

1. Donald P. Eckman, *Automatic Process Control*, Wiley Eastern Ltd., 1993.
2. Curtis D. Johnson, *Process Control Instrumentation Technology*, Pearson Education, NewDelhi, 7th Edition, 2002.

REFERENCE BOOKS:

1. Jens G.Balchen & Kenneth I.Mumme, *Process Control,* VanNostrand Reinhold Company, New York.
2. Patranabis, *Principles of Process Control*,TMH., 1981.
3. Peter Harriot, *Process Control*, TMH.
4. G.Stephanopoulis, *Chemical Process Control,* Prentice Hall.,1990.

III B. Tech. – II Semester

14BT60201: MICROPROCESSORS AND MICROCONTROLLERS

(Common to EEE, ECE and EIE)

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

PRE-REQUISITES: Computer Organization and Architecture.

COURSE DESCRIPTION: Architecture, Instruction set and programming of 8086; Programmable interfacing devices: 8255, 8251, 8259, 8257 – their architecture and programming; Interfacing Memory and I/O devices with 8086; Architecture, programming, interrupts, and applications of 8051 Microcontroller.

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

CO1. Demonstrate potential 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.

CO3. Design suitable interfaces for real time applications.

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

Detailed Syllabus:

UNIT - I: 8086 ARCHITECTURE AND PROGRAMMING (10 periods)
Microprocessor Evolution and types, 8086 internal Architecture - register organization, memory segmentation, memory organization. Introduction to programming the 8086 - Assembler directives, addressing modes, instruction set, simple programs, procedures and macros.

UNIT - II: 8086 INTERFACING AND INTERRUPTS (8 periods)
Pin description, minimum & maximum mode operation of 8086, timing diagram. Interfacing memory (RAM and EPROM) to 8086. 8086 Interrupts - types and interrupt responses, Interrupt vector table, priority of interrupts. 8259 priority interrupt controller - architecture, system connections and cascading, initialization of 8259.

UNIT - III: PROGRAMMABLE DATA COMMUNICATION DEVICES
(11 periods)

Introduction to serial and parallel communication, methods of parallel data transfer. 8255 PPI - internal architecture and system connections, operational modes and initialization, interfacing stepper motor, ADC, DAC. Methods of serial data transfer, 8251 USART - architecture and its initialization, sending and receiving characters. Serial communication standard RS 232C, USB. Architecture and operation of 8257 DMA controller.

UNIT - IV: 8051 MICROCONTROLLER AND PROGRAMMING
(8 periods)

Microcontroller Vs general purpose microprocessor. 8051 / 8052 Microcontroller – architecture, features, register organization, pin diagram, internal and external memories & their interfacing, instruction set, addressing modes, simple programs.

UNIT - V: 8051 INTERFACING **(8 periods)**

Timer / Counters – Registers, modes and programming. Serial communication – registers, programming 8051 for serial communication. Interrupts – registers, programming. 8051 applications – Interfacing key board, LEDs and LCD.

Total Periods: 45

TEXT BOOKS:

1. Douglas V. Hall, *Microprocessors and Interfacing: Programming and Hardware*, Tata McGraw-Hill, Revised 2nd edition, 2006.
2. Mazidi and Mazidi, *The 8051 Microcontroller and Embedded Systems*, Prentice Hall of India, 2000.

REFERENCE BOOKS:

1. A.K. Ray and K.M. Bhurchandi, *Advanced Microprocessors and Peripherals- Architecture, Programming and Interfacing*, Tata McGraw Hill, 2002 reprint.
2. Yu-cheng Liu, Glenn A. Gibson, *Microcomputer systems: The 8086 / 8088 Family architecture, Programming and Design*, Prentice Hall of India, 2006.

III B. Tech. – II Semester

14BT60431: PRINCIPLES OF COMMUNICATION

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

PRE-REQUISITES: Signals and Systems

COURSE DESCRIPTION: Fundamentals of Communications; Analog and digital communications - modulation and Demodulation Techniques; Information theory and coding.

COURSE OUTCOMES: After completion of the course the student 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 modulations and calculate total power & bandwidth in the modulated wave.

CO3. Design and develop modulators and demodulators for communication systems.

CO4. Solve engineering problems for feasible and optimal solutions in the core area of Analog and Digital Communication Systems .

Detailed Syllabus:

UNIT - I: INTRODUCTION (8 periods)

Block diagram of Electrical Communication System, Types of Communications, Analog, Pulse and Digital types of Signals, Fourier Transform for various Signals, Fourier Spectrum, Power Spectral Density, Autocorrelation, Cross Correlation, and Convolution.

UNIT - II: ANALOG MODULATION TECHNIQUES (11 periods)

Need for Modulation, Types of Amplitude Modulation, AM, DSBSC, SSBSC, Power and BW requirements, generation of AM, DSBSC, SSBSC, Demodulation of AM: Diode detector, Product demodulation for DSBSC & SSBSC. Frequency & Phase Modulations, Advantages of FM over AM, Bandwidth consideration, Narrowband and Wideband FM, generation and demodulation of FM, Comparison of FM & PM.

UNIT - III: PULSE MODULATIONS (8 periods)
Sampling, Nyquist Rate of Sampling, Sampling theorem for Band limited Signals, PAM, Regeneration of Base band Signal, PWM and PPM, Time Division Multiplexing, Frequency Division Multiplexing, Asynchronous Multiplexing.

UNIT - IV: DIGITAL TRANSMISSION (10 periods)
Pulse Code Modulation: Advantages, Block diagram of PCM, Quantization, effect of Quantization, Quantization error, DM, ADM and Comparison.

Digital Modulation: ASK, FSK, PSK, QPSK, DPSK, Modulation and Demodulation, Coherent and Incoherent, Modems.

UNIT - V: INFORMATION THEORY AND CODING (8 periods)
Concept of Information, Entropy and Rate of Information, Coding efficiency, Shannon-Fano and Huffman Coding, Error Control Coding, Error Detection and Correction Codes, Block Codes, Convolutional Codes.

Total Periods: 45

TEXT BOOKS:

1. R.P. Singh and S D Sapre, *Communication Systems - Analog and Digital,* TMH, 2nd Edition 2007.
2. Simon Haykin, *Communication Systems,* John Wiley, 2nd Edition 2007.

REFERENCE BOOKS:

1. H. Taub and D. Schilling, *Principles of Communication Systems,* TMH, 2nd Edition, 1991.
2. Sam Shanmugam, *Digital and Analog Communication Systems*, John Wiley, 2006.

III B. Tech. – II Semester

14BT70304: INDUSTRIAL AUTOMATION AND ROBOTICS

(PROFESSIONAL ELECTIVE - I)

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

PRE-REQUISITES: Matrices and Numerical Methods, Engineering Mechanics, Kinematics of Machinery, Dynamics of Machinery.

COURSE DESCRIPTION: Integration of robots and CNC machines into manufacturing cells; motion control devices, such as actuators and sensors, conveyors and part feeder mechanisms; use of automation equipment in manufacturing. Integration of automation equipment such as PLCs, motion control devices.

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

CO1. Select suitable sensors and actuators for automating the operations in a given industry using simple automation schemes.
CO2. Calculate the forward kinematics, inverse kinematics, for a 3R manipulator and path planning of serial and parallel robot.
CO3. Propose preliminary designs for automating simple machining operations, pick and place operations, conveyor operations etc.
CO4. Use appropriate software for implementing automation schemes using robot programming languages.

Detailed syllabus:

UNIT – I: INTRODUCTION TO AUTOMATION (8 Periods)
Automation, need, types, Basic elements of an automated system, levels of automation, Part transfer methods and mechanisms, Types of flow lines, Flow line with / without buffer storage. Assembly process and systems assembly line, Line balancing methods, Flexible assembly lines.

UNIT – II: INTRODUCTION TO INDUSTRIAL ROBOTS (9 Periods)
Robots, Brief History, Types of Robots, classification , robot configurations, joint notation schemes, work volume, Degrees of freedom, Components, Common types of arms , joints, Grippers, Drives, pneumatic, hydraulic, Electric, comparison.

UNIT – III: MANIPULATOR KINEMATICS & DYNAMICS

(11 Periods)

Mathematical Preliminaries on Vectors & Matrices. Homogeneous transformations as applicable to rotation and translation, (D-H) notation. Forward kinematics, inverse kinematics, Manipulators with two, three degrees of freedom.

Manipulator dynamics; Introduction, Inertia of a Link, Lagrangian formulation for a planar 2R manipulator.

UNIT – IV: TRAJECTORY PLANNING (9 Periods)

Trajectory planning and avoidance of obstacles, path planning, skew motion, joint integrated motion, and straight line motion.

Sensors: position sensors, potentiometers, resolvers encoders, velocity sensors, tactile sensors, proximity sensors, machine vision sensors, fail safe hazard sensor systems, and compliance mechanism.

UNIT – V: ROBOT PROGRAMMING & ROBOT APPLICATION

(8 Periods)

Robot programming, types, features of languages and software packages, Robot application in industry, Task programming, Goals of AI Research, AI techniques, Robot intelligence and task planning, modern robots, future Application and challenges and case studies.

Total Periods : 45

TEXT BOOKS:

1. M.P. Groover, *Industrial Robotics*, McGraw - Hill Education (India) Private Limited, 2nd Edition, 2008.
2. S.R.Deb / S.Deb, *Robotics Technology & Flexible Automation*, McGraw Hill Education (India) Private Limited, 2nd Edition, 2009.

REFERENCE BOOKS:

1. Mikell P. Groover, *Automation, Production Systems and CIM*, Prentice-Hall of India Pvt. Ltd, 3rd Edition, 2008.
2. Mittal R.K & Nagrath IJ, *Robotics and Control*, TMH, 2003.
3. K. S. Fu., R. C. Gonzalez, C. S. G. Lee, *Robotics: Control Sensing, Vision and Intelligence* International Edition, McGraw - Hill Book Co, 2008.
4. Ashitave Ghosal, *Robotics, Fundamental Concepts and analysis*, Oxford Press, 2006.
5. John. J. Craig, *Introduction to Robotics*, Pearson India, 3rd Edition, 2008.

III - B.Tech. - II Semester

14BT61021: PROCESS CONTROL LAB

Int.Marks	Ext. Marks	Total Marks	L	T	P	C
25	50	75	-	-	3	2

PRE-REQUISITES: Process Control Instrumentation.

COURSE DESCRIPTION: Tuning methods, Characteristics of control valve, Response of controllers for different processes like flow, temperature, level etc.

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

CO1. Analyze the characteristics of control valve and evaluate the performance of controllers for different process like flow, temperature, level etc.

CO2. Tune the controller parameters using various tuning methods

LIST OF EXPERIMENTS:

PART A : Only for viva-voce examination

LabVIEW practice (2 lab sessions)

1. Study of Functional blocks in LabVIEW.
2. Creation of Arrays and Loops in LabVIEW.

PART B : Minimum 10 experiments to be conducted

1. Response of Interacting Systems using LabVIEW.
2. Response of Non-interacting Systems using LabVIEW.
3. Response of Level Process using LabVIEW.
4. Response of Pressure Process using LabVIEW.
5. Response of flow process using LabVIEW.
6. Multi loop control systems – Ratio Control using LabVIEW.
7. Multi loop control systems – Cascade Control using LabVIEW.
8. Response of Temperature Process.
9. Current to pressure converter.
10. Realization of control actions: Electronic controllers.
11. Control valve characteristics.
12. Process tuning – Process reaction curve method.
13. Process tuning – continuous oscillation method.

III B. Tech. - II Semester
14BT60222: MICROPROCESSORS AND MICROCONTROLLERS LAB

(Common to EEE, ECE & EIE)

Int.Marks	Ext. Marks	Total Marks	L	T	P	C
25	50	75	-	-	3	2

PRE-REQUISITES: 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: After completion of the course the student will be able to

CO1. Analyze various programming alternatives & interfacing methods to build a typical microcomputer based system.

CO2. Design and develop microcomputer based system to solve various problems.

LIST OF EXPERIMENTS:
Any **TWELVE** experiments to be conducted.

I Programs using 8086

1. Introduction to MASM/TASM.
2. Arithmetic operations
3. Logic operations
4. String operations
5. Modular program: use procedure

II Interfacing with 8086

1. Stepper motor
2. Logic controller
3. A/D converter
4. Seven segment display
5. Keyboard interfacing

III Programs using 8051

1. Arithmetic operations
2. Addition operation using external memory.
3. Programs using special instructions like SWAP, bit/byte, set/ reset etc.

IV Interfacing with 8051

1. Stepper Motor
2. Digital to Analog Converter
3. Square wave generation using Timers in Mode 0 and Mode 1.

IV B. Tech. - I Semester

14BT71001:ANALYTICAL INSTRUMENTATION

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

PRE-REQUISITES: Electronic Instrumentation, Engineering chemistry.

COURSE DESCRIPTION: Different type of Gas analyzers; dissolved component analyzers; spectrophotometers and nuclear radiation detectors.

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

CO1. Demonstrate knowledge in analysing the characteristics of pH meters, dissolved Component analysers, gas analysers, radiation detectors, different chromatography Techniques and different Spectrometers with different excitations.

CO2. Identify and apply suitable analytical instrument for analysis of a sample.

CO3. Compound Analysis of different chemical solutions using Spectrophotometer and Chromotography.

Detailed Syllabus:

UNIT - I: pH , CONDUCTIVITY & DISSOLVED COMPONENT ANALYZER (10 Periods)

Classification of Analyzers; Conductivity meters: measurement of conductance, conductivity cell, temperature compensation and high frequency method; pH meters: Hydrogen electrodes, glass electrodes, reference electrodes, and combinational electrodes, null detector type pH meters, Direct type pH meters, Industrial pH meters; Dissolved oxygen analyzer; sodium analyzer; silica analyzer and sampling systems.

UNIT - II: GAS ANALYZERS (8 Periods)

Thermal conductivity type; Paramagnetic oxygen analyser; hydrogen analyser; CO monitor; NO_x analyser; H_2S analyser system; pollution monitoring instruments: sulphur dioxide, hydrocarbons estimation and sampling systems.

UNIT - III: CHROMATOGRAPHY **(8 Periods)**

Introduction, Gas chromatography: Principle, detection systems: Flame ionization detector, Argon ionization detector, Electron capture detector, Photo ionization detector; applications. Liquid chromatography: Principle, detection system: Fluorescence detector, Refractive index detector, thermal detector, mass detector; applications.

UNIT - IV: SPECTROPHOTOMETERS **(11 Periods)**

Special methods of analysis, Beer - Lambert law, colorimeters, UV - VIS spectrophotometers: single and double beam instruments, sources and detectors. FTIR spectrophotometer, atomic absorption spectrophotometer, atomic emission spectrophotometer, flame photometers.

UNIT - V : RADIATION DETECTORS AND NMR SPECTROSCOPY

(8 Periods)

Generation and characteristics of nuclear radiations, Detectors: ionization chamber, proportional counter, GM counters, scintillation counter; Principle associated with NMR spectrometer, types. Mass spectrometer: Magnetic deflection, Time of Flight, Radio frequency, Quadruple.

Total Periods: 45

TEXT BOOKS:

1. R.S. Khandpur, Handbook of Analytical Instruments, TMH, 2nd Edition, 2006.
2. Jain R.K., Mechanical and Industrial Measurements, Khanna Publishing, New Delhi, 10th Edition, 1992.

REFERENCE BOOKS:

1. WillardH.H., MerritL.L., DeanJ.A.. and SeattleF.L., Instrumental Methods of Analysis, CBS Publishing and Distributors, 7th Edition 1995.
2. Skoog D.A. and Holler.F.J, Principles of Instrumental Analysis, Holt Sounder Publication, Philadelphia, 1985.

IV B. Tech. - I Semester

14BT71002: BIOMEDICAL INSTRUMENTATION

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

PRE-REQUISITE: Sensors and Transducers, Electronic Instrumentation.

COURSE DESCRIPTION: Human Anatomy & Physiology; Bio - signals; Cardiovascular and Neuro - muscular Instrumentation; Therapeutic Equipment; Advanced Imaging techniques.

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

CO1. Demonstrate knowledge on human anotomy and physiology, ECG, EMG and EEG measuring systems, Medical imaging and therapeutic equipment.

CO2. Identify the suitable electrode for specific application.

CO3. Apply skills to analyze the performance of Bio - signals and also the internal structure of the instruments.

Detailed Syllabus:

UNIT – I: BIO ELECTRIC POTENTIALS AND ELECTRODES (10 periods)

Structure of cell, Resting and Action Potentials, Propagation of Action Potentials, Propagation of action potentials nerve to neuro - muscular junction, sources of Bioelectric Potentials, Electrode theory: Bio potential electrodes, Bio chemical transducers; Problems encountered in measuring a living system.

UNIT – II: CARDIOVASCULAR INSTRUMENTATION (10 periods)

Physiology of cardiovascular system, electrical conduction system of the heart, interpretation of ECG waveform, standard 12 - lead configurations, Einthoven triangle, specifications of ECG Machine; Blood pressure, blood flow and heart sound measurements; Relation between electrical and mechanical activities of the heart.

UNIT – III: NEURO-MUSCULAR AND RESPIRATORY INSTRUMENTATION (8 periods)

Physiology of nervous system, electrode placement for EEG and EMG recording, Specification of EEG and EMG machines, Interpretation of EEG and EMG.

Respiratory Instrumentation: Mechanism of respiration, Spirometry, Pnemuotachograph Ventilators.

UNIT – IV: THERAPEUTIC EQUIPMENT (8 periods)

Pacemakers: Need for Cardiac pacemakers, pacing modes, Ventricular asynchronous Pacemaker (Fixed rate Pacemaker), Ventricular inhibited Pacemaker (demand Pacemaker), Atrial Synchronous pacemaker, Comparison between internal & external Pacemakers; Defibrillators: AC Defibrillator, DC Defibrillator, Synchronised DC Defibrillator; Diathermy: Shortwave and microwave, Dialysis: Hemo Dialysis, Peritonal Dialysis.

UNIT – V: MEDICAL IMAGING SYSTEM (9 periods)

Ultrasonic Imaging: Doppler principle, Modes of Display: A-Mode, B-Mode and Echocardiography. Computed Tomography: Block diagram of CT scanner, Applications of Computed Tomography. MRI Imaging System, Cine angiogram, Endoscope.

Total Periods: 45

TEXTBOOKS:

1. Leslie Cromwell, Fred. J. Weibell and Erich. A. Pfeiffer, *Biomedical Instrumentation and Measurements*, 2nd Edition, PHI, 2003.
2. R.S. Khandpur, *Hand Book of Biomedical Instrumentation*, Tata McGraw - Hill, 2nd Edition, 2002.

REFERENCE BOOKS:

1. John G.Webster, *Medical Instrumentation Application and Design*, WileyIndia Pvt. Ltd., 3rd Edition,2004.
2. M. Arumugam, *Biomedical Instrumentation*, Anuradha Publications, 1992.

IV B. Tech. - I Semester

14BT71003: LOGIC AND DISTRIBUTED CONTROL SYSTEMS

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

PRE-REQUISITE: Switching Theory and Logical Design

COURSE DESCRIPTION: Basics of Programmable Logic Controller (PLC); PLC Programming Languages; I/O Processing; Concepts of DCS; Communication networks for DCS; Industrial Data Networks.

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

CO1. Demonstrate knowledge on Programmable Logic Controller (PLC) and their Programming Languages, DCS and their communication networks, Communication Standards.
CO2. Design and developsolutions to automate the given process.
CO3. Analyze the information to provide effective solution for real time problems in Automation Industries.

Detailed Syllabus:

UNIT – I: PROGRAMMABLE LOGIC CONTROLLER (PLC) BASICS (7 Periods)

Controllers, Programmable Logical Controller, Hardware, Architecture of PLC system, Power supplies and Isolators, Selection of PLC Systems - Allen Bradley, Omron, Mitsubishi. IEC Standard, Programming PLC's, Networking of PLC's, Advantages and Disadvantages of PLC.

UNIT – II: I/O PROCESSING (9 Periods)

Input/output Units: Input units, Output units. Signal Conditioning: Changing Voltage levels, Op-amp Comparator, Output Protection. Remote Connections: Serial and parallel Communication, Serial Standards, Parallel Standards. Examples of Commercial Systems. Processing inputs. I/O addresses.

UNIT – III: PLC INTERMEDIATE FUNCTIONS (11 Periods)

Ladder and functional block programming, Logic functions, Functional blocks, Jump and call, timer functions, counter functions, Register basics. Design of interlocks and alarms using a PLC, Arithmetic functions, Number Comparison Functions, Skip and MCR functions, Data Move Systems. Sequencer functions, PID functions.

UNIT – IV: DISTRIBUTED CONTROL SYSTEM (7 Periods)

Overview of Distributed Control System (DCS), DCS Software configuration, DCS Communication, DCS Supervisory Computer tasks, DCS Integration with PLCs and Computers. Communications in Distributed Control Systems – CSMA / CD Protocol, Token ring, Token Bus Communication Topology.

UNIT – V: INDUSTRIAL DATA NETWORKS (11 Periods)

HART protocol: Introduction, Method of operation, structure, operating conditions. Foundation Fieldbus: Introduction, OSI model of Foundation Field bus, troubleshooting. MODBUS: Overview, protocol structure. ProfiBus: Introduction, protocol stack, communication model, Relationship between application process and communication, Operation. Interface and backplane bus standards for instrumentation systems – VXI, VME, IEEE 1451 protocol, IEEE – 488 GPIB – Talkers, Listeners and Controllers.

Total Periods: 45

TEXT BOOKS:

1. Bolton. W, *Programmable Logic Controllers*", 5th Edition, 2009.
2. S.K. Singh, *Computer Aided Process Control*, PHI, 2009.

REFERENCE BOOKS:

1. Steve Mackay, Edwin Wrijut, Deon Reynders, John Park, *Practical Industrial Data Networks Design, Installation and Trouble shooting*' Newnes Publication, Elsevier First Edition, 2004.
2. M. Chidambaram, *Computer Control of Processes*, 2nd Edition, Narosa Publications, 2003.
3. John W. Webb and Ronald A. Reis, *Programmable Logic Controllers-Principles and Applications*, Pearson Education 5th Edition.
4. Frank D. Petruzella, *Programmable Logic Controllers*, 2nd Edition, McGraw - Hill, New york, 1997.

IV B. Tech. - I Semester

14BT60206: ADVANCED CONTROL SYSTEMS

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

PRE-REQUISITES: Control Systems.

COURSE DESCRIPTION: Linear control system design; design of compensators and controllers; non-linear systems; describing function; phase plane and stability analysis; design of controllers and observers; formulation of various optimal control problems; minimization of functional.

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

CO1. Gain knowledge on
- Need for control system design, tuning of PID controller and Two-Degrees-of-Freedom control.
- Non-linear system stability.
- Modal and optimal control.

CO2. Analyze
- Stability of a non-linear system using describing functions and phase plane analysis.
- Non-linear system stability using Lyapunov's stability criterion.
- Minimization of functional with different cases.

CO3. Demonstrate design skills in
- Compensators and controllers using Root locus and Bode plot.
- Controllers, observer and regulators using state space.

CO4. Demonstrate problem solving skills in
- Evaluating stability of systems using describing functions and lyapunov stability.
- Application of calculus of variations.

Detailed Syllabus:

UNIT – I: LINEAR CONTROL SYSTEM DESIGN (10 periods)

Introduction to control system design, types of compensators, design of compensators using bode plot and root locus technique. Types of controllers, design of PI, PD and PID controllers using bode plot and root locus technique. Tuning rules for PID controllers, two-degrees-of-freedom control.

UNIT – II: ANALYSIS OF NONLINEAR SYSTEMS (10 periods)

Introduction to nonlinear systems, different types of physical nonlinearities, describing functions, derivation of describing functions for dead zone, saturation, backlash, relay and hysteresis. Stability analysis of nonlinear systems through describing functions, Phase-Plane analysis, singular points, methods for constructing trajectories - Isoclines' method, delta method.

UNIT - III: STABILITY ANALYSIS (9 periods)

Stability in the sense of Lyapunov. Lyapunov's stability theorems. Stability analysis of linear time invariant systems by Lyapunov second method. Generation of Lyapunov functions, variable gradient method, Krasovskii's method.

UNIT – IV:DESIGN OF CONTROL SYSTEMS IN STATE SPACE (9 periods)

Necessity of pole placement, design by pole placement, necessary and sufficient conditions for arbitrary pole placement. Determination of feedback gain matrix using direct substitution method and Ackermann's formula. Full order observer and reduced order observer, quadratic optimal regulator systems.

UNIT – V: OPTIMAL CONTROL (7 periods)

Introduction to optimal control, formulation of optimal control problems, calculus of variations, minimization of functional of single function, functional involving *n* independent functions, constrained minimization.

Total Periods: 45

TEXT BOOKS:

1. M. Gopal, *Modern Control System Theory*, New Age International (P) Ltd., 2nd edition, 2000.
2. K. Ogata, *Modern Control Engineering*, Prentice Hall of India, 4th edition, 2006.

REFERENCE BOOKS:

1. A.Nagoorkani, *Advanced control theory*, RBA publications, 2nd edition, 1999.
2. I. J. Nagrath and M. Gopal, *Control Systems Engineering,* New Age International (P) Ltd., 2007.

IV B.Tech. - I Semester

14BT6HS01: BANKING AND INSURANCE

(Open Elective)

(Common to ECE, EEE, EIE & CE)

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

PRE-REQUISITE: Managerial Economics and Principles of Accountancy.

COURSE DESCRIPTION: Origin and growth of Banking, functions and importance, RBI; Debtor and Creditor relationship, Types of Accounts, Loans and Advances; e - payment, e-cash, NEFT, RTGS, Credit and Debit cards; Insurance elements and risk; LIC, GIC, IRDA.

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

CO1. Acquire Knowledge in

- Tools and concepts of Banking and Insurance.
- Basic Principles and concepts of Insurance and Banking.
- Provides life skills for effective utilization of Banking and Insurance facilities.
- e-fund transfers, e-payments and e-business models.

CO2. Develop analytical skills in understanding problems pertaining to

- Online banking and e – payments..
- Risk Management through insurance benefits the society at large.
- Money management by leveraging on technology, banking and insurance services.

Detailed Syllabus:

UNIT I: INTRODUCTION TO BANKING (9 periods)

Origin and growth of banking, meaning and functions of banking, importance of banking, Reserve Bank of India; functions, monetary policy, open market operations.

UNIT - II: BANK-CUSTOMER RELATIONSHIP (9 periods)

Debtor-creditor relationship, anti money laundering, products or services, payment and collection of cheques and other negotiable instruments. Accounts – Types of accounts, procedure for opening and closing an account. Loans and Advances- principles of lending, types of loans,

UNIT - III: BUSINESS MODELS AND ELECTRONIC PAYMENT SYSTEM (9 periods)

Features, types of e-payment system, e-cash, NEFT, RTGS, Electronic purses, Credit and Debit cards. Business models- B2B, B2C, C2C, and B2G.

UNIT - IV: INTRODUCTION TO INSURANCE (9 periods)

Introduction - Insurance definition, elements of insurance concept of risk, risk Vs uncertainty.

UNIT - V: INSURANCE OVERVIEW (9 periods)

Principles of insurance, insurance types, LIC & GIC insurance contract-nature, elements, functions, IRDA, Insurance Players in India.

Total Periods: 45

TEXT BOOKS:

1. A.V. Ranganadha Chary and R.R. Paul, *Banking and Financial system*, Kalyani Publisher, 2nd Edition, New Delhi.
2. P.K.Gupta, *Insurance and Risk Management*, Himalaya Publishing House, New Delhi, 2002.

REFERENCE BOOKS:

1. Diwan, Praq and Sunil Sharma, *Electronic Commerce- A Manager's Guide to E-Business*, Vanity Books International, Delhi, 2002.
2. Kalakota Ravi and Whinston Andrew B, *Frontiers of Electronic Commerce*, Pearson Education India, New Delhi, 1996 .
3. Schneider and Grey P, *Electronic Commerce, Course Technology*, Cengage Learning, 8th Edition, New Delhi, 2008.

IV B. Tech. - I Semester

14BT70106: ENVIRONMENTAL POLLUTION AND CONTROL

(Open Elective)

(Common to ECE, EEE, EIE & CE)

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

PRE-REQUISITES: Environmental Sciences.

COURSE DESCRIPTION: Introduction, Sources and Effects of Air Pollution – Dispersion of Pollutants and their control – Surface and Ground Water Pollution and control–Soil Pollution and remediation–Management of Municipal Solid Wastes.

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

CO1. Explain various pollutants, characteristics and their dispersion

CO2. Analyze the major pollutants that causes environmental pollution.

CO3. Conduct research and select suitable techniques to control pollution.

CO4. Understand the effects of environmental pollutions on human beings and vegetation.

CO5. Communicate the methods of management and control of environmental pollution.

Detailed Syllabus:

UNIT - I: INTRODUCTION TO AIR POLLUTION AND DISPERSION OF POLLUTANTS (8 periods)

Scope – Air Pollutants – Classifications – Natural and Artificial – Primary and Secondary, Point and Non – Point, Line and Area Sources of Air Pollution – Stationary and Mobile Sources – Dispersion of Pollutants – Dispersion Models – Applications.

UNIT - II: EFFECTS AND CONTROL OF PARTICULATES (9 periods)
Effects of Air Pollutants on Man, Material and Vegetation – Global Effects of Air Pollution – Green House Effect, Heat Island, Acid Rains, Ozone Holes – Control of Particulates – Control at Sources – Process Changes – Equipment Modifications – Design and Operation of Control Equipment – Settling Chambers – Centrifugal Separators – Bag Filters, Dry and Wet Scrubbers – Electrostatic Precipitators.

UNIT - III: WATER POLLUTION (10 periods)
Introduction–Water Quality in Surface Waters – Nutrients – Controlling Factors in Eutrophication–Effects of Eutrophication – Ground Water Pollution – Thermal Pollution – Marine Pollution – Sewage Disposal in Ocean – Types of Marine Oil Pollution – Cleanup of Marine Oil Pollution – Control of Water Pollution – Case Study on Tanneries – Drinking Water Quality Standards.

UNIT - IV: SOIL POLLUTION (9 periods)
Soil Pollutants – Sources of Soil Pollution – Causes of Soil Pollution and their Control – Effects of Soil Pollution – Diseases Caused by Soil Pollution – Methods to Minimize Soil Pollution – Effective Measures to Control Soil Pollution – Case Study on Fertilizer.

UNIT - V: MUNICIPAL SOLID WASTE MANAGEMENT (9 periods)
Introduction – Types of Solid Wastes – Principles of Excreta Disposal – Domestic Solid Waste Production – Collection of Solid Wastes – Transport of Solid Wastes – Management of Solid Wastes – Methods of Land Disposal – Sanitary Landfill – Composting – Incineration.

Total Periods: 45

TEXT BOOKS:

1. C.S.Rao, *Environmental Pollution Control Engineering*, New Age International Pvt Ltd., 2nd Edition, 2007.
2. Y.Anjaneyulu, *Introduction to Environmental Science,* BS Publications*.,* 2009.

REFERENCE BOOKS:

1. M.N. Rao and H.V.N. Rao, *Air Pollution,* Tata Mc Graw - Hill Education Pvt. Ltd., 19th Edition, 2010.
2. Daniel Vallero, *Fundamentals of Air Pollution,* Academic Press (Elsevier)*,* 5th Edition, 2014.
3. S.M.Khopkar, *Environmental Pollution Monitoring and Control,* New Age International Pvt Ltd., 2nd Edition, 2007.
4. S.Deswal and K.Deswal, *Environmental Science,* Dhanpat Rai & Co, 2nd Edition, 2011.

IV B.Tech. - I Semester
14BT70109: RURAL TECHNOLOGY
(Open Elective)

(Common to ECE, EEE, EIE & CE)

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

PRE-REQUISITES: -

COURSE DESCRIPTION: Research & Development – Non Conventional Energy – Community Development – IT Management.

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

CO1. Acquire the knowledge of various nonconventional energy systems and technologies for rural development.
CO2. Apply the principles of IT for the rural development.
CO3. Responsible for the development of technologies in rural areas.
CO4. Understand the impact of technologies in societal and environmental aspects.

Detailed Syllabus:

UNIT - I: RESEARCH & DEVELOPMENT (9 periods)

India – Ancient Indian Technologies – Rural India Life – Indian Farmer – Role of Science and Technology in Rural Development – Rural Technology and Poverty Eradication – Rural Business Hubs – Technology in improving rural infrastructure – Various organizations related to innovation – Issues of technology transfer: CAPART, NABARD, CSIR, NIF.

UNIT - II: NON CONVENTIONAL ENERGY (9 periods)

Definition of Energy, Types of alternative sources of energy, Sources of non conventional energy – Solar energy – Solar Cooker – Solar Heater – Biogas – Recycling and Management and Wastes Conservation – Assessment & Production of biomass products & their utilization.

UNIT - III: TECHNOLOGIES FOR RURAL DEVELOPMENT (9 periods)

Food & Agro based technologies – Tissue culture – Building and Construction technologies – Cultivation and processing of economic plants – Cottage and social Industries.

UNIT - IV: COMMUNITY DEVELOPMENT (9 periods)

Water conservation – Rain water Harvesting – Drinking water – Environment and Sanitation – Bio fertilizers – Medical and Aromatic plants – Employment generating technologies – Apiculture – Piciculture – Aquaculture.

UNIT - V: IT IN RURAL DEVELOPMENT (9 periods)

The Role of Information Technology in Rural Areas – Impact of Information Technology in Rural development – Need and Necessity of Technology – Corporate Social Responsibilities – Private sector participation (Activities in different spheres: Employment, Education, Health, Agriculture and Service Sectors) and Saansad Adarsh Gram Yojana (SAGY) – village adoptions schemes.

Total Periods: 45

TEXT BOOKS:

1. M.S Virdi, *Sustainable Rural Technologies*, Daya Publishing House, New Delhi, 2009.
2. S.V. Prabhath & P. Ch. Sita Devi, *Technology and Rural India*, Serials Publications, New Delhi, 2012.

REFERENCE BOOKS:

1. P. R. S. Murthy, R.C. Chackravarthy, *Information Technology & Rural Development*, Pacific Books International, 2011.
2. Shivakanth Singh, *Rural Development Policies and Programmes,* Northern book centre, New Delhi, 2002.
3. L.M.Prasad, *Principles and Practice of Management*, Sultan Chand & Sons, New Delhi, 8th Edition, 2014.
4. Venkata Reddy. K, *Agriculture and Rural Development Gandhian Perspective*, Himalaya Publishing House, 2001.

IV B. Tech. - I Semester
14BT60403: VLSI DESIGN
(PROFESSIONAL ELECTIVE - II)

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

PRE-REQUISITES: Switching Theory and Logic Design, Digital ICs and their Applications.

COURSE DESCRIPTION: Introduction to the design and implementation of VLSI circuits for complex digital systems; CMOS technology; submicron design; clocking; subsystem design; CAD tools and algorithms; simulation; verification; testing and design methodology.

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

CO1. Demonstrate knowledge in
- Understanding the Fabrication of MOS Transistors.
- Electrical properties of CMOS and BiCMOS 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.
- Testing the chip at various abstraction levels.

CO2. Perform analysis of Circuit Characterization and Performance Estimation of CMOS device and Create models of moderately sized CMOS circuits that realize specified digital functions.

CO3. Formulate and solve technology specific problems in developing an IC circuit using EDA tools.

CO4. Use modern design tools to IC devices to create system on - chip (SOC) designs in FPGAs.

Detailed Syllabus:

UNIT –I: REVIEW OF MICROELECTRONICS AND INTRODUCTION TO MOS TECHNOLOGIES (9 Periods)

Basic MOS Transistor, CMOS, BiCMOS Technology, Fabrication of NMOS & CMOS. Basic Electrical Properties of MOS & BiCMOS Circuits: Ids – Vds relationships, Threshold Voltage VT, gm, and ù0, Pass Transistor, nMOS inverter, Determination of pull up to pull down ratio for an NMOS inverter, CMOS & BiCMOS Inverters, Latch-up in CMOS circuits.

UNIT – II: MOS AND BICMOS CIRCUIT DESIGN PROCESS (12 Periods)

VLSI design flow, Transmission gate & alternate CMOS logic structures, MOS layers, stick diagrams: n-MOS design style, CMOS design style, design rules and layouts, General observations on Design rules, Symbolic Diagrams, Layout diagrams for inverters, NAND & NOR. Sheet resistance applied to MOS, capacitances of layers, Delay unit, Inverter delays, Driving Large capacitive loads, Wiring capacitances, Scaling models and scaling factors, limitation of scaling.

UNIT - III: SUBSYSTEM DESIGN (9 Periods)

Adders – Transmission based Adder, Carry look ahead, Manchester Carry Chain, Carry Skip Adder, Carry Select Adder, Shifters - Barrel Shifter, Logarithmic Shifter, Multipliers – Array Multiplier, Carry Save multiplier, Booth Multiplier, ALUs, Parity generators, Comparators, Linear feedback shift register.

UNIT - IV: SEMICONDUCTOR INTEGRATED CIRCUIT DESIGN (8 Periods)

Memory Elements – General memory array architecture, 6-transistor SRAM cell, Memory Read/Write, DRAM cell, Content Addressable memory. Design Strategies, Programming of PALs, Programmable Interconnect, CPLD, FPGA, Cell Based Design methodology

UNIT - V: VERIFICATION & TESTING (8 Periods)

HDL Synthesis, Layout Synthesis, Design capture tools, Design Verification Tools. Introduction, Testers Test Fixtures & Test programs, Logic verification principles, Manufacturing Test Principles, Design for Testability, Boundary Scan.

Total Periods: 45

TEXT BOOKS:

1. Kamran Eshraghian, Eshraghian Douglas and A. Pucknell, *Essentials of VLSI Circuits and Systems,* PHI, 2005.
2. Neil H. E. Weste, David Harris, Ayan Banerjee, CMOS VLSI Design, Pearson Education, 3rd Edition, 2006.

REFERENCE BOOKS:

1. John M. Rabaey, *Digital Integrated Circuits: A Design Perspective*, PHI, 2nd Edition, 1997.
2. John. P. Uyemura*, Introduction to VLSI Circuits and Systems,* John Wiley, 2003.
3. Eugene D. Fabricius, *Introduction to Very Large Scale Integration Design,* Paperback, McGraw - Hill Education (ISE Editions), August 1990.
4. Stephen Brown, Zvonko Vranesic, *Fundamentals of Digital Logic with Verilog Design*, TMH 2007.
5. Weste and EShraghian, *Principles of CMOS VLSI Design,* Pearson Education, 2nd Edition, 1998.

IV B. Tech. – I Semester
14BT51201: COMPUTER NETWORKS
(PROFESSIONAL ELECTIVE - II)

(Common to ECE and EIE)

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

PRE-REQUISITES: Nil.

COURSE DESCRIPTION: Introduction to Computer Networks; The Physical Layer; The Data Link Layer; The Medium Access Sub layer; The Network Layer; The Transport Layer; The Application Layer; Network Security.

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

CO1. Demonstrate knowledge on
- Concepts of computer networks.
- Functionality of reference models layers.
- 3G Mobile Phone Networks, 802.11.

CO2. Analyze the issues in data link layer by using error detection and correction techniques, medium access sub layer by channel allocation schemes and transport layer by connection management schemes.

CO3. Acquire problem solving skills to assess the routing of the packet by selecting the appropriate routing algorithms.

Detailed Syllabus:

UNIT - I: INTRODUCTION AND PHYSICAL LAYER (9 periods)

Uses of Computer Networks, Network Hardware, Network Software, Reference Models: OSI, TCP/IP, Example Networks: Internet, 3G Mobile Phone Networks, 802.11. Guided Transmission Media, Wireless Transmission.

UNIT - II: DATA LINK LAYER AND MEDIUM ACCESS SUBLAYER (10 periods)

Data Link Layer Design Issues, Error detection and correction-CRC, Hamming codes, Elementary Data Link Protocols, Sliding Window Protocols. Channel Allocation problem, Multiple Access protocols: ALOHA, CSMA, CSMA / CD protocols, Collision free protocol, Limited contention protocol, Ethernet, DLL Switching.

UNIT - III: NETWORK LAYER (10 periods)

Network Layer Design Issues, Routing Algorithms: Shortest path, Flooding, Distance vector, Hierarchical, Broadcast, Multicast and Any cast, Congestion Control Algorithms, Quality of Service, Internetworking, The Network Layer in the Internet.

UNIT - IV: TRANSPORT LAYER (8 periods)

Transport Service, Elements of transport protocol, Internet Transport layer protocols: UDP, TCP; UDP – Introduction, Remote Procedure Call, Real-Time Transport Protocol TCP - Introduction, Service Model, Protocol, Segment Header, Connection Establishment, Connection Release, Connection Management Modeling, Sliding Window, Timer Management, Congestion Control, The Future of TCP.

UNIT - V: APPLICATION LAYER AND NETWORK SECURITY (8 periods)

Domain name system (DNS), Electronic Mail, World Wide Web: Architectural Overview, Dynamic Web Document, HTTP. Introduction to Network Security: Cryptography - Substitution Techniques, Transposition Techniques, One-Time Pads.

Total Periods: 45

TEXT BOOK:

1. Andrew S. Tanenbaum and David J. Wetherall, *Computer Net works,* Pearson Education, 5th Edition, 2012.

REFERENCE BOOKS:

1. Behrouz A. Forouzan, *Data communication and Networking***,** Tata McGraw-Hill, 4th Edition, 2006.
2. James F. Kurose and Keith W. Ross, *Computer Networking A Top-Down Approach Featuring the Internet***,** Pearson Education, 2nd Edition, 2003.

IV - B.Tech. - I Semester

14BT71021: ANALYTICAL & BIOMEDICAL INSTRUMENTATION LAB

Int.Marks	Ext. Marks	Total Marks	L	T	P	C
25	50	75	-	-	3	2

PRE-REQUISITES: 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: After completion of the course the student will be able to

CO1. To measurements of heart sounds, respiration rate, pH Value and calorific value.
CO2. Analyze the performance spectrometers, flame photometer, gas chromatography and Geiger Muller counter.

LIST OF EXPERIMENTS:

Minimum 11 experiments to be conducted.

1. Measurement of pH value of a given sample using pH meter.
2. Measure the absorbance, transmittance and concentration of the sample using UV-VIS Spectrometer.
3. Measure the concentration of a sample using Flame Photometer.
4. Characteristics of Geiger Muller Counter.
5. Compound analysis of a sample using Gas/Liquid chromatography.
6. Measurement of dissolved oxygen.
7. Blood pressure measurement using sphygmomanometer.
8. Analysis of ECG for different lead configuration.
9. Analysis of EEG Signals.
10. Design of an Instrumentation Amplifier for bioelectrical Signals.
11. Measurement of Respiration rate.
12. Measurement of heart sound.
13. Measure the conduction velocity in muscle fiber.

IV - B. Tech. - I Semester

14BT71022: INDUSTRIAL AUTOMATION LAB

Int.Marks	Ext. Marks	Total Marks	L	T	P	C
25	50	75	-	-	3	2

PRE-REQUISITES: Process Control Instrumentation, Logical and Distributed Control Systems.

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 and Cascade control system; Ratio control system; Drum type Boiler with only measurement points.

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

CO1. Identify and analyze the problems of various real time processes in Automation Industries.

CO2. Design and develop solutions for various real time processes in Automation Industries.

CO3. Use modern technologies to Analyze and synthesize the informa tion to provide effectivesolutions for real time problems.

LIST OF EXPERIMENTS: Minimum 11 experiments to be conducted

P&I DRAWINGS USING CAD

1. Study of various symbols and abbreviations used in P&ID diagram
2. Draw the P&I diagram of Feedback Control System and Cascade Control System.
3. Draw the P&I diagram of Feed forward Control system and Ratio Control System.
4. Draw the P&I diagram of Feedback and Cascade Control System for Evaporators.
5. Draw the P&I diagram of a Drum type Boiler with only measure ment points.

PLC

1. Implementation of Ladder Diagrams for Logic gates, timer and counters.
2. Programming a PLC to demonstrate control of a level Process.
3. Programming a PLC to demonstrate control of Pressure.
4. Programming a PLC to demonstrate DC Motor speed control.
5. Programming a PLC to demonstrate Bottle filling system.
6. Programming a PLC to demonstrate Temperature control.
7. Implementation of PLC programming through SCADA.
8. Programming a PLC to demonstrate control of flow process trough SCADA.

IV B. Tech. - I Semester

14BT71023: SEMINAR

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

PRE-REQUISITES: All the courses of the program up to IV B. Tech. – I Semester.

COURSE DESCRIPTION: Identification of topic for the seminar; Literature survey; Performingcritical study and analysis of the topic identified; Preparation of thesis and presentation.

COURSE OUTCOMES: After completion of the seminar work the student will be able to

CO1. Demonstrate in-depth knowledge on the seminar topic.

CO2. Analyze critically, chosen seminar topic for substantiated conclusions.

CO3. Undertake investigation of issues related to seminar topic providing valid conclusions.

CO4. Function effectively as individual on the chosen seminar topic.

CO5. Develop communication skills, both oral and written for preparing and presenting seminar report.

CO6. Engage in lifelong learning to improve knowledge and competence in the chosen field of seminar.

IV - B. Tech. - II Semester

14BT81001: FIBER OPTICS & LASER INSTRUMENTATION

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

PRE-REQUISITES: Engineering Physics, Industrial Instrumentation – I & II.

COURSE DESCRIPTION: Optical fiber, components of optical fiber, fiber optic Sensors, Industrial and medical applications of laser.

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

CO1. Demonstrate 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. Analyse the optical parameters and charecteristics.

Detailed Syllabus:

UNIT - I: FIBER OPTICS (9 periods)

Introduction to optical fibers, Laws of reflection, critical angle, Light guidance, Numerical aperture, Dispersion, Losses, Different types of fibers, Modes of operation and their transmission characteristics.

Components of Optical Fiber: Light Sources for fiber optics, Photo detectors, source coupling, Fiber termination, Splicing and connectors.

UNIT - II: FIBER OPTIC INSTRUMENTATION (9 periods)

Fiber optic instrumentation system, Interferometer method of measurement of length, Measurement of pressure, Temperature, Current, Voltage, Liquid level and strain, fiber optic Gyroscope, Polarization maintaining fibers, Applications.

UNIT - III: FUNDAMENTALS OF LASER (9 periods)

Fundamental characteristics of lasers, Three level and four level lasers, Properties of laser, Laser modes, Resonator configuration, Q-switching and mode locking, Types of lasers: Gas lasers, solid lasers, liquid lasers, semiconductor lasers.

UNIT - IV: INDUSTRIAL AND MEDICAL APPLICATIONS OF LASER

(9 periods)

Industrial Applications: Industrial applications of lasers, Laser heating Material processing, laser welding, melting and trimming of material, Laser Doppler velocity meter.

Medical applications: LASER's in medicine, Interaction with tissues, Interaction with bio molecules,laser endoscope.

UNIT - V: HOLOGRAPHY AND OPTOELECTRONIC MODULATORS

(9 periods)

Holography: Principle, Methods, Holographic Interferometers, Different types of holographic techniques, Acoustical holography, Character recognition by holography, 3 - D Cinematography with holographic screen.

Optoelectronic Modulators: Electro-optic, Magneto-optic and Acousto-optic Modulators.

Total Periods: 45

TEXT BOOKS:

1. Ghatak A.K. and Thyagarajan K., O*ptical Electronics*, Foundation Books, 1991.
2. Arumugam.M**,** *Optical Fibre Communication and Sensors***,** Anuradha agencies,2008**.**

REFERENCE BOOKS:

1. Das P., *Lasers and Optical Engineering*, Springers International Students Edition, 1991.
2. Thyagarajan K. and Ghatak A.K., *Lasers: Theory and Applications*, Plenum Press, 1981.
3. Gerd Keiser, *Optical Fiber Communication*, TMH, 3rd Edition, 2000.

IV B. Tech. - II Semester

14BT70402: EMBEDDED SYSTEMS

(Common to EEE and EIE)

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

PRE-REQUISITES: Microprocessors and Microcontrollers.

COURSE DESCRIPTION: Introduction to Embedded System; State Machines and Concurrent Process Models; Various Communication interfacing Models; RTOS Concepts; Target Architectures.

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

CO1.	Demonstrate knowledge on Communication Interfacing Models, Processor Technology, State Machines, Kernel Objects, ARM and SHARC Controllers.
CO2.	Analyze Various problems in Optimization of Single Purpose Processor, Synchronization among the Processes, Clock Driven and Event Driven Scheduling and Debugging Techniques.
CO3.	Design and develop embedded system to suit a particular Application.
CO4.	Choose suitable Hardware and software components of a system that Work together to solve engineering problems to exhibit a specific behavior.

Detailed Syllabus:

UNIT - I: INTRODUCTION (12 periods)

Embedded systems overview, classification, applications, design challenge, processor technology, IC technology, Design Technology, Trade-offs. Single purpose processors RT-level combinational logic, sequential logic (RT-level), custom single purpose processor design (RT-level), optimizing custom single purpose processors, Basic architecture, operation, Pipelining, Programmer's view, development environment.

UNIT - II: STATE MACHINE AND CONCURRENT PROCESS MODELS (8 periods)

Introduction, models versus languages, finite state machines with data path model (FSMD), using state machines, program state machine model (PSM), concurrent process model, concurrent processes, communication among processes, synchronization among processes, implementation, data flow model.

UNIT - III: COMMUNICATION INTERFACE (7 periods)

Need for communication interfaces, RS232 / UART, RS422 / RS485, USB, Infrared, IEEE 1394 Fire wire, Ethernet, I^2C bus and CAN.

UNIT - IV: RTOS CONCEPTS (10 periods)

Concepts 1: Architecture of the Kernel, Tasks and Task scheduler, Types of real - time tasks, Task periodicity, Task scheduling, Classification of scheduling algorithms, Clock driven Scheduling, Event driven Scheduling, resource sharing, Commercial RTOs.

Concepts 2: Interrupt service routines, Semaphores, Mutex, Mailboxes, Message Queues, Event Registers, Pipes, Signals, Timers, Memory Management, Priority inversion problem.

UNIT - V :TARGET ARCHITECUTERS (8 periods)

Host and target machines, linkers, loading software into target machine, debugging techniques,ARM microcontroller, ARM pipeline, Instruction set architecture, THUMB instructions, Exceptions in ARM, salient features of SHARC microcontroller and comparison with ARM microcontroller.

Total Periods: 45

TEXT BOOKS:

1. Frank Vahid, Tony D. Givargis, *Embedded System Design – A Unified Hardware/Software Introduction,* John Wiley, 2002.
2. KVKK Prasad, *Embedded/Real Time Systems,* Dramatic Press, 2005.

REFERENCE BOOKS:

1. Raj Kamal, *Embedded System Architectures Programming & Design*, Tata MC Graw-Hill Publishing, 2003.
2. David E.Simons, *An Embedded Software Premier*, Pearson Education, 2004.

IV B. Tech. – II Semester
14BT81002: POWER PLANT INSTRUMENTATION
(PROFESSIONAL ELECTIVE - III)

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

PRE-REQUISITES: Industrial Instrumentation-I & II.

COURSE DESCRIPTION: Different methods of power generation; Instrumentation and control in water and air - fuel circuit; Turbine monitoring and control; power plant management.

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

CO1. Demonstrate knowledge about
- Different methods of power generation.
- Instrumentation and control in water and air - fuel circuit.
- Turbine monitoring and Control.
- Power plant management.

CO2. Identify and formulate suitable control scheme for different control loops in power generation.

Detailed Syllabus:

UNIT - I: AN OVERVIEW OF POWER GENERATION (9 periods)

Methods of power generation: Hydro, Nuclear, Solar, Wind, Thermal, Tidal, Geothermal, classification of instruments in a power plant, objectives of instrumentation and control; Cogeneration.

UNIT - II: INSTRUMENTATION IN WATER CIRCUIT AND AIR-FUEL CIRCUIT (9 periods)

Measurements in water circuit: water circuit, water flow measurement, differential pressure transmitter, steam flow measurement, water and steam pressure measurements, water and steam temperature measurements, Drum water level measurement.

Measurements in Air-fuel circuit: Air-fuel circuit: fuels, combustion air, flue gases, waste gases, measurement of flow/Quantity, measurements of pressure, measurement of temperature, measurement of level.

UNIT – III: CONTROLS IN WATER CIRCUIT AND AIR-FUEL CIRCUIT (9 periods)

Controls in water circuit: Boiler drum level: single element drum level control, two element drum level control, three element drum level control; superheated steam temperature control: waterside steam temperature control, cascade steam temperature control, feed forward-plus-feedback steam temperature control, fire side steam temperature control, steam pressure control.

Controls in Air-fuel circuit: Combustion control, furnace draft control.

UNIT - IV: TURBINE MONITORING AND CONTROL (9 periods)

Principal parts of steam turbine, turbine measurements: process parameters, mechanical parameters, electrical parameters; turbine control system: safety control systems, process control systems, Lubrication system, controls in lubrication system, turbo alternator cooling system

UNIT - V: POWER PLANT MANAGEMENT (9 periods)

Maintenance of measuring instruments: types of maintenance, maintenance costs, life cycle costs; Intrinsic and electrical safety: Intrinsic safety of instruments, electrical safety, explosion hazards and intrinsic safety; Interlocks for boiler operation: safety interlocks, start- up and shut down interlocks.

Total Periods: 45

TEXT BOOK:

1. Krishnaswamy & Ponni Bala, *Power Plant Instrumentation*, PHI, 2010.

REFERENCE BOOKS:

1. Patranabis, *Principles of Industrial Instrumentation*, Mcgraw - Hill, 2nd Edition.
2. A.R. Mallick, *Practical boiler operation engineering and power plant,* Denett & Co., 2nd Edition, 2010.

IV B. Tech. - II Semester

14BT81004: AIRCRAFT INSTRUMENTATION

(PROFESSIONAL ELECTIVE - IV)

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

PRE-REQUISITE: Industrial Instrumentation - I & II.

COURSE DESCRIPTION: Aircraft instruments; air data instruments; gyroscopic instruments; engine instruments and electronic flight instrumentation system.

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

CO1. Demonstrate Knowledge on aircraft instruments, air data instruments, gyroscope, engine instruments and electronic flight instrument system.

Detailled Syllabus:

UNIT - I: BASICS OF AIRCRAFT (9 Periods)

Control surfaces, forces, moments and angle of attack, engines, modern aircraft system, aircraft Instruments and their layout - aircraft display types: quantitative displays, display colour and markings, instrument grouping - glass cockpits of modern aircraft: attitude director indicator, electronic attitude director indicator, horizontal situation indicator.

UNIT - II: AIR DATA INSTRUMENTS (9 Periods)

Introduction to air data instruments, types of air data instruments: Pneumatic air data instruments, air data computer, international standard atmosphere - introduction to ISA, atmospheric variations with altitude, earth's atmosphere, air data instruments - combined pitot and static probe, separate static ports, location of combined probe and static ports, pneumatic - type air data instruments: pneumatic air speed indicator, temperature compensation, altimeter.

UNIT - III: GYROSCOPIC AND ADVANCED FLIGHT INSTRUMENTS (9 Periods)

Types of Gyro: conventional mechanical gyroscopes, vibrating gyros, ring laser gyroscope, fibre optic gyros, basic mechanical gyros and its properties,directional gyro, gyro horizon, turn and bank indicator: turn indicator, bank indicator, turn coordinator, standby attitude director indicator, gyro stabilized direction indicating system.

UNIT - IV: ENGINE INSTRUMENTS (9 Periods)

Engine speed measurement: Electricaltachogenerator indicator, Servo - type RPM indicators, non contact type tacho probe, optical tachometer, hall effect sensor, torque measurement: hydromechanical transducer, electronic torque meter, pressure measurement, engine fuel quantity indicator, fuel flow rate indicator: rotating – vane flow meter.

UNIT – V: ELECTRONIC FLIGHT INSTRUMENTATION SYSTEM (9 Periods)

Flight director system, attitude director indicator, horizontal situation indicator, mode selector panel/mode controller, annunciator display panel, active matrix liquid crystal display units.

Total Periods: 45

TEXT BOOK:

1. S.Nagabhushana and L.K.Sudha, *Aircraft Instrumentation and Systems,* I K International Pvt. Ltd., 2010.

REFERENCE BOOK:

1. Pallett, E.H.J, *Aircraft Instruments and Integrated Systems,* Pearson higher Education, 1992.

IV B.Tech. - II Semester

14BT81006: INSTRUMENTATION IN PROCESS INDUSTRIES

(PROFESSIONAL ELECTIVE - IV)

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

PRE-REQUISITE: Control Systems, Process Control Instrumentation.

COURSE DESCRIPTION: Description of the Process in Instrumentation in the Food Industry, Paper Industry, Pharmaceutical Industry, Iron and Steel Industry, Petrochemical Industry**.**

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

CO1. Demonstrate knowledge on the basics of measurement systems, Analyzers, Valves Feeders, Controllers, Displays and P& ID.

Detailed Syllabus:

UNIT-I: INSTRUMENTATION IN THE FOOD INDUSTRY (9 Periods)

Description of the Process, Measurement Hardware in the Food Industry, Analyzers in the Food Industry, Valves and Feeders in the Food Industry, Controllers and Displays in the Food Industry, Computer Applications in the Food Industry, Typical Control Systems in the Food Industry.

UNIT-II: INSTRUMENTATION IN THE PAPER INDUSTRY (9 Periods)

Description of the Process, Measurement Hardware in the Paper Industry, Analyzers in the Paper Industry, Valves and Feeders in the Paper Industry, Controllers and Displays in the Paper Industry, Computer Applications in the Paper Industry, Typical Control Systems in the Paper Industry.

UNIT-III: INSTRUMENTATION IN THE PHARMACEUTICAL INDUSTRY (9 Periods)

Description of the Process, Measurement Hardware in the Pharmaceutical Industry, Analyzers in the Pharmaceutical Industry, Valves in the Pharmaceutical Industry, Controllers in the Pharmaceutical Industry, Computer Applications in the Pharmaceutical Industry, and Typical Control Applications in the Pharmaceutical Industry.

UNIT - IV: INSTRUMENTATION IN THE IRON AND STEEL INDUSTRY (9 Periods)

Description of the Process, Measurement Hardware in the Iron and Steel Industry, Analyzers in the Iron and Steel Industry, Valves in the Iron and Steel Industry, Controllers in the Iron and Steel Industry, Computer Applications in the Iron and Steel Industry, Typical Control Applications in the Iron and Steel Industry.

UNIT-V: INSTRUMENTATION IN THE PETROCHEMICAL INDUSTRY (9 Periods)

Control of Chemical Reactors, Computer Control of Batch Reactors, Control of Distillation Towers, Optimizing Control of Distillation Columns, Control of Furnaces, Control of Dryers, Control of Compressors.

Total Periods: 45

TEXT BOOK:

1. Bela G. Liptak, *Instrumentation in Processing Industries*, Chilton Book Company, Canada, 1973.

REFERENCE BOOK:

1. Bela G.Liptak, *Instrument Engineers Handbook on Process Control*, Chilton Book Company, Canada, 3rd Edition, 1999.

IV B.Tech. - II Semester

14BT81021: COMPREHENSIVE VIVA-VOCE

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

PRE-REQUISITES: All courses of the program.

COURSE DESCRIPTION: Assessment of all the courses of the program from view point of knowledge, skills, applications and attitude.

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

CO1. Demonstrate knowledge in the program domain.

CO2. Exhibit professional etiquette suitable for career progression.

CO3. Present views cogently and precisely.

IV B. Tech. - II Semester

14BT81022: PROJECT WORK

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
60	140	200	-	-	20	10

PRE-REQUISITES: All the 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: After completion of the project work the student 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 professional and ethical responsibilities while executing the project work.
CO7. Function effectively as individual and a member in the project team.
CO8. Develop communication skills, both oral and written for preparing and presenting project report.
CO9. Demonstrate knowledge and understanding of cost and time analysis required for carrying out the project.
CO10. Engage in lifelong learning to improve knowledge and competence in the chosen area of the project.