Supporting Document for 1.1.3

Courses having focus on

Employability/ Entrepreneurship/ skill Development

Program: B.Tech.- Electronics and Instrumentation Engineering

Regulations : SVEC-19

The Courses (with course outcomes) under SVEC-19 Regulations which focus on *employability/ entrepreneurship/ skill development* are highlighted with the following colours.

Skill

Employability

Entrepreneurship

I B. Tech. - I Semester
(19BT1BS01) DIFFERENTIAL EQUATIONS AND MULTIVARIABLE CALCULUS
(Common to CE, ME, EEE, ECE, EIE, CSE, CSSE, IT, CSE(AI) & CSE(DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES: --

COURSE DESCRIPTION: Ordinary Differential Equations; Partial Differential Equations; Multivariable Calculus (Differentiation); Multivariable Calculus (Integration); Multivariable Calculus (Vector Calculus).

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

CO1. Formulate and solve differential equations by applying knowledge of calculus for engineering problems.

CO2. Demonstrate knowledge in multivariable calculus for evaluating multiple integrals through techniques of integration.

CO3. Identify scalar and vector valued functions and evaluate vector integrals through knowledge of vector integral theorems and techniques.

DETAILED SYLLABUS:

UNIT-I: ORDINARY DIFFERENTIAL EQUATIONS (9 Periods)

Second and higher order linear differential equations with constant coefficients: Non-Homogeneous equations with R.H.S terms of the type e^{ax}, $\sin ax$, $\cos ax$, polynomials in x, $e^{ax}V(x)$ and $xV(x)$; method of variation of parameters; Equations reducible to linear differential equations with constant coefficients: Cauchy's and Legendre's linear equations; Applications to L-C-R Circuit problems.

UNIT-II: PARTIAL DIFFERENTIAL EQUATIONS (9 Periods)

Formation of PDE, solutions of first order linear and non-linear PDEs, Solution to homogenous and non-homogenous linear partial differential equations of second and higher order by complimentary function and particular integral method, method of separation of variables in Cartesian coordinates.

UNIT-III: MULTIVARIABLE CALCULUS (DIFFERENTIATION) (9 Periods)

Partial derivatives, Chain rule, Total derivative, Jacobian, Maxima and Minima of functions of two variables, Lagrange's method of undetermined multipliers.

UNIT-IV: MULTIVARIABLE CALCULUS (INTEGRATION)   **(9 Periods)**

Evaluation of Double integrals (Cartesian and polar coordinates), Change of order of integration (Cartesian form only); Evaluation of Triple integrals; Change of variables: double integration from Cartesian to polar coordinates, Triple integration from Cartesian to spherical and cylindrical polar coordinates; Areas enclosed by plane curves.

UNIT-V: MULTIVARIABLE CALCULUS (VECTOR CALCULUS)   **(9 Periods)**

Vector Differentiation: Scalar and Vector fields: Gradient of a scalar field, directional derivative, divergence of a vector field, solenoidal vector, curl of a vector field, irrotational vector, Laplacian operator. **Vector Integration:** Line integral-circulation-work done, Surface integral-flux and Volume integral; Vector integral theorems: Theorems of Green, Gauss and Stokes (without proofs).

Total Periods: 45

Topics for self-study are provided in the lesson plan.

TEXT BOOKS:

1. T. K. V. Iyengar, B. Krishna Gandhi, S. Ranganatham and M.V.S.S.N. Prasad, *Engineering Mathematics, vol-1*, S. Chand and Company, 13th edition, 2014.

2. B. S. Grewal, *Higher Engineering Mathematics*, Khanna publishers, 44th edition, 2017.

REFERENCE BOOKS:

1. Dennis G. Zill and Warren S. Wright, *Advanced Engineering Mathematics*, Jones and Bartlett, 6th edition, 2011.

2. R. K. Jain and S. R. K. Iyengar, *Advanced Engineering Mathematics*, Alpha Science International Ltd., 6th edition, 2017.

I B. Tech - I Semester

(19BT1BS02) BIOLOGY FOR ENGINEERS

(Common to EEE, ECE, EIE, CSE(AI) & CSE(DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	2	-	-	2

PRE-REQUISITES: --

COURSE DESCRIPTION: Living Organisms; Proteins, Nucleic acids and Enzymes; Genetics and Molecular Biology; Recombinant DNA technology; Human Physiology and Applied Biology.

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

CO1. Apply the basic knowledge of biology to understand the significance of various biological techniques.

CO2. Identify the role of DNA in the molecular basis of information transfer and understand single gene disorders related to the health perspective.

CO3. Apply the basic knowledge of bio-analytical devices and methods to assess health issues.

DETAILED SYLLABUS:

UNIT-I: LIVING ORGANISMS (6 Periods)

Comparison of biological organisms with man-made systems, Classification of living organisms, Cellular basis of life, differences between prokaryotes and eukaryotes, classification on the basis of carbon and energy sources, molecular taxonomy

UNIT-II: PROTEINS, NUCLEIC ACIDS AND ENZYMES (6 Periods)

Biomolecules, structure and functions of proteins and nucleic acids, Industrial applications of enzymes, Fermentation and its industrial applications

UNIT-III: GENETICS AND MOLECULAR BIOLOGY (6 Periods)

Mendel's laws, single gene disorders in humans, Genetic code, DNA replication, Transcription, Translation.

UNIT- IV: RECOMBINANT DNA TECHNOLOGY (6 Periods)

Recombinant DNA Technology: recombinant vaccines, transgenic microbes, plants and animals, animal cloning, biosensors, biochips.

UNIT–V: HUMAN PHYSIOLOGY AND APPLIED BIOLOGY (6 Periods)

Fundamentals of Human physiology, neurons, synaptic and neuromuscular junctions, Introduction to EEG, DNA fingerprinting, DNA Micro array and Genomics.

Total Periods: 30

Topics for self-study are provided in the lesson plan.

TEXT BOOKS:

1. Rajiv Singal, GauravAgarwal, *Biology for Engineers*, CBS, 2019.

2. S. Sing and T. Allen, *Biology for Engineers*, Vayu Education of India, 2014.

REFERENCE BOOKS:

1. B. Alberts, A. Johnson et al., *The molecular biology of the cell*, Garland Science, 6th edition, 2014.

2. A. T. Johnson, *Biology for Engineers*, CRC press, 2011.

ADDITIONAL LEARNING RESOURCES:

1. Structure and function of Proteins: https://nptel.ac.in/courses/104102016/16

2. Enzyme catalysis: https://nptel.ac.in/courses/103103026/module3/lec35/4.html

3. Biochips: https://nptel.ac.in/courses/112104029/3

I B. Tech. - I Semester

(19BT1BS03) ENGINEERING PHYSICS

(Common to EEE, ECE, EIE, CSE(AI), CSE(DS) & CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --

COURSE DESCRIPTION: Wave Optics; Electromagnetic Waves; Fiber Optics; Semiconductors; Dielectrics; Magnetism; Superconductors and Nanomaterials

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

CO1. Apply the knowledge of light waves to interpret the concepts of Interference, Diffraction and Polarization

CO2. Demonstrate the concepts of electromagnetic wave propagation in an Optical fibers.

CO3. Apply the basic knowledge of semiconductors to understand the functioning of various optoelectronic devices.

CO4. Demonstrate the basic knowledge of dielectric and magnetic properties to understand the various dielectric polarizations and magnetic materials.

CO5. Understand the concepts of superconductors and nanomaterials to familiarize their applications in relevant fields.

DETAILED SYLLABUS:

UNIT-I: WAVE OPTICS **(9 Periods)**

Interference: Principle of superposition - Interference of light - Theory of interference fringes - Conditions for sustained interference - Interference in thin films (reflected light) - Newton's rings - Determination of wavelength.

Diffraction: Fraunhofer diffraction - Single slit diffraction - Diffraction grating - Grating spectrum - Determination of wavelength.

Polarization: Polarization by reflection, refraction and double refraction - Nicol's prism - Half wave and Quarter wave plate - Engineering applications of interference, diffraction and polarization.

UNIT-II: ELECTROMAGNETIC WAVES AND FIBER OPTICS **(10 Periods)**

Divergence, Curl of Electric and Magnetic Fields - Maxwell's Equations (qualitative)- Electromagnetic wave propagation (conducting and non conducting media).

Introduction to fiber optics - Total Internal Reflection - Critical angle of propagation - Acceptance angle, Acceptance cone - Numerical Aperture - Classification of fibers based on Refractive index profile, modes - Attenuation losses - Dispersion - Propagation of electromagnetic wave through optical fiber - Block diagram of fiber optic communication - Applications of an optical fiber - Fiber optic Sensors (temperature, displacement).

UNIT-III: SEMICONDUCTORS   (10 Periods)

Origin of energy bands - Classification of solids based on energy bands - Intrinsic semiconductors - Density of electrons in intrinsic semiconductor - Density of holes in intrinsic semiconductor (qualitative) - Intrinsic carrier concentration - Fermi energy - Electrical conductivity of intrinsic semiconductors - Extrinsic semiconductors - Density of charge carriers in n-type - Density of charge carriers in p-type (qualitative) - Direct and Indirect band gap semiconductors - Hall effect, Hall coefficient - Applications of Hall effect - Drift and Diffusion currents -pn junction - Semiconducting materials for optoelectronic devices : Photodiode and Semiconductor diode laser.

UNIT-IV: DIELECTRICS AND MAGNETISM   (9 Periods)

Introduction to dielectrics - Electric polarization - Dielectric polarizability, susceptibility and dielectric constant - Types of polarizations (qualitative) - Frequency dependence of polarization - Lorentz (internal) field - Dielectric break down - Piezoelectricity - Applications of dielectrics.

Introduction to magnetics - Magnetic dipole moment, magnetization, magnetic susceptibility and permeability - Origin of magnetic moment - Classification of magnetic materials - Hysteresis loop - Soft and hard magnetic materials.

UNIT-V: SUPERCONDUCTORS AND NANOMATERIALS   (7 Periods)

Introduction to Superconductors, Properties - Critical parameters of Superconductors - Meissner effect - Penetration depth - Types of Superconductors - BCS Theory - Josephson effect (AC & DC) - High T_C Superconductors - Applications.

Basic principles of nanomaterials - Synthesis of nanomaterials by PLD method - Properties of nanomaterials (Electrical, Magnetic, Optical and Mechanical) - Applications of nanomaterials.

Total Periods: 45

Topics for self-study are provided in the lesson plan

TEXT BOOKS:

1. M. N. Avadhanulu, P. G. Kshirsagar& T.V. S. Arun Murthy, *A Text book of Engineering Physics*, S. Chand Publications, 11th edition, 2019.

2. P. K. Palaniswamy,*Engineering Physics*, Scitech Publications India Private Limited, 2nd edition, 2009.

REFERENCE BOOKS:

1. K. Thyagarajan, *Engineering Physics*, McGraw-Hill Education (India) Pvt. Ltd, 2016.

2. R. K. Gaur and S. L. Gupta, *Engineering Physics*, DhanpatRai Publications (P) Ltd, 2015.

I B. Tech. – I Semester

(19BT10341) BASIC CIVIL AND MECHANICAL ENGINEERING

(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --

COURSE DESCRIPTION: Overview of Civil Engineering; Surveying, Civil Engineering Materials, Mechanics of Materials, Building Components, Civil Engineering Infrastructure; Overview of Basic Mechanical Engineering; Internal Combustion Engines and Turbines, Mechanical Power Transmission Systems, Manufacturing Processes, Machining Processes, Non-Conventional Machining.

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

CO1.   Apply the basic principles of civil engineering, Techniques and tools for analyzing civil structures and solve related problems.

CO2.   Describe the working of principles of basic mechanical engineering and solve problems related to it.

DETAILED SYLLABUS:

Part – A: CIVIL ENGINEERING

UNIT–I: SURVEYING AND CIVIL ENGINEERING MATERIALS   (10 Periods)

Overview of Civil Engineering: Civil Engineering contributions to the welfare of society, specialized sub disciplines in Civil Engineering.

Surveying: Objectives, classification and principles; Measurements – distances, angles, levels, areas and volumes; contouring; Illustrative examples.

Civil Engineering Materials: Bricks, stones, concrete, steel, glass, timber, composite materials.

Mechanics of Materials: Forces, system of forces, laws of mechanics ,moment of a force, equilibrium, resultant, Internal and External forces, Stress, Strain, Hooke's law and Elasticity.

UNIT–II: BUILDING COMPONENTS AND CIVIL ENGINEERING INFRASTRUCTURE

(8 Periods)

BUILDING COMPONENTS:

Sub structure - Types of foundations, Bearing capacity and settlement, Requirement of good foundations.

Superstructure - Civil engineering construction - Brick masonry, Stone masonry, Beams, Columns, Lintels, Roofs, Floors, Stairs, Building bye-laws - bye-laws floor area, carpet area and floor space index, basics of interior design and landscaping.

Civil Engineering Infrastructure - Types of Bridges and Dams, Water supply and Sanitary systems, Rainwater harvesting, Types of Highways and Railways, Ports and Harbours.

Part – B: MECHANICAL ENGINEERING

UNIT–III: INTERNAL COMBUSTION ENGINES, TURBINES AND PUMPS

(9 Periods)

Overview of Mechanical Engineering: Introduction to Mechanical Engineering, specialized sub disciplines in Mechanical Engineering.

Internal Combustion Engines - Classification – Working principle of Petrol and Diesel Engines – Four stroke and two stroke engines – Comparison of four stroke and two stroke engines.

Turbines and Pumps – Classifications of Steam turbines - Impulse turbine, Reaction turbines; Working principle of Reciprocating Pumps (single acting and double acting) and Centrifugal Pumps.

UNIT–IV: MECHANICAL POWER TRANSMISSION SYSTEMS **(9 Periods)**

Power Transmission Systems: Belt, rope and chain drives, Gears and Transmission screw

Power transmission by belts: Classification of belts, Length of the Belt (Open and Crossed-Belt Drives), Power Transmitted by Belt Drive, Tension due to Centrifugal Forces, Initial Tension, Maximum Power Transmitted.

Power transmission by Gear train: Gear terminology, Classification of gears, Gear train- Simple Gear Train and Compound Gear Train, Power Transmitted by Simple Gear Train.

UNIT –V: MANUFACTURING PROCESSES **(9 Periods)**

Manufacturing processes: Elementary ideas of Casting, Forging, Rolling, Welding, Soldering and Brazing.

Machining processes- Lathe-Turning, Taper turning, Thread cutting, Shaping, Drilling, Grinding, Milling (simple sketches and short notes).

Total Periods: 45

Topics for self-study are provided in the lesson plan

TEXTBOOKS:

1. Shanmugam G. and Palanichamy M.S., *Basic Civil and Mechanical Engineering*, Tata McGraw Hill PublishingCo.,NewDelhi, 1st edition 2018.

2. R. Vaishnavi, M. Prabhakaran& V. Vijayan, *Basic Civil and Mechanical Engineering*, S.CHAND Publications, 2nd edition, 2013.

3. B.C Punmia, Ashok Kumar Jain, Arunkumar Jain, *Surveying (vol-I),* Laxmi publications, 16th edition, 2005.

4. B. C Punmia, Ashok Kumar Jain, Arunkumar Jain, *Building Construction,* Laxmi publications, 10th edition, 2008.

REFERENCES:

1. Seetharaman S., *Basic Civil Engineering*, Anuradha Agencies, 2005.

2. Ramamrutham S., *Basic Civil Engineering*, DhanpatRai Publishing Co.(P) Ltd.1999.

3. Kalpakjian, Serope, *Manufacturing Engineering and Technology,* Pearson Education, 7th edition, 2014.

4. Prabhu.T.J, Jai Ganesh. V and Jebaraj.S, *Basic Mechanical Engineering*, Scitech Publications, Chennai, 2000.

5. Pravin Kumar, *Basic mechanical engineering* Pearson Education, 1st edition, 2013.

I B. Tech. – I Semester

(19BT10201) BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

(Common to EEE, ECE, EIE, CSE(AI), CSE(DS) & CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --

COURSE DESCRIPTION: Principles of Electrical Systems; AC Machines; Semiconductor Devices and Op-Amps.

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

CO1. Analyze electrical circuits by applying the conceptual knowledge of circuit elements.

CO2. Demonstrate knowledge on various generation technologies, protection devices, safety procedures and BEE standards.

CO3. Demonstrate knowledge on characteristics and applications of transformers and AC machines.

CO4. Demonstrate knowledge on characteristics and applications of diode, BJT and Op-amps.

DETAILED SYLLABUS:

UNIT-I: PRINCIPLES OF ELECTRICAL SYSTEMS-I   (9 Periods)

Basic electrical sources: DC-Battery, AC sources–Single loop generator; Single phase and three phase supply; Electrical circuit elements (R, L and C), Ohm's law, Kirchhoff's laws, Representation of sinusoidal waveforms, peak and RMS values, phasor representation, reactive power, apparent power, real power, energy and power factor.

UNIT-II: PRINCIPLES OF ELECTRICAL SYSTEMS-II   (9 Periods)

Significance of Power factor and power factor correction, most economical power factor. Typical layout of electrical grid; Typical layout and operation of Hydro, Thermal and Solar Power Plants; Fuse, circuit breaker (MCB, MCCB, RCCB, ELCB), relay (elementary treatment); Inverter and UPS (block diagram approach only). Earthing – importance of earthing, pipe earthing and plate earthing; Safety measures. Energy Efficiency (Star rating) standards by BEE.

UNIT-III: TRANSFORMERS AND AC MACHINES   (9 Periods)

Construction and working of a single phase transformer, EMF Equation; Construction and working of three phase induction motor, torque equation, torque-slip characteristics, applications; construction and working of a resistor start &capacitor start and run single phase induction motor, applications; Construction and working of synchronous machine, applications.

UNIT-IV: SEMICONDUCTOR DEVICES (10 Periods)

PN Junction diode, Characteristics, applications - half wave and full wave rectifier. Zener diode, characteristics, application–Regulator. BJT- operation, configurations, characteristics, applications - switch and amplifier.

UNIT-V: OP-AMPS (8 Periods)

Operational Amplifier: Block diagram of Op-Amp, equivalent circuit, Op-Amp AC and DC Characteristics, Inverting and Non-Inverting modes. Applications - Adder, Comparator, Integrator and Differentiator.

Total Periods: 45

Topics for self-study are provided in the lesson plan

TEXT BOOKS:

1. Ashfaq Hussain*, Fundamentals of Electrical Engineering,* Dhanpatrai & Co. (P) Ltd., 3rd edition, 2009.

2. R. L. Boylestad and Louis Nashelsky, *Electronics Devices and Circuits*, PHI, 11th edition, 2009.

REFERENCE BOOKS:

1. M.S. Naidu, S. Kamakshaiah, *Introduction to Electrical Engineering ,*Tata McGraw-Hill Education, New Delhi, 2007.

2. D. Roy Chowdhury, *Linear Integrated Circuits*, New Age International Pvt. Ltd., 4th edition, 2011.

I B. Tech. - I Semester

(19BT1BS31) ENGINEERING PHYSICS LAB

(Common to EEE, ECE, EIE, CSE(AI), CSE(DS) & CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: --

COURSE DESCRIPTION: Determination of wavelength of light and thickness of a thin film; numerical aperture and acceptance angle of optical fiber; Characteristics of various semiconductor diodes; Resistivity of semiconductor; magnetic field along axial line of a current carrying coil

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

CO1. Apply the basic knowledge of light waves and semiconductors to demonstrate the functioning of optoelectronic devices.

CO2. Understand the experimental procedures to calculate the thickness of a thin film, Hall coefficient, Hysteresis losses, and acceptance angle of an optical fiber.

CO3. Determine the experimental values of magnetic field induction, wave length of a light source, energy gap of a semiconductor.

CO4: Apply skills to plot characteristic curves to determine the various parameters of semiconductor diodes.

CO5. Work independently and in teams to solve problems with effective communication.

List of Engineering Physics Experiments:

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

1. Determine the thickness of the wire using wedge shape method.
2. Determination of wavelength of light source by Newton's ring method.
3. Determination of wavelength by plane diffraction grating method.
4. Estimation of magnetic field along the axis of a circular coil carrying current.
5. Study the variation of Magnetic field induction (B) vs Magnetic field strength (H) by magnetizing the magnetic material (B-H Curve).
6. Determination the numerical aperture of a given optical fiber and hence to estimate its acceptance angle.
7. Determination of number of charge carriers and Hall coefficients of a given semiconductor using Hall Effect.
8. Determine the resistivity of semiconductor by Four probe method.
9. Determine the energy gap of a semiconductor.
10. Study the I-V characteristics of pn junction diode.
11. Estimation of threshold voltages of different LED's.
12. Study the characteristics of Photodiode.
13. Determination of wavelength of laser by using diffraction grating.

REFERENCES:

1. S. Balasubramaniah and M.N. Srinivasan, *A Text book of practical physics*, S Chand Publications, 2017.

2. *http://vlab.amrita.edu/index.php* - Virtual Labs, Amrita University.

(19BT10231) **BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB**

(Common to EEE, ECE, EIE, CSE(AI), CSE(DS) & CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: Physics at intermediate level.

COURSE DESCRIPTION: Practical investigations on Electrical circuits, AC Machines, Semiconductor Devices and Op-Amps.

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

CO1. Analyze, measure, interpret and validate the practical observations by applying the fundamental knowledge of electrical circuits, machines and electronic devices.

CO2. Design Op-amp based amplifier, voltage summer and integrator circuits for desired specifications.

CO3. Work independently and in teams to solve problems with effective communication.

List of Experiments:

Minimum Ten experiments are to be conducted.

1. Measurement of electrical quantities (AC & DC) using Voltmeter, Ammeter and Wattmeter.

2. Verification of Ohm's law and Kirchhoff's laws.

3. Circuit
   (a) with one lamp controlled by one switch and provision of 2-pin or 3-pin socket PVC surface conduit system.
   (b) With two lamps controlled by two switches with PVC surface conduit system.
   (c) for Stair case wiring and Godown wiring.

4. Measurement of Power factor and it's improvement.

5. Load test on 1-Phase Transformer.

6. Brake test on 3-Phase Induction Motor.

7. Brake test on 1- phase induction motor.

8. VI Characteristics of PN and Zener Diodes.

9. Ripple factor and load regulations of rectifier with and without filters.

10. Input and output characteristics of CE configuration.

11. Design of inverting and non-inverting amplifiers using op-amp.

12. Design of voltage summer and integrator using op-amp.

13. Soldering practice.

REFERENCES BOOKS/ LAB MANUALS:

1. P. S. Dhogal, *Basic Practicals in Electrical Engineering*, Standard Publishers, 2004.

2. YannisTsividis, *A First Lab in Circuits and Electronics*, Wiley, 1st edition., 2001

ADDITIONAL LEARNING RESOURCES:

1. www.vlab.co.in, Virtual Electric Circuits Lab, A initiative of MHRD under NMEICT.
2. www.vlab.co.in, Basic Electronics Lab, A initiative of MHRD under NMEICT.
3. https://nptel.ac.in/courses/117106108/
4. https://ocw.mit.edu/high-school/physics/exam-prep/electric-circuits/
5. https://nptel.ac.in/courses/108105017/
6. https://nptel.ac.in/courses/108108112/
7. https://nptel.ac.in/courses/117107094/

(19BT20331) ENGINEERING WORKSHOP

(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: --

COURSE DESCRIPTION: Knowledge on various workshop hand and power tools; hands on experience in different manufacturing trades such as fitting, carpentry, sheet metal forming and foundry; Demonstration on dismantling and assembling of various two wheeler parts, power tools in machining and metal joining, basics of plumbing and working of 3D printer.

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

CO1. Design and model various basic prototypes in the trade of fitting such as square/half round mating, V- mating and dovetail mating from the given MS workpieces using fitting tools.

CO2. Develop different prototypes in the carpentry trade such as cross lap joint, dovetail / bridle joints and Mortise and Tenon joint using carpentry tools.

CO3. Design and model different prototypes in the sheet metal forming trade such as rectangular tray, square vessel/cylinder, Funnel as per the dimensions using sheet metal forming tools.

CO4. Develop sand mold using single piece pattern and split piece pattern in the foundry trade using foundry tools.

CO5. Demonstrate the knowledge on automobile parts, power tools, plumbing operation, 3D printing technology involved in different engineering applications.

CO6. Work independently / in groups & communicate effectively in oral and written forms.

DETAILED SYLLABUS:

FITTING: Conduct a detailed study on various aspects in fitting trade which includes the details of fitting operations, safety precautions, types of tools, tool holders, miscellaneous tools, care and maintenance of hand tools, marking and measurement tool, and finishing tool.

List of Exercises :

1. Make a square/half round mating from the given MS workpieces
2. Make a V- mating from the given MS workpieces
3. Make a dovetail mating from the given MS workpieces

CARPENTRY: Conduct a detailed study on various aspects in carpentry trade which includes the details of types of wood, carpentry tools, wood working techniques, types of joints, safety precautions, and care and maintenance of tools.

List of Exercises:

4. Prepare a cross lap joint
5. Prepare dovetail / bridle joints
6. Prepare a Mortise and Tenon joint.

SHEET METAL FORMING: Conduct a detailed study on various aspects in sheet metal forming which includes the details of sheet materials, hand tools, sheet metal fabrication, and safety and precautions

List of Exercises:

7. Fabricate a rectangular tray as per the dimensions
8. Fabricate square vessel/cylinder as per the dimensions
9. Fabricate a Funnel as per the dimensions

FOUNDRY: Conduct a detailed study on various aspects in foundry which includes the details of moulding sand, properties of moulding sand, types of patterns and pattern, materials, foundry tools, and safety and precautions

List of Exercises:

10. Prepare a sand mold, using the given single piece pattern (stepped pulley/cube)
11. Prepare a sand mold, using the given split piece pattern (pipe bent/dumbbell)

DEMONSTRATION:

12. Demonstrate the dismantling and assembling of various two wheeler parts
13. Demonstrate the usage of power tools.
14. Demonstrate the plumbing operation and identify the essential tool and materials required for plumbing.
15. Demonstrate the working of 3D printer

Note: Student shall perform any **Twelve Exercises**

REFERENCE BOOKS/LABORATORY MANUALS:

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

ADDITIONAL LEARNING RESOURCES:

1. R. K. Jain, *Production Technology*, Khanna Publishers, 17th edition, 2012.
2. Kalpakjian, Serope, *Manufacturing Engineering and Technology*, Pearson Education, 7th edition, 2014.

I B. Tech. – I Semester

(19BT1AC01) SPOKEN ENGLISH

(Common to EEE, ECE, EIE, CSE(AI) & CSE(DS))

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

PRE-REQUISITES: --

COURSE DESCRIPTON: Functional English; Vocabulary Building; Functional Grammar-I; Functional Grammar – II; Communication Skills.

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

CO1: Demonstrate knowledge of grammar and vocabulary in writing effective formal letters and e-mails.

CO2: Communicate effectively by applying appropriate speaking and writing techniques by examining and applying functional English.

DETAILED SYLLABUS:

UNIT-I: FUNCTIONAL ENGLISH: (6 Periods)

Introduction - Functional Spoken English; Self Introduction; **Listening – Speaking:** Do's and Don'ts; **Expressing:** Ability / Admiration / Agreement / Annoyance / Appreciation / Pleasure / Sarcasm / Satisfaction / Surprise / Approval / Certainty/ Doubt / Gratitude / Possibility / Fear / Worry / Condolences; **Asking for:** Advice / Clarification / Direction / Information / Permission; **Making:** Predictions / recommendations.

UNIT-II: VOCABULARY BUILDING   (6 Periods)

Introduction: Vocabulary for day-to-day conversations; Vegetables / Groceries / Fruits / Weather; Parts of a Human body / Dresses / Furniture / Relations; Birds / Cries of Animals; Food / Hospitality / Houses / Rooms / Tools; Airport / News Paper / Books / Gems; Corporate Vocabulary / Jobs / Occupations / Diseases; British / American spelling; Slang Words and Technical Jargon.

UNIT-III: FUNCTIONAL GRAMMAR - I   (6 Periods)

Parts of Speech, Verb forms; Tenses; Voice; Speech.

UNIT–IV: FUNCTIONAL GRAMMAR - II   (6 Periods)

Universal Auxiliaries; Sentence Structure - WH - Questions - How to frame Questions and give answers; Question Tags; Subject and verb agreement; Spotting Errors.

UNIT-V: COMMUNICATION SKILLS   (6 Periods)

Polite, Courteous and Diplomatic expressions; Good Manners and Etiquette; Conversation Techniques; Narrating Stories.

                                                                Total Periods: 30

Topics for self-study are provided in the lesson plan

TEXT BOOKS:

1. L. Adinarayana and V. Prakasam, *Spoken English*, Neelkamal Publications Pvt. Ltd., New Delhi, 2008.

2. Ram BhaskerRaju, *The Complete Book on Spoken English*, Goutham Buddha Publications, Hyderabad, 2002.

REFERENCE BOOKS:

1. Sabina Pillai, *Spoken English for my World,* Oxford University Press, New Delhi, 2016.

2. K. R. Lakshminarayanan, *Speak in English,* Scitech Publications, Chennai, 2009.

ADDITIONAL LEARNING RESOURCES

1. https://www.britishcouncil.in/programmes/english-partnerships/state/skills-projects/AP-English-Skills.

2. https://www.fluentu.com/blog/english/websites-to-learn-english

I B. Tech. - II semester

(19BT2BS01) TRANSFORMATION TECHNIQUES AND LINEAR ALGEBRA

(Common to CE, ME, EEE, ECE, EIE, CSE, CSSE, IT, CSE(AI) & CSE(DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES: --

COURSE DESCRIPTION: Fourier Series and Fourier Transforms; Laplace Transforms; Inverse Laplace Transforms; Linear Algebra-I (Matrices); Linear Algebra-II (Vector Spaces).

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

CO1. Apply the knowledge of Fourier and Laplace transform techniques to solve differential equations.

CO2. Analyze linear transformations and associated matrices to solve engineering problems by applying the knowledge of linear algebra.

DETAILED SYLLABUS:

UNIT-I: FOURIER SERIES AND FOURIER TRANSFORMS   (9 Periods)

Fourier series: Determination of Fourier coefficients, Euler's formulae, convergence of Fourier series (Dirichlet's conditions), Fourier series in $(0,2l),(-l,l)$; Fourier series of even and odd functions; Half-range Fourier sine and cosine expansions in $(0,l)$; Fourier integral theorem (statement only), Fourier sine and cosine integrals; Fourier transforms, Fourier sine and cosine transforms, Inverse Fourier transforms.

UNIT-II: LAPLACE TRANSFORMS   (9 Periods)

Definition of Laplace transform, existence conditions, Laplace transform of standard functions, Properties of Laplace transforms, Laplace transforms of derivatives, Laplace transforms of integrals, multiplication by t^n, division by t, Laplace transform of periodic functions, Laplace transforms of unit step function and unit impulse function.

UNIT- III: INVERSE LAPLACE TRANSFORMS   (9 Periods)

Inverse Laplace transform by different methods; Convolution theorem (without proof), inverse Laplace transforms by convolution theorem; Applications of Laplace transforms to ordinary differential equations of first and second order with constant coefficients.

UNIT- IV: LINEAR ALGEBRA-I (MATRICES)   (9 Periods)

Rank of a matrix: echelon form; Linear systems of equations: solving system of Homogeneous and Non-Homogeneous equations; Eigen values and Eigen vectors of a matrix and properties (without proofs), Diagonalization of a matrix by orthogonal transformation; Quadratic forms and nature of the quadratic forms, reduction of quadratic form to canonical form by orthogonal transformation.

UNIT- V: LINEAR ALGEBRA-II (VECTOR SPACES)   **(9 Periods)**

Vector spaces, Linear dependence and independence of vectors, basis, dimension, Linear transformations (maps), range and kernel of a linear map, rank and nullity, inverse of a linear transformation, rank-nullity theorem (without proof), matrix associated with a linear map.

Total Periods: 45

Topics for Self study are provided in the Lesson Plan

TEXT BOOKS:

1. T. K. V. Iyengar, B. Krishna Gandhi, S. Ranganatham and M. V. S. S. N. Prasad, *Engineering Mathematics-II*, S. Chand & Company, 10th edition, 2016.

2. B. S. Grewal, *Higher Engineering Mathematics*, Khanna publishers, 44th edition, 2017.

3. David Poole, *Linear Algebra: A Modern Introduction*, Brooks/Cole, 2nd edition, 2005.

REFERENCE BOOKS:

1. B. V. Ramana, *Higher Engineering Mathematics*, Tata McGraw hill, 1st edition, 2017.

2. V.Krishna Murthy, Mainra and Arora: *An Introduction to Linear Algebra*, Affiliated East-West Press, 1993.

I B. Tech. - II Semester

(19BT1BS04) ENGINEERING CHEMISTRY

(Common to EEE, ECE, EIE, CSE(AI) & CSE(DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --

COURSE DESCRIPTION: Atomic Structure and Bonding Theories; Water Treatment; Electrochemistry and Applications; Corrosion; Instrumental Methods and Applications; Fuel chemistry and Lubricants.

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

CO1. Apply the basic knowledge of quantum mechanical approach to atomic structure and bonding theories to identify shapes of different orbitals and molecules.

CO2. Analyze and solve problems associated with hardness of water, boiler troubles and address the societal, health and safety issues related to quality of water.

CO3. Apply the basic knowledge of corrosion phenomenon to identify solutions for control of corrosion and demonstrate competency in the basic concepts of electrochemical cells.

CO4. Demonstrate the basic knowledge of instrumental methods and their applications in the structural analysis of materials.

CO5. Apply the basic knowledge of fuel chemistry and lubricants to identify the quality of fuels and lubricants.

DETAILED SYLLABUS:

UNIT-I: ATOMIC STRUCTURE AND BONDING THEORIES   (9 Periods)

Quantum-mechanical model of atom, Schrodinger wave equation, significance of Ψ and Ψ^2, applications to particle in a box and hydrogen atom; Molecular orbital theory – bonding in homo and hetero nuclear diatomic molecules – energy level diagrams of N_2, O_2, NO and CO; Π-molecular orbitals of butadiene and benzene; VSEPR theory and molecular shapes.

UNIT-II: WATER TREATMENT   (9 Periods)

Introduction, types of water, Impurities in water and their consequences. Hardness of water, units of hardness, disadvantages of hardness, measurement of hardness by EDTA method, numerical problems on measurement of hardness of water, boiler troubles-priming & foaming, scales & sludge, caustic embrittlement, boiler corrosion, softening of water– Ion exchange process, zeolite process, desalination of brackish water by reverse osmosis, Drinking water treatment- Ozonisation & chlorination, specifications of potable water as per WHO and BIS standards. Fluoride in ground water: Effects on human health, defluoridation method – Nalgonda method; merits and demerits of various defluoridation methods.

UNIT-III: ELECTROCHEMISTRY AND APPLICATIONS   (10 Periods)

Electrode potential, Nernst equation, reference electrodes (Calomel electrode and glass electrode), electrochemical cell, cell potential calculations. Primary cells – dry cell, alkali metal sulphide batteries, Secondary cells – lead acid, lithium ion batteries, Fuel cells - Hydrogen-oxygen fuel cell, Methanol-oxygen fuel cell, Solid-oxide fuel cell.

Corrosion: Introduction, Definition, types of corrosion- wet (galvanic corrosion, concentration cell corrosion) and dry corrosion, Factors influencing corrosion, control of corrosion- sacrificial anodic protection, Impressed current cathodic protection, electroplating method (Nickel).

UNIT-IV: INSTRUMENTAL METHODS AND APPLICATIONS   (9 Periods)

Introduction to spectroscopy–types of energy present in molecules, types of spectra, UV-Vis spectroscopy – principle, types of electronic transitions, chromophore, auxochrome, Bathochromic shift, Hypsochromic shift, Instrumentation of UV-Vis spectrophotometer, applications; Infrared spectroscopy – principle, types of vibrational modes, group frequencies, Instrumentation of IR spectrophotometer, applications. principle and applications of physicochemical methods (SEM, TEM, X-ray diffraction).

UNIT-V: FUEL CHEMISTRY AND LUBRICANTS   (8 Periods)

Fuel chemistry: Types of fuels, calorific value, numerical problems based on calorific value; Liquid fuels, cracking of oils (Thermal and Fixed-bed catalytic cracking), knocking and anti-knock agents, Octane and Cetane values, Synthetic petrol: Fischer-Tropsch method and Bergius process.

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

Total Periods: 45

Topics for self-study are provided in the lesson plan

TEXT BOOKS:

1. P. C. Jain & Monika Jain, *Engineering Chemistry*, DhanpatRai Publishing Company (P) Ltd, New Delhi, 16th edition, 2013.

2. K. N. Jayaveera, G. V. Subba Reddy and C. Ramachandriah, *Engineering Chemistry,* Mc.Graw Hill Publishers, New Delhi.

REFERENCE BOOKS:

1. J. D. Lee, *Concise Inorganic Chemistry*, Oxford University Press, 5th edition 2010.

2. Skoog and West, *Principles of Instrumental Analysis*, Thomson, 6th edition, 2007.

3. Peter Atkins, Julio de Paula and James Keelar, *Atkins' Physical Chemistry*, Oxford University Press, 10th edition, 2010.

(19BT1HS01) **COMMUNICATIVE ENGLISH**

(Common to EEE, ECE, EIE, CSE(AI) & CSE(DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: --

COURSE DESCRIPTION: Introduction to communication; Active listening; Effective speaking; Reading; Technical writing.

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

CO1: Demonstrate knowledge of English language, examining and applying the aspects of Process of communication, Paralinguistic features, Skimming, Scanning, and Elements of style in writing.

CO2: Analyze the modes and techniques of listening, speaking, reading, writing and apply appropriately to communicate effectively with the engineering community and society.

CO3: Apply reading and writing techniques in preparing documents by examining SQ3R Technique, Writer's Block, and Précis Writing.

CO4: Communicate effectively applying appropriate speaking techniques by examining and applying the communication styles in Conferences, Symposia, Seminars and Persuasive Speaking.

DETAILED SYLLABUS:

UNIT- I: INTRODUCTION TO COMMUNICATION (9 Periods)

Introduction – Language as a Tool of Communication – Communicative Skills (Listening, Speaking, Reading and Writing) – Effective Communication – Modes of Communication– Barriers to Communication (classification) - Case study

UNIT-II: ACTIVE LISTENING (9 Periods)

Introduction –Traits of a Good Listener – Listening Modes – Types of Listening – Barriers to Effective Listening – Listening for General Content and Specific Information - Case study

UNIT-III: EFFECTIVE SPEAKING (9 Periods)

Introduction – Achieving Confidence, Clarity and Fluency – Paralinguistic Features – Barriers to Speaking – Types of Speaking – Conferences; significance, planning and preparation and procedure – Symposia and Seminars - Persuasive Speaking - Case study

UNIT-IV: READING (9 Periods)

Introduction – Reading and Interpretation – Intensive and Extensive Reading – Critical Reading ––Techniques for Good Comprehension- SQ3R Reading Technique –Study Skills - Case study

UNIT- V: TECHNICAL WRITING (9 Periods)

Introduction – Language – Elements of Style – Techniques for Good Technical Writing – Paragraphs Construction – Essays: types, Steps to Essay Writing and Checklist – Précis Writing - Case study

Total Periods: 45

Topics for self-study are provided in the lesson plan

TEXT BOOKS:

1. Meenakshi Raman &Sangeetha Sharma, *Technical Communication*, Oxford University Press, New Delhi, 2012.

2. Ashraf Rizvi*, Effective Technical Communication*, McGraw-Hill Education (India) Pvt. Ltd., New Delhi, 2018.

REFERENCE BOOKS:

1. Sanjay Kumar &PushpLata, *Communication Skills*, Oxford University Press, New Delhi, 2013.

2. Rajendra Pal and J. S. Korlahalli, *Essentials of Business Communication*, Sultan Chand and Son, New Delhi, 2010.

ADDITIONAL LEARNING RESOURCES

1. https://www.skillsyouneed.com/ips/active-listening.html: A useful summary of what active listening skills are.

2. https://en.wikipedia.org/wiki/Active_listening: Wikipedia entry about active listening.

3. https://www.forbes.com/sites/womensmedia/2012/11/09/10-steps-to-effective-listening/#4b27a2503891: Ten steps to Active Listening (by Forbes magazine).

4. https://goo.gl/t1Uqrt: 20 tips for organizing a conference.

5. https://goo.gl/kPMr9u: 10 important issues for speakers at a conference.

6. https://goo.gl/C5bDvv: Wikihow guide to organizing a conference.

(19BT10501) PROGRAMMING FOR PROBLEM SOLVING

(Common to EEE, ECE, EIE & CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES: A course on Basic Mathematics

COURSE DESCRIPTION: Introduction to problem solving approach, Introduction to Python programming, control structures, sequences, sets, Dictionaries, Implementation of Data structures using Python, Modular programming, file handling, Data representation and Visualization.

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

CO1. Demonstrate knowledge on Python constructs to solve basic problems.

CO2. Develop and use Python modules to provide solutions to problems.

DETAILED SYLLABUS:

UNIT-I: INTRODUCTION TO PROBLEM SOLVING AND PYTHON PROGRAMMING

(10 Periods)

Problem Solving Aspect: top-down design, implementation of algorithms, building blocks of flow charts, program verification and efficiency of algorithms.

Python Programming: tokens, literals, identifiers, keywords, special symbols and operators; fundamental data types, expressions, type conversions, handling Input and output in Python.

UNIT-II: CONTROL STRUCTURES **(8 Periods)**

Selection Statements: if statement, if-else statement, if-elif-else statement, nested-if statement.

Iterative Statements: while loop, for loop, break statement, continue statement, pass and else statements used with loops.

UNIT-III: SEQUENCES, SETS, DICTIONARIES AND DATA STRUCTURES

(9 Periods)

Sequences: Lists and operations - creating, inserting elements, updating elements, deleting elements, searching and sorting, list comprehensions, nested lists; **tuples -** creating, searching and sorting, nested tuples; **strings -** Initializing a string and string operations, string handling methods, string formatting; **sets -** set creation and operations; **dictionaries -** operations on dictionaries, dictionary methods, sorting elements using lambdas.

Data structures: Stacks - push, pop, peek and display operations on stack, applications of stack; **Queues –** enqueue, dequeue and display operations on queue, applications of queues.

UNIT-IV: MODULAR PROGRAMMING AND FILE HANDLING   (10 Periods)

Modular Programming: need for functions, function definition, function call, variable scope and lifetime, return statement, positional arguments, keyword arguments, default arguments and variable-length arguments, recursive functions; Modules - math, NumPy, date and time.

File Handling: types of files, opening and closing files, reading and writing data.

UNIT-V: DATA REPRESENTATION AND VISUALIZATION   (8 Periods)

Pandas: creating data frame, reading data from CSV files, indexing and selecting data, dealing with rows and columns; Visualization - bar plots, histogram, Scatter Plot.

Total Periods: 45

Topics for self-study are provided in the lesson plan

TEXT BOOKS:

1. R. NageswaraRao, *Core Python Programming,* 2nd edition, Dreamtech Press, 2018.

2. R. G. Dromey, *How to solve i*t by Computer,* Pearson, 2006.

REFERENCE BOOKS:

1. ReemaThareja, *Python   Programming   using   Problem   Solving   Approach*, 1st edition, Oxford University Press, 2017.

2. Charles Dierbach, *Introduction to Computer Science using Python: A Computational Problem-Solving Focus*, Wiley India, 2016.

(19BT20241) NETWORK ANALYSIS

(Common to ECE & EIE)

Int. Marks	Ext. Marks	Total Marks		L	T	P	C
40	60	100		3	1	-	4

PRE-REQUISITES: Physics at Intermediate Level.

COURSE DESCRIPTION: Fundamentals of electrical circuits; Analysis of single phase AC circuits; Network theorems; Transient analysis and Two port networks.

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

CO1. Analyze and solve various DC and single phase AC circuits by applying conceptual knowledge of network reduction, analyzing techniques and theorems

CO2. Design the Components for resonant, transient circuits and Two-port networks meeting the specified needs using circuit concepts.

DETAILED SYLLABUS:

UNIT–I: FUNDAMENTALS OF ELECTRICAL CIRCUITS   (9 Periods)

Basic definitions of network, circuit, node, branch and loop; network reduction techniques-series, parallel, series-parallel circuits, current division and voltage division rules; source transformation, wye-to-delta and delta-to-wye transformations; nodal analysis and super node concept, mesh analysis and super mesh concept – numerical problems with dependent and independent AC & DC sources.

UNIT–II: ANALYSIS OF SINGLE PHASE AC CIRCUITS   (9 Periods)

Analysis of single phase AC circuits: impedance and admittance, impedance triangle; power triangle; Sinusoidal response of R, L and C elements with different combinations; current locus; Resonance, bandwidth and quality factor for series and parallel networks.

UNIT–III: NETWORK THEOREMS   (8 Periods)

Superposition, Thevenin's, Norton's, Maximum power transfer, Millmann's and Reciprocity theorems for DC & AC Excitations (without proof).

UNIT–IV: TRANSIENT ANALYSIS   (10 Periods)

Transient response of RL, RC and RLC for DC excitation and Sinusoidal excitation - Solution by using Differential equation and Laplace Transforms method.

UNIT–V: TWO PORT NETWORKS   (9 Periods)

Network Functions - Driving point and transfer functions. 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.

Total Periods: 45

Topics for self-study are provided in the lesson plan

TEXT BOOKS:

1. Charles K. Alexander, Mathew N O Sadiku, *Fundamentals of Electric Circuits*, 5th edition, McGraw Hill Education (India) Private Limited, NewDelhi, 2013.

2. A. Sudhakar, Shyammohan S Palli, *Circuits and Networks Analysis and Synthesis*, 5th edition, McGraw Hill Education (India) Private Limited, NewDelhi, 2015.

REFERENCE BOOKS:

1. J. A. Edminister, M. D. Nahvi, *Theory and Problems of Electric Circuits*, 4th edition, Schaum's outline series, McGraw Hill, New Delhi, 2004.

2. W H Hayt, J E Kemmerly, S M Durbin, *Engineering Circuit Analysis*, 6th edition, McGraw Hill, New Delhi, 2008.

ADDITIONAL LEARNING RESOURCES

1. https://nptel.ac.in/courses/117106108/
2. https://ocw.mit.edu/high-school/physics/exam-prep/electric-circuits/

I B. Tech. - II Semester

(19BT1BS32) ENGINEERING CHEMISTRY LAB

(Common to EEE, ECE, EIE, CSE(AI) & CSE(DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: --

COURSE DESCRIPTION: Estimation of hardness, alkalinity, dissolved oxygen of water samples, Iron, Strength of an acid in Pb-acid battery and residual chlorine in drinking water by volumetric methods; Measurement of viscosity of lubricants; Instrumental methods like conductivity meter, potentiometer, P^H meter and colorimeter; Characterization of simple organic compounds by UV-Vis and IR spectroscopy.

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

CO1. Apply analytical skills for the quantitative estimation of materials through volumetric methods of analysis and address the societal, health issues related to quality of water.

CO2. Develop analytical skills for the quantitative estimation of materials through instrumental methods of analysis.

CO3. Work independently and in teams to solve problems with effective communication.

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. Determination of alkalinity of Water sample
3. Estimation of Dissolved Oxygen in water by Winkler's method.
4. Estimation Fe (II) by Dichrometry
5. Conductometric titration of strong acid Vs strong base
6. Estimation of Ferrous ion by Potentiometry
7. Determination of strength of acid by P^H metric method
8. Determination of Strength of an acid in Pb-Acid battery
9. Determination of Viscosity by Ostwald's viscometer
10. Determination of percentage of Iron in Cement sample by colorimetry
11. Estimation of residual chlorine in drinking water.
12. Identification of simple organic compounds by UV-Vis and IR spectroscopy

TEXT BOOKS:

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

(19BT1HS31) COMMUNICATIVE ENGLISH LAB

(Common to EEE, ECE, EIE, CSE(AI) & CSE(DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: -

COURSE DESCRIPTION: Phonetics; Vocabulary Building; Grammar; Just a Minute; Elocution/Impromptu; Giving Directions; Role Plays; Public Speaking; Describing Objects; Reading Comprehension; Listening Comprehension; Information Transfer; Letter Writing

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

CO1: Demonstrate knowledge of Phonetics by examining and applying sounds of English in Phonetic Transcription.

CO2: Analyze sentence structures by applying and demonstrating the skills of Vocabulary and Grammar.

CO3: Apply appropriate listening and reading skills by analyzing the context and demonstrate in Listening Comprehension and Reading Comprehension.

CO4: Function effectively as an individual and as a member in diverse teams examining and applying speaking skills in Just A Minute and Role Play.

CO5: Communicate effectively applying appropriate writing and speaking techniques by examining and demonstrating knowledge through Describing Objects, Information Transfer and Letter Writing.

List of Exercises:

First Ten exercises are mandatory among the following:

1. Just a Minute, Elocution/Impromptu

   Steps to be followed – Useful tips – Dos & Don'ts – Preparation – Examples

2. Phonetics

   Sounds of English – Consonants – Vowels – Speech Organs – Phonetic Transcription – Word Accent – Basics of Intonation

3. Vocabulary Building

   Prefixes & Suffixes – Synonyms & Antonyms – Phrasal verbs – Idioms – One word substitutes – Words often confused

4. Grammar

   Tenses –Nouns – Word order and error correction

5. Giving Directions

   Useful phrases – Sample conversations - Exercises

6. Role Plays

   Useful tips – Dos & Don'ts – Exercises – Role Plays for practice

7. Public Speaking

Stage presence – Voice control – Body Language – Rehearsals – Audience – Delivery - Dos & Don'ts – Project Submission

8. Letter Writing

Introduction – Objective – Formats – Types – Exercises

9. Describing Objects

Jargon – Useful Phrases – Do's & Don'ts – Exercises

10. Listening Comprehension

Introduction – Types of listening – Practice – Benefits of listening – Exercises

11. Information Transfer

Tables – Pie Charts – Venn Diagrams – Graphs – Flow Charts – Steps to be followed – Exercises

12. Reading Comprehension

Introduction – Types of reading – Inferring – Critical analysis – Exercises

TEXT BOOK:

1. Communicative English Lab Manual (SVEC-19)

REFERENCE BOOKS:

1. D. Sudha Rani, *A Manual for English Language Laboratories*, Pearson, Noida, 2010.

2. Nira Kumar, English *Language Laboratories*, PHI Learning Pvt. Ltd., New Delhi, 2011.

SUGGESTED SOFTWARE:

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

ADDITIONAL LEARNING RESOURCES

1. https://goo.gl/IjE45p: Amazon India site – with thousands of different product descriptions
2. https://goo.gl/3ozeO6: 15 ways to calm your nerves before giving a presentation.
3. https://goo.gl/p20ttk: useful site for more language about introducing yourself.

I B. Tech. – II Semester

(19BT10331) COMPUTER AIDED ENGINEERING DRAWING

(Common to EEE, ECE, EIE, CSE(AI) & CSE(DS))

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	1	2	2

PRE-REQUISITES: --

COURSE DESCRIPTION: Engineering drawing conventions; Importance of engineering drawing; fundamental concepts of sketching; computer aided drafting and different types of projections of geometric entities (both 2D and 3D) through computer aided drafting packages.

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

CO1. Apply the principles of engineering drawing, Methods and CAD tools to draw the Geometries, Curves and Orthographic projections used to communicate in engineering applications.

CO2. Develop lateral surfaces of solids and draw Isometric views of given objects for engineering communication using principles of engineering drawing and CAD tools.

CO3. Work independently / in groups & communicate effectively in oral and written forms.

DETAILED SYLLABUS:

Introduction to Engineering Graphics and Design:

Principles, significance -Conventions in drawing-lettering - BIS conventions-Dimensioning principles and conventional representations.

Exercises:

1. Practice exercise on Basic Lettering and Dimensioning
2. Practice exercise on Conventional representations

Introduction to AutoCAD: Basic drawing and editing commands: line, circle, rectangle, erase, view, undo, redo, snap, object editing, moving, copying, rotating, scaling, mirroring, layers, templates, polylines, trimming, extending, stretching, fillets, arrays, dimensions.

Exercises:

3. Practice exercise using basic drawing commands
4. Practice exercise using editing commands

CONICS, CURVES, PROJECTION OF POINTS, LINES AND PLANES

Conics & Special Curves: Conic sections including the rectangular hyperbola-eccentricity method only; Cycloid, Epicycloid and Hypocycloid, Involutes.

Exercises:

5. Practice exercises on Ellipse, Parabola, Hyperbola and Rectangular Hyperbola
6. Practice exercises on Cycloid, Epicycloid, Hypocycloid and Involutes

Projection of points, lines and planes: Projection of points in any quadrant, lines inclined to one or both planes, finding true lengths, angle made by line , Projections of regular plane surfaces.

Exercises:

7. Practice exercises on Projection of points

8. Practice exercises on projection of lines inclined to one plane

9. Practice exercises on projection of lines inclined to both planes

10. Practice exercises on Projections of regular plane surfaces

PROJECTION OF SOLIDS AND SECTION OF SOLIDS

Projection of solids: Projection of regular solids inclined to one plane.

Sections of solids: Section planes and sectional view of right regular solids- prism, cylinder, pyramid and cone, True shapes of the sections.

Exercises:

11. Practice exercises on Projections of regular solids

12. Practice exercises on Sections of solids

DEVELOPMENT OF SURFACES

Development of surfaces: Development of surfaces of right regular solids-prism, cylinder, pyramid, cone and their sectional parts.

Exercises:

13. Practice exercises on Development of surfaces of right regular solids

ORTHOGRAPHIC AND ISOMETRIC PROJECTIONS

Orthographic Projections: Systems of projections, conventions and application to orthographic projections.

Isometric Projections: Principles of isometric projection- Isometric scale; Isometric views: lines, planes, simple solids.

Exercises:

14. Practice exercises on Orthographic Projections

15. Practice exercises on Isometric Projections

TEXT BOOKS:

1. D. M. Kulkarni, A. P. Rastogi, A. K. Sarkar, *Engineering Graphics with AutoCAD*, PHI Learning Private Limited, New Delhi, Revised Edition, 2010.

2. N D Bhatt and V M Panchal, *Engineering Drawing*, Charotar Publishing House, Gujarat, 51st edition, 2013.

REFERENCE BOOKS/LABORATORY MANUALS:

1. Sham Tickoo, *AutoCAD 2013 for Engineers and Designers*, Dreamtech Press, 2013.

2. M. H. Annaiah&RajashekarPatil, *Computer Aided Engineering Drawing*, New Age International Publishers, 4th edition, 2012.

I B. Tech. – II Semester

(19BT10531) PROGRAMMING FOR PROBLEM SOLVING LAB

(Common to EEE, ECE, EIE & CSBS)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: A course on Basic Mathematics

COURSE DESCRIPTION: The course is designed to provide hands on practice on Scratch programming and python programming for problem solving.

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

CO1.   Develop scripts using Scratch tool to simulate simple problems.

CO2.   Apply Python Constructs and Modules to develop solutions for real-life problems.

CO3.   Function effectively as an individual and in team to foster knowledge and creativity.

CO4.   Write and present a substantial technical report/ document effectively.

PRACTICAL EXERCISES:

1) a) Design a script in Scratch to simulate Airplane for take-off and land.

   b) Design a script in Scratch to make a sprite to ask the user to enter two different numbers and an arithmetic operator and then calculate and display the result.

2) a) Design a script in Scratch to calculate factorial of a given number.

   b) Design a script in Scratch to simulate Maze game. (Hint: To get Maze images refer http://inventwithScratch.com/downloads/)

3) a) Write a python script to read two integer numbers and perform arithmetic operations.

   b) Write a python script to evaluate following expressions by considering necessary inputs.

   i) $ax^2 + bx + c$ ii) $ax^5 + bx^3 + c$ iii) $(ax + b) / (ax - b)$ iv) $x - a / b + c$

4) a) Write a python script to convert given decimal number into octal, hexa decimal and binary.

   b) Write a python script to read four integer values separated with commas and display the sum of those four numbers.

   c) Write a python script to print "SVEC" with prefix of ten spaces by using format().

5) a) Write a python script to calculate electricity bill based on following slab rates.

Consumption units	Rate (in Rupees/Unit)
0-100	4
101-150	4.6

151-200	5.2
201-300	6.3
Above 300	8

(Hint: To get Consumption units take current Meter reading, old meter reading from the user as input)

b) Print the following pattern using python script.

```
                1
            1   2   1
        1   2   3   2   1
    1   2   3   4   3   2   1
1   2   3   4   5   4   3   2   1
```

6) a) Write a python script to read *N* student details like name, roll number, branch and age. Sort the student details based on their names and display.

b) Write a python script to delete duplicate strings from a list of strings. (Insertion order should maintain after deleting duplicate string).

c) Write a python script to read N number of student details into nested list and convert that as a nested dictionary.

7) a) Design a function that can perform sum of two or three or four numbers.

b) Write a python script to implement towers of Hanoi problem.

c) Write a Python function prime square (l) that takes a nonempty list of integers and returns True if the elements of l alternate between perfect squares and prime numbers, and returns False otherwise. Note that the alternating sequence of squares and primes may begin with a square or with a prime. Here are some examples to show how your function should work.

>>>primesquare([4])

True

>>>primesquare([4,5,16,101,64])

True

>>>primesquare([5,16,101,36,27])

False

8) a) Write a python script to perform arithmetic operations on numpyarrays.

b) Write a python script to perform following matrix operations using numpy.

i) Dot product   ii) Matrix product   iii) Determinant   iv) Inverse

9) a) Write a python script to Create Pandas data frame using list of lists.

b) Write a python script to load data from a CSV file into a Pandas Data Frame and perform basic operations on it.

10) a) Draw a Scatter Plot by considering an appropriate data set.

b) Draw histograms by considering an appropriate data set.

11) **Mini Project-1**

12) **Mini Project-2**

TEXT BOOK:

1. R. Nageswara Rao, *Core Python Programming*, Dreamtech Press, 2nd edition, 2018.

I B. Tech. – II Semester

(19BT20251) NETWORK ANALYSIS LAB

(Common to ECE & EIE)

Int. Marks	Ext. Marks	Total Marks		L	T	P	C
50	50	100		-	-	2	1

PRE-REQUISITES: Physics at Intermediate Level.

COURSE DESCRIPTION: Practical investigations on DC, single phase AC circuits, circuit theorems, transient circuits and Two-Port networks.

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

CO1. Analyze, measure, interpret and validate the practical observations by applying the conceptual knowledge of electrical networks.

CO2. Design resonant, transient and Two-port circuits/networks meeting the specified needs using electrical circuits/networks concepts.

CO3. Work independently and in teams to solve problems with effective communication.

List of Experiments:

Minimum Ten experiments are to be conducted.

1. Analysis of Series and Parallel circuits.
2. Mesh and Nodal analysis.
3. Phasor analysis of RL, RC and RLC circuits.
4. Current locus of RL and RC circuits.
5. Series and Parallel resonance.
6. Measurement of active and reactive power in a single phase circuit.
7. Verification of Superposition and Reciprocity theorems.
8. Verification of Thevenin's and Norton's theorem.
9. Verification of Maximum Power transfer theorem for DC and AC excitations.
10. Transient response of RL, RC and RLC circuits.
11. Determination of Open circuit and Short circuit parameters in isolated and interconnected networks.
12. Determination of ABCD and Hybrid parameters in isolated and interconnected networks.

REFERENCE BOOKS / LAB MANUALS:

1. P. S. Dhogal, *Basic Practicals in Electrical Engineering*, Standard Publishers, 2004.

2. YannisTsividis, *A First Lab in Circuits and Electronics*, Wiley, 1st edition, 2001.

ADDITIONAL LEARNING RESOURCES:

1. www.vlab.co.in, *Virtual Electric Circuits Lab*, A initiative of MHRD under NMEICT.
2. https://nptel.ac.in/courses/117106108/
3. https://ocw.mit.edu/high-school/physics/exam-prep/electric-circuits/

II B. Tech. - I Semester

(19BT3BS02) SPECIAL FUNCTIONS AND COMPLEX ANALYSIS

(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES: A course on Differential equations and Multivariable calculus

COURSE DESCRIPTION: Special Functions (Beta and Gamma functions); Special Functions (Bessel's and Legendre's equations); Analytic Functions; Conformal Mapping; Complex Integration; Residue Theorem.

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

CO1. Apply the knowledge of special functions to evaluate improper integrals.

CO2. Analyze the behavior of functions through the knowledge of complex analysis and evaluate integrals on complex planes.

DETAILED SYLLABUS:

UNIT-I: SPECIAL FUNCTIONS (Beta and Gamma Functions)   **(7 Periods)**

Beta and Gamma functions: Properties, Relationship between beta and gamma functions, Evaluation of integrals using beta and gamma functions.

UNIT- II: SPECIAL FUNCTIONS (Bessel's and Legendre's Equations) (9 Periods)

Bessel's equation: Recurrence formulae for $J_n(x)$, Generating function for $J_n(x)$ (without proof), Orthogonality of Bessel functions; Legendre's equation: Legendre polynomials, Rodrigue's formula, Generating function for $P_n(x)$ (without proof), Recurrence formulae for $P_n(x)$.

UNIT- III: ANALYTIC FUNCTIONS AND CONFORMAL MAPPING   **(11 Periods)**

Differentiation, analytic functions, Cauchy-Riemann equations (both Cartesian and polar), harmonic functions, harmonic conjugate, potential functions; Conformal mapping: Definition and examples, Translation, Rotation, Inversion, Transformations $w = z^2, e^z$; Bilinear transformation and their properties.

UNIT-IV: COMPLEX INTEGRATION   **(8 Periods)**

Line integrals, Cauchy's theorem (without proof), Cauchy's integral formula (without proof), Generalized Cauchy's integral formula (without proof); Taylor's series, Laurent's series; zeros of an analytic functions, Singularities: Types of singularities, pole of order n.

UNIT-V: RESIDUE THEOREM   (10 Periods)

Residues and evaluation of residues at poles, Cauchy's Residue theorem (without proof), evaluation of integrals using residue theorem, evaluation of improper and real integrals of the type: (i) $\int\limits_{0}^{2\pi} f(\cos\theta, \sin\theta)d\theta$ ii) $\int\limits_{-\infty}^{\infty} f(x)dx$ iii) $\int\limits_{-\infty}^{\infty} e^{imx} f(x)dx$.

Total Periods: 45

Topics for self-study are provided in the lesson plan

TEXT BOOKS:

1. T. K. V. Iyengar, B. Krishna Gandhi, S. Ranganatham and M. V. S. S. N. Prasad, *Text book of Engineering Mathematics, Vol-III*, S. Chand & Company, 9th edition, 2012.

2. B. S. Grewal, *Higher Engineering Mathematics*, Khanna publishers, 44th edition, 2017.

REFERENCE BOOKS:

1. J. W. Brown and R. V. Churchill, *Complex Variables and Applications,* Mc-Graw Hill,
   7th edition, 2004.
2. N. P. Bali and Manish Goyal, *A text book of Engineering Mathematics*, Laxmi Publications, Reprint, 2010.

(19BT30402) ELECTRONIC DEVICES AND CIRCUITS

(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Courses on Basic Electrical and Electronics Engineering, Differential Equations and Multivariable Calculus and Engineering Physics.

COURSE DESCRIPTION:

Linear and Non-Linear Wave shaping, Biasing and small signal analysis of BJT & FET, Operation and characteristics of Special Purpose electronic devices.

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

CO1: Analyze the response of High pass circuits, Low pass RC circuits for various signals and performance of clippers and clampers.

CO2: Design transistor biasing circuits and stabilize the operating point using appropriate techniques.

CO3: Develop mathematical model of BJT for CE, CB and CC configurations using h-parameters.

CO4: Analyze various configurations and biasing techniques for FET.

CO5: Demonstrate the operation and characteristics of special purpose semiconductor devices for real time applications.

DETAILED SYLLABUS:

UNIT-I: LINEAR& NONLINEAR WAVE SHAPING   (9 Periods)

High-pass, Low-pass RC circuits, their response for Sinusoidal, Step, Pulse, Square and Ramp inputs. High pass RC network as a Differentiator, Low pass RC network as an Integrator, Diode clippers and Clampers.

UNIT-II: TRANSISTOR BIASING & STABILISATION   (10 Periods)

DC Load Line analysis and Selection of Q point, Biasing Circuits-Fixed(Base) Bias, Collector-to-Base Bias, Base Bias and collector-to-Base Bias with Emitter Resistor, Voltage Divider Bias Circuit, Thermal stability of Bias circuits, compensation techniques using Thermistor, Sensistor and Diode.

UNIT-III: SMALL SIGNAL ANALYSISOF BJT   (9 Periods)

Transistor modeling using h-Parameters, CE, CB and CC circuit analysis using h-parameters, Simplified hybrid model, Comparison of CB, CE and CC circuits. Analysis of CE amplifier with emitter resistance.

UNIT-IV: FIELD EFFECT TRANSISTOR   **(10 Periods)**

Construction, Operation and characteristics of JFET, Enhancement MOSFET & Depletion MOSFET, FET Biasing-Gate bias, Self bias, voltage divider bias, FET equivalent circuit, CS,CD and CG amplifiers, comparison of BJT & FET.

UNIT-V: SPECIAL PURPOSE ELECTRONIC DEVICES   **(7 Periods)**

Tunnel Diode, Varactor Diode, Uni Junction Transistor (UJT), UJT as Relaxation Oscillator, DIAC, TRIAC, Silicon Controlled Rectifier

                                                                        Total periods: 45

Topics for self-study are provided in the lesson plan

TEXT BOOKS:

1. Jacob Millman, Herbert Taub and Suryaprakash Rao Mothiki, *Pulse Digital and Switching Waveforms,* TMH, 3rd edition, 2011.

2. J. Millman, Christos C. Halkias and SatyabrataJit, *Electronic Devices and Circuits*, TMH, 3rd Edition, 2010.

REFERENCE BOOKS:

1. David A. Bell, *Electronic Devices and Circuits*, Oxford University press, 5th Edition, 2014

2. S. Salivahanan, N. Suresh Kumar, *Electronic Devices and Circuits*, TMH, 3rd Edition 2013.

3. R.L. Boylestad and Louis Nashelky, *Electronic Devices and Circuits*, PHI, 10th Edition, 2009.

ADDITIONAL LEARNING RESOURCES:

1. http://www.nptelvideos.in/2012/11/basic-electronics-prof-tsnatarajan.html

2. https://kupdf.net/download/n-n-bhargava-basic-electronics-and-linear-

   circuits_5912b54adc0d60a324959ea5_pdf

3. http://www.talkingelectronics.com/Download%20eBooks/Principles%20of%20electro nics/CH-21.pdf

(19BT30404) SWITCHING THEORY AND LOGIC DESIGN
(Common to ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: A course on Transformation Techniques and Linear algebra.

COURSE DESCRIPTION:

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

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

CO1: Demonstrate the knowledge of Boolean Algebra, various number systems and Logic gates to implement Digital Circuits.

CO2: Design subsystem by Analyzing combinational & sequential logic circuits for providing optimal solutions

CO3: Develop Asynchronous sequential logic and programmable memories for societal needs.

CO4: Design various programmable logic arrays using logic gates

DETAILED SYLLABUS

UNIT I: NUMBER SYSTEMS AND BOOLEAN ALGEBRA   (10 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, logic 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, Ex-or Function, Tabular Method- Simplification of Boolean function using tabulation Method.

UNIT III: COMBINATIONAL LOGIC DESIGN   (9 Periods)
Combinational circuits, Analysis & Design procedure, Binary Adder-Sub tractor, Decimal Adder, Binary Multiplier, Magnitude comparator, Decoder, Encoders, Multiplexers and De- Multiplexers.

UNIT IV: SEQUENTIAL LOGIC DESIGN   (11 Periods)
Sequential Circuits, Latches, Flip-Flops, Analysis of Clocked sequential circuits, State Reduction & Assignment, Design procedure, Introduction to Registers-Universal Shift Registers, Introduction to Counters, Ripple Counters-Binary and BCD Ripple Counter , Synchronous counters-Binary, Up-Down Binary Counter and BCD Counter and Other counters-Ring Counter, Johnson Counter.

UNIT V: ASYNCHRONOUS SEQUENTIAL LOGIC AND PROGRAMMABLE MEMORIES
**   (7 Periods)**
Introduction, Analysis procedure, Design Procedure-Primitive Flow Table, Reduction of State and Flow Tables-Implication Table and Implied States, Hazards, ROM, PLA, PAL.

Topics for self-study are provided in the lesson plan

TEXT BOOK:

1. M. Morris Mano, Michael D. Ciletti, *Digital Design With an Introduction to the Verilog HDL*, Pearson,5th edition, 2017.

REFERENCE BOOKS:

1. A. Anand Kumar, *Switching Theory and Logic Design*, PHI Learning Private Limited, 3rd edition, India, 2017.
2. Charles H. Roth, Jr. and Larry L. Kinney, *Fundamentals of Logic Design*, Cengage Learning, 7th edition, 2015

(19BT31001) ELECTRICAL AND ELECTRONIC MEASUREMENTS

Int. Marks	Ext. Marks	Total Marks		L	T	P	C
40	60	100		3	1	-	4

PRE-REQUISITES: A course on Network Analysis

COURSE DESCRIPTION: Science of measurement; construction and principle of operation of ammeters, voltmeters, ohmmeters; potentiometers; power meter; power factor meter; energy meter; design of AC and DC bridges; frequency and time measurements.

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

CO1. Select suitable measuring instrument for measurement of voltage, current, resistance, power and energy by applying the fundamental concepts of measuring instruments.

CO2. Calibrate the DC and AC potentiometers and apply the concepts for calibration of ammeter& voltmeter and measurement of resistance & inductance.

CO3. Design AC and DC bridges for measurement of resistance, capacitance and Inductance.

CO4. Demonstrate the digital measuring instrument used for measurement of frequency and time period.

DETAILED SYLLABUS:

UNIT-I: 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 Analog voltmeter, AC voltmeter using rectifiers, true RMS Voltmeter

UNIT-II: 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-III: 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-IV: 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.

UNIT-V: 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.

Total Periods: 45

Topics for self-study are provided in the lesson plan

TEXT BOOK:

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

2.   H S Kalsi, *Electronic Instrumentation and Measurements*, McGraw-Hill, 4th edition, 2019.

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, McGraw-Hill, 4th edition 2003.

ADDITIONAL LEARNING RESOURCES:

1. https://nptel.ac.in/courses/108/105/108105153/

2. https://swayam.gov.in/nd1_noc19_ee44/preview

II B. Tech. – I Semester

(19BT31002) TRANSDUCERS IN INSTRUMENTATION

Int. Marks	Ext. Marks	Total Marks		L	T	P	C
40	60	100		3	-	-	3

PRE-REQUISITES: Courses on Engineering Physics, Network Analysis

COURSE DESCRIPTION: Introduction to measuring instruments and characteristics of transducers; working principle of resistive, inductive, capacitive, self-generating and other sensors; applications of principles in sensors for measurement of Temperature, Torque, Velocity, Acceleration; Miscellaneous sensors.

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

CO1. Demonstrate knowledge on static and dynamic characteristics of transducers and estimate the errors in the measuring instrument.

CO2. Demonstrate the working principle of various sensors and its applications.

CO3. Analyze different temperature measuring transducers and develop measuring circuits to solve problems.

CO4. Analyze and measure torque, velocity and acceleration by applying different sensing techniques and transducers to solve problems.

DETAILED SYLLABUS:

UNIT – I: MEASUREMENT & CHARACTERISTICS OF TRANSDUCERS   (9 Periods)

Elements of a Generalized Measurement System, Errors: Relative Error, Limiting Error, Types of Errors, Statistical measurement of errors: Mean, Median, Standard Deviation, Normal Distribution; Transducer Principle, Classification of transducers, Static Characteristics of transducers: Accuracy, Precision, Threshold, Resolution, Sensitivity, Linearity, Hysteresis, Dead Space, Repeatability, Reproducibility, Span and Calibration. Dynamic characteristics of transducers: Fidelity, Measuring Lag, Dynamic Error, Speed of Response.

UNIT – II: BASIC SENSORS & ITS PRINCIPLE   (10 Periods)

Resistive Sensor: Potentiometer, Strain gauges& its types. Capacitive Sensors: Change in overlapping area, dielectric constant and distance between the plates. Inductive sensors: Variable reluctance, Eddy current, Linear variable differential transformers, Hall Effect. Piezoelectric sensors, Ultrasonic sensor: Attenuation, Transit time, Doppler effect;

UNIT – III: TEMPERATURE MEASUREMENT   (9 Periods)

Temperature measurement: Change in physical properties – Solid expansion type, Fluid expansion type (Filled-in system), Resistance temperature detector (RTD), principle, types, Measuring circuits: 3-Lead & 4-Lead arrangement. Thermistors principle and types, linearization methods, Thermocouples: thermoelectric effects, Laws, Thermoelectric characteristics of thermocouple, types, measuring circuits, Cold junction Compensation, IC temperature sensors - Diodes, Transistors, Temperature switches,

thermostats, Radiation measurement: Introduction, types: Radiation & Infrared Pyrometers; Analysis and selection of Temperature sensors.

UNIT – IV: TORQUE, VELOCITY & ACCELERATION   (9 Periods)

Torque Measurement: Load cell method, Strain gauge method, Weidman Magentostrictive, Digital Methods. Velocity Measurement: Electromagnetic Type, Tachometers, Stroboscope. Acceleration Measurement: Reluctance type, Potentiometric type, piezoelectric type, Null Balance. Comparison, Analysis and selection of different Torque, Velocity and Acceleration sensors.

UNIT – V: MISCELLENEOUS SENSORS   (8 Periods)

Gyroscopes: Principle, Single axis Restrained Gyro and Two axis free Gyro, Three axis Gyro, Vibration Sensors, magneto diodes & magneto transistors, Resonant Sensors: force, temperature, angular velocity; SAW Sensors, Encoders: Incremental & absolute. SMART sensors.

Total Periods: 45

Topics for self-study are provided in the lesson plan

TEXT BOOKS:

1. D. Patranabis, *Principles of Industrial Instrumentation*, TMH, 3rd Edition, 2010.
2. Ramon Pallás Areny, John G. Webster, *Sensors and Signal Conditioning*, John Wiley and Sons, 2nd Edition, 2000.

REFERENCE BOOKS:

1. Ernest Doebelin, Dhanesh Manik, *Measurement Systems*, McGraw Hill International, 6th Edition, 2011.
2. Bela G Liptak, *Instrument Engineers' Handbook: Process Measurement and Analysis*, CRC Press - Butterworth Heinemann, 4th Edition, 2003.
3. A. K. Sawhney, *A Course in Electrical and Electronics Measurements and Instrumentation*, Dhanpat Rai and Sons, 19th edition, 2011.

ADDITIONAL LEARNING RESOURCES:

1. https://nptel.ac.in/courses/108105064/
2. https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/108105064/lec1.pdf
3. https://www.ibiblio.org/kuphaldt/socratic/sinst/book/liii.pdf

II B. Tech. – I Semester

(19BT3HS31) SOFT SKILLS LAB

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

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: --

COURSE DESCRIPTION: Body Language; Assertiveness; Goal Setting; Thinking Skills; Team Building; Conflict Management; Technical Report Writing; Résumé Writing; Group Discussions; Interview Skills; Interpersonal Skills; Etiquette.

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

CO1. Demonstrate knowledge of career skills by examining and applying the styles and strategies of Goal Setting, Thinking Skills, and Etiquettes.

CO2. Analyze the limitations and possibilities of favourable situations by applying the skills of Body Language and demonstrate through Assertiveness, and Interpersonal Skills.

CO3. Apply appropriate soft skills by analyzing the problem situations that arise in professional career through demonstrating remedies in Conflict Management.

CO4. Demonstrate ability to function effectively as an individual and as a member in diverse teams examining and applying soft skills in Interviews, Group Discussion and Team Building.

CO5. Apply appropriate speaking and writing techniques in preparing documents and to communicate effectively by examining and demonstrating knowledge in Technical Report Writing and Résumé Writing.

List of Exercises:

First TEN exercises are mandatory among the following:

1. Body Language

Types of Body Language – Parts of Body – Facial Expressions – Eye Contact Insights – Good Posture

2. Assertiveness

Communications Styles – Benefits – Being Unassertive – Role Playing

3. Goal Setting

Seven Steps of Goal Setting – Self Motivation – Personal Goal Setting – Setting Career Goals

4. Thinking Skills

Positive Thinking – Creative Thinking – Lateral Thinking – Logical Thinking – Intitutive Thinking

5. Team Building

Learning Activities – Management Essentials – Team Building Scenarios

6. Conflict Management

Ways of Resolving Conflict – Personality Types and Conflict – Conflict Resolution Process – Team Conflict

7. Technical Report Writing
   Objectives – Formats – Writing Styles

8. Résumé Writing
   Structure and Presentation – Planning – Defining Career Objectives – Projecting One's Strengths and Skills – Cover Letter – Formats and Styles

9. Group Discussions
   Types of GD – Dos and Don'ts – Dynamics of GD – Intervention – Summarization Techniques

10. Interview Skills
   Planning – Opening Strategies – Answering Strategies – Tele Conferencing – Video Conferencing

11. Interpersonal Skills
   Starting a Conversation – Responding to a Conversation – Conversation Examples – Body Language – Role Play

12. Etiquette
   Basic Social Etiquette – Telephone Etiquette – Dinning Etiquette – Conference Etiquette

TEXT BOOK:

1. Soft Skills Lab Manual, SVEC.

REFERENCE BOOK:

1. R. C. Sharma & Krishna Mohan, *Business Correspondence and Report Writing*, Tata McGraw-Hill Publishing Company Limited, 3rd edition, New Delhi, 2012.

SUGGESTED SOFTWARES:

1. KVAN SOLUTIONS

2. Learning to Speak English 8.1, The Learning Company – 4 CDs.

3. English in Mind, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.

4. Language in Use 1, 2 & 3.

5. Cambridge Advanced Learner's Dictionary - 3rd Edition.

6. Let's Talk English, Regional Institute of English South India.

ADDITIONAL LEARNING RESOURCES

1. http://www.career.vt.edu/interviewing/TelephoneInterviews.html
2. http://job-search-search.com/interviewing/behavioral_interviews

3. https://goo.gl/laEHOY (dealing with complaints)

4. http://www.adm.uwaterloo.ca/infocecs/CRC/manual/resumes.html

5. https://goo.gl/FEMGXS

(19BT30432) ELECTRONIC DEVICES AND CIRCUITS LAB

(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks		L	T	P	C
50	50	100		-	-	2	1

PRE-REQUISITES: A Course on Basic Electrical and Electronics Engineering.

COURSE DESCRIPTION: Integrator and Differentiator, Clippers and Clampers, Transistor switch, h-parameter calculation, Drain and Transfer characteristics of FET, Frequency response of CE and CS amplifiers, UJT Relaxation oscillator, Characteristics of DIAC and SCR

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

CO1. Analyze the response of RC circuits for square input.

CO2. Analyze the characteristics of BJT, FET, DIAC and SCR.

CO3. Design BJT and FET Amplifiers and evaluate the performance parameters from the frequency response.

CO4. Develop the basic applications of diode, transistor and UJT for desired specifications.

CO5. Work independently and in teams to solve problems with effective Communication.

LIST OF EXPERIMENTS:

(Minimum Ten Experiments are to be conducted)

1. Design RC integrator and differentiator and determine their response to the square input.
2. Develop clipper circuit to clip positive and negative portions of the input waveform with two reference voltages.
3. Develop clamping circuits to clamp different positive and negative dc levels of the input signal.
4. Verify the switching action of a BJT with suitable circuit.
5. Verify input and output characteristics of BJT in Common Base configuration experimentally and find required h – parameters from the graphs
6. Verify the frequency response of Common Emitter Amplifier.
7. Study and draw the Drain and Transfer Characteristics of a JFET experimentally.
8. Verify the Frequency Response of Common Source Amplifier using JFET.
9. Study and draw the V-I Characteristics of DIAC experimentally.
10. Study and draw the V-I Characteristics of SCR experimentally.
11. Design a Relaxation Oscillator using UJT.
12. Design and analyze any biasing circuit using BJT.

REFERENCE BOOKS/LABORATORY MANUALS:

1. Navas K.A, *Electronics Lab Manual*, PHI Learning Private Ltd, Vol.2, 6th Edition, 2018.

ADDITIONAL LEARNING RESOURCES:

1. www.vlab.co.in, Basic Electronics Lab, An initiative of MHRD under NMEICT.

II B. Tech. – I Semester

(19BT31031) INSTRUMENTATION WORKSHOP

Int. Marks	Ext. Marks	Total Marks		L	T	P	C
50	50	100		-	-	2	1

PRE-REQUISITES: Courses on Basics of Electrical and Electronic Engineering, Network Analysis

COURSE DESCRIPTION: Test various instrumentation devices; measure the current, voltage and power; solder and de-solder the components; PCB design and electrical wiring diagram for instrument panel.

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

CO1. Demonstrate knowledge on testing of various components using measuring instruments.

CO2. Develop printed circuit boards for simple electronic circuits.

CO3. Calibrate voltmeters and ammeters for specified range.

CO4. Apply simulation tool to develop electronic circuits.

CO5. Design electric circuit wiring loop with IEEE Standards for the given application.

CO6. Work independently and in teams to solve problems with effective communication.

LIST OF EXPERIMENTS:

Minimum of TEN experiments are to be conducted.

1. Testing of resistors, capacitors, diode, Transistor, Different SCRs, Relay, and Contactors.
2. Measure voltage, time period and phase difference of a circuit using CRO.
3. Dismantle & assemble CRO and Function generator and identification of components present.
4. Calibration exercise for voltmeter and ammeter.
5. Design a printed circuit board for a given circuit.
6. Solder and de-solder electronic components on PCB as well solder earth connection.
7. Test pressure/flow/level/temperature switch.
8. Test proximity & limit switch.
9. Test assembled instrument loop wiring for various parameters and faults.
10. Introduction to surface mount device.
11. Introduction to an electronic design and simulation package.
12. Electric circuit wiring diagram using IEEE standard symbols for one instrument panel application.
13. Study of flow and level transmitters.

TEXTBOOKS:

1. K. Padmanabhan and P. Swaminathan, *Electronic Components*, Laxmi Publications, 2nd edition, 2006.
2. Thomas Petruzzellis, *Build Your Own Electronics Workshop,* McGraw-Hill, 2005
3. H S Kalsi, *Electronic Instrumentation and Measurements,* McGraw-Hill, 4th edition, 2019.
4. Curtis D. Johnson, *Process Control Instrumentation Technology*, Pearson Education Limited, 8th edition, 2013.

ADDITIONAL LEARNING RESOURCES:

1. http://www.instrumentationworld.com/instrumentation_tutorial.htm

2. http://www.pc-education.mcmaster.ca/Instrumentation/go_inst.htm

(19BT31032) MEASUREMENTS AND TRANSDUCERS LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: Basics of Electrical and Electronic Engineering, Network Analysis

COURSE DESCRIPTION: Calibration of measuring instruments; Measurement of voltage, resistance, inductance, capacitance, displacement, pressure, temperature and weight; Design of AC/DC bridges.

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

CO1. Analyze the performance of instruments to measure voltage, current, resistance, inductance, capacitance and energy by calibrating the instruments.

CO2. Analyze the performance of sensors to measure temperature, displacement, acceleration, pressure and weight by calibrating the experimental setup.

CO3. Design and develop the appropriate circuit for measurement of voltage, current, resistance, Inductance and capacitance based on the application.

CO4. Work independently and in teams to solve problems with effective communication.

LIST OF EXPERIMENTS:

Minimum of TEN Experiments are to be conducted

1. Calibration of D'Arsonval Galvanometers for measurement of Voltage & Current.
2. Calibration of D'Arsonval Galvanometers for measurement of Resistance (shunt & Series).
3. Design of Wheatstone bridge and Kelvin Bridge for measurement of Resistance.
4. Design of Schering Bridge and De Sauty Bridge for measurement of Capacitance.
5. Design of Maxwell's bridge and Andersons Bridge for measurement of Inductance.
6. Measurement of resistance, inductance, capacitance and quality factor of the coil using Q meter.
7. Measurement of energy using single phase energy meter.
8. Study and analyze the characteristics of capacitive transducer for measurement of angular displacement.
9. Calibration of LVDT for linear displacement measurement.
10. Study and analyze the characteristics of RTD sensor.
11. Study and analyze the characteristics of strain gauge.
12. Study and analyze the characteristics of bourdon tube.
13. Study and analyze the characteristics of piezoelectric sensor.

REFERENCE BOOKS/LABORATORY MANUALS:

1. A. K. Sawhney, *A Course in Electrical and Electronics Measurements and Instrumentation*, Dhanpat Rai and Sons, New Delhi, 19thRevised Edition, 2013.
2. H.S. Kalsi, *Electronic Instrumentation*, TMH, 2002.

ADDITIONAL LEARNING RESOURCES:
1. https://www.youtube.com/watch?v=xLjk5DrScEU
2. http://sl-coep.vlabs.ac.in/
3. http://vlabs.iitkgp.ernet.in/asnm/#

(19BT3MC01) ENVIRONMENTAL SCIENCE

(Common to EEE, ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	-	40	2	-	-	-

PRE-REQUISITES: -

COURSE DESCRIPTION: Natural resources; Ecosystems; Biodiversity; Environment pollution and control; Social issues and environment; Human population and environment.

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

CO1　Analyze natural resources to solve complex environmental problems and natural resource management considering society, environment and sustainability.

CO2　Analyze ecosystems and biodiversity to solve complex environmental problems by following environmental ethics considering society, environment and sustainability besides communicating effectively in graphical form.

CO3　Analyze various types of pollution and their control measures to solve environmental problems through appropriate tools and techniques following latest developments considering society, ethics, environment and sustainability.

CO4　Analyze social issues and its impact on environment, environmental acts to solve complex environmental problems considering society, environment and sustainability besides communicating effectively in graphical form.

CO5　Analyze human population and its impact on environment to solve complex environmental problems through team work and using appropriate tools and techniques considering ethics, society, environment and sustainability.

DETAILED SYLLABUS:

UNIT - I: NATURAL RESOURCES　　　　　　　　　(07 periods)

Multidisciplinary nature of environment; Natural Resources: Renewable and non-renewable resources; Forest, Water, Mineral, Food and Energy resources -Causes, Effects, Remedies, Case studies; Role of an individual in conservation of natural resource and equitable use of resources for sustainable lifestyles.

UNIT - II: ECOSYSTEMS AND BIODIVERSITY　　　　　(07 periods)

Ecosystems: Concept of an ecosystem, Structure and function of an ecosystem - Producers, Consumers, Decomposers; Food chains, Food webs, Ecological pyramids – Types; Characteristic features, Structure and functions of forest ecosystem, Desert ecosystem, Aquatic ecosystem.

Biodiversity: Concept and value of biodiversity, Role of biodiversity in addressing new millennium challenges, Hot spots of biodiversity, Threats to biodiversity, Man-wild life conflicts, Endemic, Endangered and extinct species of India, Conservation of biodiversity – In-situ and ex-situ.

UNIT - III: ENVIRONMENTAL POLLUTION AND CONTROL　　(06 periods)

Causes, Adverse effects and control measures of pollution - Air pollution, Water pollution, Soil pollution, Noise pollution, Thermal pollution, Nuclear pollution, Solid waste

management – Urban waste, industrial waste; Latest developments in pollution control, Hazards and disaster management – Floods, Earthquakes, Tsunamis, Case studies.

UNIT - IV: SOCIAL ISSUES AND THE ENVIRONMENT   (06 periods)

Sustainable development, Urban problems related to energy, Environmental ethics – Issues, Solutions; Global warming, Acid rain, Ozone layer depletion, Nuclear accidents and case studies, Wasteland reclamation, Consumerism and waste products, Concept of green technologies, Environment justice: National Green Tribunal and its importance; Environment protection act, Air act, Water act, Wildlife protection act, Forest conservation act, Issues involved in enforcement of environmental legislation, Public environmental awareness.

UNIT - V: HUMAN POPULATION AND THE ENVIRONMENT   (04 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/Assignment/Seminar on Environmental assets – Water bodies/Forest/Grassland/Hill/Mountain.

Total Periods: 30

Topics for self-study are provided in the lesson plan.

TEXT BOOKS:

1. Anubha Kaushik and C. P. Kaushik, *Perspectives in Environmental Studies*, New Age International (P) Ltd. Publications, 6th Edition, 2018.
2. Erach Barucha, *Environmental Studies,* Orient Blackswan, 2nd Edition, 2013.

REFERENCE BOOKS:

1. Cunningham W.P. and Cunningham M.A., *Principles of Environmental Science*, Tata McGraw-Hill Publishing Company, New Delhi, 8th Edition,2016.
2. Benny Joseph, *Environmental Studies*, Tata McGraw-Hill, 2nd Edition, 2009.
3. M. Anji Reddy, *Text Book of Environmental Sciences and Technology*, BS Publications, 2014
4. R. Rajagopalan, *Environmental Studies*, Oxford University Press, 2nd Edition, 2011.

ADDITIONAL LEARNING RESOURCES:

1. B. S. Chauhan, *Environmental Studies*, University Science Press, 2nd Edition, 2018.
2. Botkin and Keller, *Environmental Science: Earth as a Living Planet*, John Wiley & Sons, 8th International Student Edition, 2011.

II B. Tech. – II Semester

(19BT50201) **CONTROL SYSTEMS**

(Common to ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Courses on Network Analysis, Transformation Techniques and Linear Algebra

COURSE DESCRIPTION:

Concepts of control system; Transfer function of various physical systems; Time response analysis; Frequency response analysis; Controller design and state space analysis.

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

CO1. Develop the mathematical model for various physical systems to determine the transfer function by applying the fundamental principles.

CO2. Analyze the time response of first and second order system to evaluate steady state errors.

CO3. Analyze stability of a system in time and frequency domains.

CO4. Design compensator for a system using bode plot and root locus technique to meet the desired specification for sustainable operation.

CO5. Apply state space method to model the system, to investigate controllability and observability.

DETAILED SYLLABUS:

UNIT-I: MATHEMATICAL MODELING OF SYSTEMS   (11 Periods)

Introduction to control systems — Classification of open loop and closed loop control systems with examples; Modelling of physical systems — Transfer function of mechanical systems, electrical systems, Armature control and field control of DC motor – electrical analogy of mechanical systems; Block diagram reduction and Signal flow graph.

UNIT-II: TIME RESPONSE ANALYSIS   (7 Periods)

Standard test signals; Time response of first and second order systems — Time-domain specifications, steady state error — static and dynamic error constants;Effects of Proportional, Integral and Derivative controllers.

UNIT-III: STABILITY ANALYSIS   (11 Periods)

Introduction to stability, Routh-Hurwitz stability criterion – Relative stability; Root locus — rules to construct root loci, effect of pole and zero additions on the root loci. Frequency domain specifications, Bode plot, Polar plot and Nyquist Criterion, Correlation between time and frequency response.

UNIT-IV: DESIGN OF COMPENSATORS   **(8 Periods)**

Introduction to Compensators, Lag, Lead, Lead-Lag; Compensator design using root locus and Bode plots.

UNIT-V: STATE SPACE ANALYSIS   **(8 Periods)**

Concept of state, state variable, state model; Transfer function to state space and state space to transfer function representation; Modelling of physical system in state space; State transition matrix and its properties – solution of state equations – diagnolization of state matrix; Controllability and observability using Kalman's test.

Total Periods: 45

Topics for self-study are provided in the lesson plan

TEXT BOOKS:

1. A. Anand Kumar, *Control Systems*, PHI learning Pvt. Ltd., 2nd edition, 2014.
2. Katsuhiko Ogata, *Modern Control Engineering*, Pearson Education Publishers, 5th edition, 2010.

REFERENCE BOOKS:

1. Nagrath I.J. and Gopal M, *Control Systems Engineering*, New Age International Publications, 5th edition, 2010.
2. Richard C. Dorf and Robert H. Bishop, *Modern Control Systems*, Prentice Hall, 12th edition, 2010.
3. Benjamin C.Kuo and Farid Golnaraghi, *Automatic Control Systems*, John Wiley & Sons Publications, 8th edition, 2002.
4. Nagoorkani, *Control Systems*, RBA Publications, 2nd edition, 2006.

ADDITIONAL LEARNING RESOURCES:

1. NPTEL_CONTROL SYSTEMS: https://nptel.ac.in/courses/107/106/107106081/
2. EDX_INTRODUCTION TO CONTROL SYSTEMS: https://www.edx.org/course/introduction-to-control-system-design-a-first-look

(19BT30403) SIGNALS AND SYSTEMS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: A course on Differential Equations and Multivariable Calculus.

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

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

CO1 Understand the basic operations on signals & sequences and determine the response of LTI systems using convolution.

CO2 Apply Fourier series and transform to analyze spectral characteristics of continuous-time periodic and aperiodic signals.

CO3 Analyze the properties of correlation and convolution to extract signals from noisy signal in various applications.

CO4 Apply Laplace transformation technique to analyze the characteristics of LTI systems.

CO5 Analyze sampling & it's effects and reconstruct signals using interpolation.

DETAILED SYLLABUS:

UNIT I– INTRODUCTION TO SIGNALS AND SYSTEMS   (12 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 –Convolution Integral, Properties of Linear Time-Invariant Systems.

UNIT II – FOURIER SERIES AND FOURIER TRANSFORM   (12 periods)

Fourier series: Representation of Fourier series, Continuous time periodic signals, Dirichlet's conditions, Properties of CT Fourier Series, Trigonometric Fourier Series and Exponential Fourier Series with examples. Complex Fourier spectrum. Fourier series representation of a periodic signals. Fourier Transforms: Deriving Fourier Transform from Fourier series, Fourier Transform of standard signals, Fourier Transform of Periodic Signals, Properties of CT Fourier Transform, 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   (7 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 in radar systems, Extraction of signal from noise by filtering.

UNIT IV – LAPLACE TRANSFORMS   (7 periods)

The Laplace Transform, The Region of Convergence for Laplace Transforms, The Inverse Laplace Transform, Relationship between Fourier and Laplace Transforms, Properties of the Laplace Transform, Some Laplace Transform Pairs, Analysis and Characterization of LTI Systems Using the Laplace Transform.

UNIT V– SAMPLING   (7 periods)

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.

Total periods: 45

Topics for self-study are provided in the lesson plan

TEXT BOOK:

1. Alan V. Oppenheim, Alan S. Willsky, & S. Hamid, *Signals and Systems*, Pearson Higher Education, 2nd Edition,2008.

REFERENCE BOOKS:

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

ADDITIONAL LEARNING RESOURCES

1. Hilbert Transform: https://ieeexplore.ieee.org/document/5609110
2. Impulse Response Application: https://ieeexplore.ieee.org/document/629264
3. SAMPLING:https://www.researchgate.net/publication/325846982_SAMPLE_AND_SAMPLING_DESIGNS

II B. Tech. – II Semester

(19BT40402) ELECTRONIC CIRCUIT ANALYSIS AND DESIGN

(Common to ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	4

PRE-REQUISITES: A course on Basic Electrical and Electronic Engineering and Electronic Devices & circuits.

COURSE DESCRIPTION: Demonstrate Single Stage Amplifiers; Multi Stage amplifiers; Frequency Response; Negative Feedback Amplifiers; Oscillators; Large Signal Amplifiers; Tuned Amplifiers.

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

CO1. Design multistage amplifiers using voltage divider bias to determine the Gain, Bandwidth, Input and Output Impedances.

CO2. Analyze transistors at high frequencies using Hybrid-π Model to determine the gain and bandwidth.

CO3. Design negative Feedback Amplifiers with high stability and positive feedback amplifiers to generate sustained oscillations.

CO4. Analyze different classes of Power Amplifiers to improve power efficiency and understand frequency response of single stage tuned amplifiers.

DETAILED SYLLABUS:

UNIT-I: DESIGN OF LOW FREQUENCY AMPLIFIERS   (10 periods)

BJT Amplifiers: Classification of Amplifiers, Distortion in amplifiers, Different coupling schemes used in amplifiers, Design and analysis of RC coupled amplifier, effect of coupling and bypass capacitors, Multistage Frequency Effects, Cascode amplifier, Darlington pair, Bootstrapped Darlington circuit.

MOSFET Amplifiers: MOS Small signal model, Common source amplifier, Common Gate Amplifier, Source follower-simple problems.

UNIT-II: TRANSISTOR AT HIGH FREQUENCY   (10 periods)

The Hybrid- pi (π) – Common Emitter transistor model, Hybrid-π conductance, Hybrid-π capacitances, validity of Hybrid-π model, CE short circuit current gain, current gain with resistive load, single stage CE transistor amplifier response, Gain-bandwidth product, Emitter Follower at Higher Frequencies-problems.

UNIT-III: NEGATIVE FEEDBACK AMPLIFIERS   (9 periods)

Concepts 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 – Method of analysis of Feedback amplifiers- Voltage series, Voltage shunt, Current series and Current shunt amplifiers-simple problems.

UNIT-IV: OSCILLATORS   **(7 periods)**

Conditions for oscillations, Classification, RC phase shift oscillator, Wien bridge oscillator, generalized analysis of LC oscillators, Quartz, Hartley and Colpitts Oscillators, Frequency stability-simple problems.

UNIT-V: LARGE SIGNAL AND TUNED AMPLIFIERS   **(9 periods)**

Large Signal Amplifiers: Classification, Class A Power Amplifier- Power conversion Efficiency, Transformer Coupled power Amplifier, Push Pull and Complimentary Symmetry Class B power amplifier, Class AB operation, Principle of operation of class –C Amplifier, Class D Power Amplifier, Class S power Amplifier, Transistor Power Dissipation, Heat Sinks.

Tuned Amplifiers: Introduction, Q-Factor, single stage Tuned Amplifiers- frequency response of tuned amplifiers.

                                                Total Periods: 45

Topics for self-study are provided in the lesson plan

TEXT BOOKS:

1. Jacob Millman and Christos C.Halkias, *Integrated Electronics,* McGraw-Hill Education, 2nd edition, 2010.

2. Adel S.Sedra, Kenneth C.Smith, *Micro Electronic Circuits Theory and Applications*, OXFORD International Student Edition, 5th edition, ,2009

REFERENCE BOOKS:

1. Robert L. Boylestad and Louis Nashelsky, *Electronic Devices and Circuits Theory*, Pearson Education, 10th Edition, 2009.

2. David A. Bell, *Electronic Devices and Circuits,* Oxford University press, 5th Edition, 2014.

3. S. Salivahanan, N. Suresh Kumar, A Vallvaraj, *Electronic Devices and Circuits*, Mc Graw Hill Education 3rd Edition, 2013

(19BT40403) LINEAR AND DIGITAL IC APPLICATIONS

(Common to ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: Courses on Network Analysis, Switching Theory and Logic Design & Electronic Devices and Circuits

COURSE DESCRIPTION: Linear & Non-Linear Applications of Op-Amp; IC 555 timer and phase locked loops; Application of PLL; filters; A-D & D-A Converters; CMOS and Bipolar Logic Interfacing; HDL with combinational and sequential logic design.

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

CO1: Design different applications of op-amp, timer circuits and analyze PLL for specified applications.

CO2: Design active filters using op-amp for audio processing applications.

CO3: Analyze different analog to digital and digital to analog converters for data acquisition system.

CO4: Analyze Verilog HDL capabilities to model digital circuits.

CO5: Model combinational and sequential ICs using Verilog HDL to synthesize digital circuits.

DETAILED SYLLABUS:

UNIT-I: OP-AMP APPLICATIONS, IC555 TIMERS & PLL   (11 periods)

Review of operational Amplifiers, Instrumentation amplifier, Log and Antilog amplifiers, RC phase shift oscillator.

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).

UNIT-II: FILTERS &D-A AND A-D CONVERTERS   (9 periods)

Filters: First - order and second order LPF, HPF Butterworth Filters.

D-A Converter: Weighted resistor DAC, R-2R Ladder DAC.

A-D Converters: Flash type, Successive Approximation type and Dual slope ADC.

UNIT-III: VERILOG HARDWARE DESCRIPTION LANGUAGE   (8 periods)

Introduction, Language Elements, operators, Expressions, Modeling-gate level modeling, data flow modeling, behavioral modeling, structural modeling.

UNIT-IV: COMBINATIONAL LOGIC DESIGN APPLICATIONS   (8 Periods)

74x999 Adder and Subtractor, 74X138 3-to-8 Decoder,74x148 Priority Encoder,74x151 8X1 Multiplexer, 74x181 Arithmetic and Logic Unit,74x280 9-Bit Parity Generator, 74x85 4-bit Comparator, Barrel Shifter using 74x151 multiplexer, Simple Floating-Point Encoder, Dual priority Encoder, modeling of circuits by using Verilog HDL.

UNIT V – SEQUENTIAL LOGIC DESIGN APPLICATIONS   (9 periods)

Flip-Flops- JK-74LS109 and D-74LS74. Counters - 74x163 binary counter, Modulo-11 & 193 counters with a counting sequence, Modulo-8 Binary counter, Excess 3 decimal Counter using 74X163,74x169 up/down counter, Self-Correcting Ring & Johnson Counter,3-bit LFSR Counter.74x194 universal shift register, Modeling of circuits using Verilog HDL.

Total Periods: *45*

Topics for self-study are provided in the lesson plan

TEXT BOOKS:

1.   D. Roy Chowdhury, *Linear Integrated Circuits*, New Age International (p) Ltd, 4th Edition, 2011.

2.   John F. Wakerly, *Digital Design Principles & Practices*, Pearson Education Asia, 4th Edition, 2008.

REFERENCE BOOKS:

1.   Ramakanth A. Gayakwad, *Op-Amps & Linear ICs*, PHI, 3rd Edition, 1998

2.   J. Bhaskar, *A Verilog HDL Primer*, BS Publications, 2nd Edition, 2001

ADDITIONAL LEARNING RESOURCES:

1.   https://www.coursera.org/learn/electronics
2.   https://www.youtube.com/results?search_query=james+roberge

(19BT41001) INDUSTRIAL INSTRUMENTATION

Int. Marks	Ext. Marks	Total Marks		L	T	P	C
40	60	100		3	-	-	3

PRE-REQUISITES: Courses on Transducers in Instrumentation, Electrical and Electronic Measurements

COURSE DESCRIPTION: Measurement of humidity, Viscosity, Density, Pressure, Level and Flow parameters; Signal Conditioning & Safety Instruments.

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

CO1. Analyze and identify the appropriate transducer to measure density, viscosity, humidity and pressure based on applications.

CO2. Analyze and identify the appropriate transducer to measure level and flow based on applications.

CO3. Design signal conditioning circuit for amplifiers, range extension and conversion of V to I & I to V.

CO4. Demonstrate the safety instruments, requirements for safety and standards.

DETAILED SYLLABUS:

UNIT - I: DENSITY, VISCOSITY & HUMIDITY MEASUREMENT   (11 Periods)

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. Humidity: Psychrometer, hygrometer & Types, Dew point device. Analysis and selection of Density, Viscosity and Humidity sensors.

UNIT - II: PRESSURE MEASUREMENT   (8 Periods)

Dead weight gauges, Manometer and its Types, 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. Analysis and selection of pressure sensors.

UNIT – III: LEVEL MEASUREMENT   (7 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 and Capacitance type. Ultrasonic Methods, bellow element type level transmitters, Fibre - optic type, Analysis and selection of level sensors.

UNIT – IV: 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. Analysis and selection of Flow sensors.

UNIT-V: SIGNAL CONDITIONING & SAFETY INSTRUMENTS   (9 Periods)

Wheatstone bridge: Compensation & Sensitivity. Design of I to V, V to I converters, Range conversion of current, voltage, Design application of Instrumentation amplifier, Signal conditioning for Self-generating sensors: Chopper and low drift amplifiers Composite amplifier, charge amplifier and electrometer amplifier.

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

Total Periods: 45

Topics for self-study are provided in the lesson plan

TEXT BOOKS:

1.   D. Patranabis, *Principles of Industrial Instrumentation*, TMH, 3rd Edition, 2010.

2.   A. K. Sawhney, *A Course in Electrical and Electronics Measurements and Instrumentation*, Dhanpat Rai and Sons, 19th edition, 2011.

REFERENCE BOOKS:

1.   Bela G Liptak, *Instrument Engineers' Handbook: Process Measurement and Analysis*, CRC Press - Butterworth Heinemann, 4th Edition, 2003.

2.   Ramon Pallás Areny, John G. Webster, *Sensors and Signal Conditioning*, John Wiley and Sons, 2nd Edition, 2000.

3.   Ernest Doebelin, Dhanesh Manik, *Measurement Systems*, McGraw-Hill International, 6th Edition, 2011.

ADDITIONAL LEARNING RESOURCES:

1.   https://nptel.ac.in/courses/108105064/
2.   https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/108105064/lec1.pdf
3.   https://www.ibiblio.org/kuphaldt/socratic/sinst/book/liii.pdf

II B. Tech. – II Semester
(19BT4BS01) MATERIAL SCIENCE
(Open Elective-1)
(Common EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks		L	T	P	C
40	60	100		3	-	-	3

PRE-REQUISITES: -

COURSE DESCRIPTION: Introduction to Material Science and Engineering; Composite Materials; Smart Materials; Nano and Biomimetic Materials; Emerging Materials.

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

CO1. Attain the basic knowledge on composites, smart materials, biomimetic materials and nano materials.

CO2. Demonstrate essential information about structure and properties of various composites used in various engineering applications.

CO3. Understand the basic properties of electro-rheostatic, magneto-rheostatic and shape memory alloys used in device applications.

CO4. Accomplish the basic knowledge in nano materials to familiarize various nano structured device applications.

CO5. Outline the processing and properties of functionally graded materials and identify its applications in various fields.

DETAILED SYLLABUS:
UNIT- I: INTRODUCTION TO MATERIAL SCIENCE AND ENGINEERING

(08 Periods)

Introduction - historical perspective - material science and engineering, classification of materials (metals, ceramics, polymers and composites) and advanced materials and their applications (biomaterials, smart materials and nano materials), modern materials needs. Processing, properties and applications of metals, polymers and ceramics (Qualitative).

UNIT- II: COMPOSITE MATERIALS (10 Periods)

Composite Materials - Classification, Laminated composites and Reinforced composite materials – Classification, structure and properties of sandwich composites – applications (commercial Aircraft, Marine Grade Sandwich, Automobile Grade Sandwich and Wind Turbine Blades), properties and applications of Nano composites - Advantages and Limitations of composites.

UNIT- III:SMART MATERIALS (07 Periods)

Classification of smart materials -Magneto-rheostatic (MR) and Electro-rheostatic (ER) materials - Shape Memory Alloys (SMA)- characteristics, Shape memory effect applications in different fields, advances in smart materials.

UNIT – IV: NANO AND BIOMIMETIC MATERIALS (10 Periods)

Nanomaterials: Introduction, Low dimensional structures and energy quantization. Fabrication of nano materials - Lithographic technique using photons, metallic, semiconducting and magnetic properties of nano materials and applications (renewable energy and nano electro-mechanical systems (NEMS)).

Biomimetic materials – Introduction- classification and their applications (Lotus effect, Dolphin sound wave technology and viper as a model in defence)

UNIT- V: EMERGING MATERIALS   (10 Periods)

Functionally graded materials (FGM) - Types, processing, properties and potential applications, functionally graded fibre cement – structural material, Functionally Graded Nanoelectronic, Optoelectronic and Thermoelectric Materials (Qualitative) and its applications.

Total Periods: 45

Topics for Self Study are provided in the Lesson Plan

TEXT BOOKS:

1. William D Callister, David G Rethwisch, *Materials Science and Engineering*, Wiley, 9th edition, 2014.

2. K M Gupta, *Engineering Materials – Research, Applications and Advances*, CRC press (Taylor & Francis group), 2015.

REFERENCE BOOKS:

1. Sulabha K Kulkarni*, Nanotechnology: Principles and practices*, Springer, 9th edition, 2014.

2. Charles P. Poole and Frank J. Owens, *Introduction to Nanotechnology*, Wiley-Interscience, May 2003.

3. Sulabha K Kulkarni, *Nanotechnology: Principles and Practices,* Springer, 3rd edition, 2014.

II B. Tech. - II Semester

(19BT4HS02) BUSINESS COMMUNICATION AND CAREER SKILLS

(Open Elective-1)

(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks		L	T	P	C
40	60	100		3	-	-	3

PRE-REQUISITES: -

COURSE DESCRIPTION: Nature and Scope of Communication; Corporate Communication; Writing Business Messages & Documents; Careers and Résumés; Interviews.

COURSE OUTCOMES:

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

CO1. Demonstrate knowledge of professional communication by examining and applying the styles and strategies of business communication in Communication Networks and Writing Messages.

CO2. Analyze the limitations of business communication by applying and demonstrating corporate communication aspects for effective communication through Interpersonal Communication, Informal Communication, and Crisis Management and Communication.

CO3. Apply appropriate writing techniques for effective professional communication in preparing documents by demonstrating and examining Stages in Writing Business Messages, Strategies for Writing the Body of a Letter, and Structuring Résumés.

CO4. Apply appropriate speaking techniques by examining and demonstrating effective communication in distinguished situations through Corporate Communication and Cross Cultural Communication

DETAILED SYLLABUS:

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

Introduction: Communication Basics - Functions of Communication – Communication Networks - Interpersonal Communication – Informal Communication - Communication Barriers - Roles of a Manager.

UNIT- II: CORPORATE COMMUNICATION   (9 periods)

Introduction: Corporate Communication - Cross-Cultural Communication; Concept & Styles - Corporate Communication Strategy - Corporate Citizenship - Crisis Communication: Case Study.

UNIT- III: WRITING BUSINESS MESSAGES &DOCUMENTS   (9 periods)

Introduction: Importance of Written Business Communication - Types of Business Messages - Five Main Stages of Writing Business Messages – Business Letter Writing; Kinds of Business Letters – Common Components of Business Letters – Strategies for Writing the Body of a Letter.

UNIT- IV: CAREERS AND RÉSUMÉS (9 periods)

Introduction - Career Building - Résumé Formats; Traditional, Electronic and Video Resumés – Sending Résumés - Follow-up Letters - Business Presentations and Speeches; Planning –

Structuring - Organizing – Delivery.

UNIT- V: INTERVIEWS (9 periods)

Introduction - General Preparation for an Interview - Success in an Interview - Important Non-verbal Aspects – Types of Interviews – Styles of Interviewing - Types of Interviewing Questions - Online Recruitment Process.

Total Periods: 45

Topics for Self Study are provided in the Lesson Plan

TEXT BOOKS:

1. Meenakshi Raman and Prakash Singh, *Business Communication*, Oxford University Press, New Delhi, 2nd edition, 2012.
2. Neera Jain and Sharma Mukherji, *Effective Business Communication*, Tata McGraw- Hill Education, Pvt. Ltd., New Delhi, 2012.

REFERENCE BOOKS:

1. Courtland L.Bovee et al., *Business Communication Today*, Pearson, New Delhi, 2011.
2. Krizan, *Effective Business Communication*, Cengage Learning, New Delhi, 2010.

ADDITIONAL LEARNING RESOURCES

1. http://www.career.vt.edu/interviewing/TelephoneInterviews.html
2. http://job-search-search.com/interviewing/behavioral_interviews
3. https://goo.gl/laEHOY (dealing with complaints)
4. http://www.adm.uwaterloo.ca/infocecs/CRC/manual/resumes.html
5. https://goo.gl/FEMGXS
6. http://www.resumania.com/arcindex.html

II B. Tech. - II Semester

(19BT4HS04) ENTREPRENEURSHIP FOR MICRO, SMALL AND MEDIUM ENTERPRISES

(Open Elective-1)

(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: -

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

COURSE OUTCOMES:

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

CO1. Demonstrate knowledge in concepts, functions, Micro and Macro units, NGOs, BharatiyaMahila Bank, Women Entrepreneurship, Schemes and Programmes.

CO2. Analyze the idea generation, business plans, business acumen, institutional finance and rural entrepreneurship.

DETAILED SYLLABUS:

Unit – I: ENTREPRENEURSHIP DEVELOPMENT   (9 periods)

Introduction to Entrepreneurship Development - Concept ofEntrepreneurship – Growth of Entrepreneurship in India **-** Factors affecting Entrepreneurship growth - Characteristics of an Entrepreneur – Functions of Entrepreneur – Entrepreneurial Decision Process – Types of Entrepreneurs – Distinction between an Entrepreneur and a manager.

Unit – II: IDEA GENERATION AND FORMULATION OF BUSINESS PLANS

(9 periods)

Sources of Ideas – Methods of idea generation – Steps in Setting up of a Small Business Enterprise – Formulation of Business Plan – Contents and Significance of Business Plan – Common Errors in Business Plan Formulation – The role of incubation centers for promoting entrepreneurship and start-ups.

Unit – III: MICRO AND SMALL ENTERPRISES   (9 periods)

Meaning and Definition – Micro and Macro units – Essentials – Features – Characteristics – Scope of Micro and Small Enterprises – Objectives of Micro Enterprises – Relationship between Micro and Macro Enterprises- Problems of Micro and Small Enterprises

Unit – IV: INSTITUTIONAL FINANCE   (9 periods)

Institutional Finance **–** Need-Scope-Services - Various Institutions offering Institutional support: – Small Industries Development of Bank of India (SIDBI), State Industrial Development Corporations – Small Industries Development Organisation (SIDO) – Small Industries Service Institutes (SISIs) – SFCs - National Institute of Entrepreneurship and Small Business Development (NIESBUD) – Micro Units Development and Refinance Agency Bank (MUDRA).

Unit –V: WOMEN & RURAL ENTREPRENEURSHIP   (9 periods)

Concept of Women entrepreneur - Functions of Women entrepreneurs - Growth of women entrepreneurship in India - Challenges of Women entrepreneurs- Programmes supporting women entrepreneurship – Rural Entrepreneurship – Meaning, Need for Rural entrepreneurship, Problems of rural entrepreneurship, Role of NGOs, Role of BharatiyaMahila Bank for encouraging Women Entrepreneurs – Micro Finance & Self Help Groups (Basic Concepts).

Total periods: 45

Topics for Self Study are provided in the Lesson Plan

TEXT BOOKS:

1. Dr.S.S.Khanka*, Entrepreneurial Development*, S. Chand and Company Ltd, Revised edition, 2012.
2. MadhurimaLall&ShikhaSahai, *Entrepreneurship*, Excel Books India, 4th edition, 2014.

REFERENCE BOOKS:

1. Nandan, H., *Fundamentals of Entrepreneurship*, PHI Learning Pvt. Ltd., New Delhi, 3rd edition, 2013.
2. BholanathDutta, *Entrepreneurship Management* – Text and Cases, Excel Books, 3rd edition, 2015.

II B. Tech. - II Semester

(Open Elective-1)

(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks		L	T	P	C
40	60	100		3	-	-	3

PRE-REQUISITES: -

COURSE DESCRIPTION: Oral communication; Basic grammar; Basic writing; Berufsdeutcsch (Business German)

COURSE OUTCOMES:

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

CO1. Communicate everyday using familiar words with expressions and simple sentences.

DETAILED SYLLABUS:

UNIT I: INTRODUCTION (9 Periods)

Introduction - German alphabets, numbers, days in a week, names of months, seasons. Grammar: Nouns –(i)Nominative case and (ii) Nominative personal pronouns, simple sentence, Verb Conjugation 1st and 2nd type, verb Conjugation 3rd type, 'Wh' questions (simple sentences) Nominative (definite and indefinite) Articles

UNIT II: CITY AND FOOD (9 Periods)

In the city: naming places and buildings, means of transport, basic directions. Food: drink, groceries and meals. Apartments: rooms, furniture, colours.

Grammar: Nouns-articles negation–(kein and nicht); imperative and the accusative case; Nominative Possessive Pronouns.

UNIT III: DAY TO DAY CONVERSATIONS (9 Periods)

Everyday life, telling time, making appointments, leisure activities, and celebrations. Different types of professions, Health and the body, Holiday and weather, Clothes and Dresses.

UNIT IV: BASIC GRAMMAR (9 Periods)

Grammar: Possessive articles, Prepositions (am, um, von. bis); Modal verbs, Separable verbs, the accusative, past tense of 'to have' and 'to be', the imperative sentences, dative case, perfect tense.

UNIT V: BASIC WRITING (9 Periods)

Translation from English to German and German to English, Contacts, Writing letters and Email Writing.

Total Periods: 45

Topics for Self Study are provided in the Lesson Plan
TEXT BOOKS:

1. Heuber,Tangram Aktuelleins, HeuberVerlag Publications, 2011.

REFERENCE BOOKS:

1. Anta Kursisa, Gerhard Newner, Sara vicenta, Fir fuer Deutsch 1 und Deutsch 2, HeuberVerlag Publications, 2005.
2. Herman Funk, Studio D A1 Cornelsen, GOYAL SAABPublication, Year 2011.

II B. Tech. - II Semester

(19BT4HS08) INDIAN HISTORY

(Open Elective-1)

(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: -

CORSE DESCRIPTION: Introduction; Ancient India; Classical and Medieval era; Modern India; India after independence.

COURSE OUTCOMES:

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

CO1. Demonstrate contextual knowledge on evolution of ancient and medieval Indian History and acquire awareness on societal and cultural issues.

CO2. Analyze the situations before and after Independence and assess the societal reforms implemented in India after Independence.

DETAILED SYLLABUS:

UNIT I: INTRODUCTION   (8 Periods)

Elements of Indian History; History Sources: Archaeology, Numismatics, Epigraphy & Archival research; Methods used in History; History & historiography; sociological concepts-structure, system, organization, social institutions, Culture and social stratification (caste, class, gender, power), State& Civil Society.

UNIT II: ANCIENT INDIA   (9 Periods)

Mohenjo-Daro civilization; Harappa civilization; Mauryan Empire.

UNIT III: CLASSICAL & MEDIEVAL ERA   (12 Periods)

Classic Era (200 BC - 1200 AD); Hindu - Islamic Era (1200 - 1800 AD).

UNIT IV: MODERN INDIA   (6 Periods)

Age of Colonialism (17th - 19th centuries); First war of Indian Independence;

Freedom Struggle (1857-1947).

UNIT-V: INDIA AFTER INDEPENDENCE (1947 -)   (10 Periods)

The Evolution of the Constitution and Main Provisions; Consolidation of India as a Nation; Politics in the States; Indian economy; Modernization and globalization, Secularism and communalism, Nature of development, Processes of social exclusion and inclusion, ChangingNature of work and organization.

Total Periods: 45

Topics for Self Study are provided in the Lesson Plan

TEXT BOOK:

1. K. Krishna Reddy, *Indian History,* Tata McGraw-Hill, 21st reprint, 2017.

REFERENCE BOOKS:

1. Guha, Ramachandra, *India after Gandhi*, Pan Macmillan, 2007.
2. Thapar, Romila, *Early India*, Penguin, 2002.

II B. Tech. - II Semester
(19BT4HS10) **PERSONALITY DEVELOPMENT**
(Open Elective-1)
(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks		L	T	P	C
40	60	100		3	-	-	3

PRE-REQUISITES: A course onSoft Skills Laboratory

COURSE DESCRIPTION: Personalities and Leadership Qualities; Self Esteem and self Development; Attitude; Communication Relationship; Critical Work Skills and Ethics.

COURSE OUTCOMES:

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

CO1. Demonstrate knowledge of leadership qualities by examining and applying personality traits through Positive self esteem, Open Communication and Self-Righteousness.

CO2. Analyze the limitations of Attitudes by applying and demonstrating communication traits through Decision Making, Ethics and Self Actualization.

CO3. Apply appropriate Analyzing techniques for comprehending different personalities by examining Positive and Negative Characteristic Traits and demonstrating through Leadership Styles, Mentoring and Behaviour Modification.

CO4. Apply appropriate techniques in Solving Problems by examining and demonstrating Time Management, Stress Management and Anger Management.

DETAILED SYLLABUS:

UNIT- I: PERSONALITIES AND LEADERSHIP QUALITIES   (9 periods)

Introduction: Different Personalities **-** Personality Analysis **-** Freudian Analysis **–** Vedantic Concept: Swamy Vivekananda**-** Personality Begets - Types- Leadership Qualities – Decision Making **-** Case Studies: Personalities.

UNIT- II: SELF ESTEEM AND SELF DEVELOPMENT   (9 periods)

Know Yourself: Self Image - Positive Self Esteem -Turn Failure into Success - Be Sensitive to Feedback - Build Self Confidence – Self Actualization - Set Goals - Action Plans - Accountability – Behavior Modification – Mentoring - Learning- Counseling – Challenge yourself with Aptitude Tests and Internships.

UNIT- III: ATTITUDE   (9 periods)

Importance – Difference between Behavior and Attitude - Changing Negative Attitude-Impact of Attitudes on others - Unproductive Attitudes –Assess your Behaviour.

UNIT- IV: COMMUNICATION RELATIONSHIP   (9 periods)

Introduction – Positive and Negative Characteristic Traits - Grapevine Communication – Open Communication; Team Player - Leadership styles – Performance Expectations - Electronic Communication;TextMessaging – Voicemail – E-Mail

UNIT- V: CRITICAL WORK SKILLS AND ETHICS   (9 periods)

Time Management - Balancing Life and Work - Stress Management - Anger Management - Making Decisions and Solving Problems - Developing Creativity - Ethics and Self-Righteousness – Being Judgemental in the Real World - Striving for Integrity.

Total Periods: 45

Topics for Self Study are provided in the Lesson Plan

TEXT BOOKS:

1. Harold R. Wallace and L. Ann Masters, *Personal Development for Life and Work*, Cengage Learning, Delhi, 10th edition Indian Reprint, 2011. (6th Indian Reprint 2015)

2. Barun K. Mitra, *Personality Development and Soft Skills,* Oxford University Press, 2011.

REFERENCE BOOKS:

1. K. Alex, *Soft Skills*, S. Chand & Company Ltd, New Delhi, 2nd Revised Edition, 2011.

2. Stephen P. Robbins and Timothy A. Judge*, Organizational Behaviour*, Prentice Hall, Delhi, 16th edition, 2014.

ADDITIONAL LEARNING RESOURCES

1. https://www.ncbi.nlm.nih.gov/pubmed/25545842

II B. Tech. - II Semester

(19BT4HS12) **WOMEN EMPOWERMENT**

(Open Elective-1)

(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: -

COURSE DESCRIPTION: Concept & Framework, Status of Women, Women's Right to work, International Women's Decade, and Women Entrepreneurship.

COURSE OUTCOMES:

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

CO1. Demonstrate the characteristics of empowered women, their achievements, and frame work for women empowerment, legal laws, and political status of women.

CO2. Apply the knowledge of women rights to address various societal issues and obstacles in different fields including science and technology.

CO3. Understand the significance of participation in policy debates, National conferences and common forums for women's' equality and development.

CO4. Analyze the concept of women entrepreneurship, government schemes and entrepreneurial challenges and opportunities.

DETAILED SYLLABUS:

UNIT I: CONCEPT & FRAMEWORK **(9 Periods)**

Introduction- Empowered Women's Characteristics- Achievements of Women's Empowerment **Concept of Empowerment:** Meaning& Concept- Generalizations about Empowerment -Empowerment Propositions - Choices women can make for empowerment - Women's participation in decision making, development process & in Governance. **Framework for Women's Empowerment** - Five levels of equality- Tenets of Empowerment- Elements - Phases and aspects - Techniques - Categories and Models – Approaches.

UNIT II: STATUS OF WOMEN **(9 Periods)**

Legal Status: Present Scenario- Call for Social change- Significant trends - Legal & Schemes - Personal Law- Joint Family- Criminal Law- Shift towards Dowry - Deterrent Punishment - Criminal Law(II Amendment) - Discrimination in Employment

Political Status: Present Scenario - Political Participation & its Nature- Socio-economic Characteristics - Political Mobilization: Mass Media - Campaign Exposure - Group Orientation - Awareness of issues and participation - Progress & Future Thrust.

UNIT III: WOMEN'S RIGHT TO WORK **(9 Periods)**

Introduction- Present Scenario - Changes in Policy &Programme - National Plan of Action- Women's Cells and Bureau - Increase in work participation rate- Discrimination in labourmarket - Women in unorganized sector - Issues and Obstacles- Women in Education

- Women in Science & Technology - **Case Study:** Linking Education to Women's Access to resources.

UNIT IV: WOMEN'S PARTICIPATORY DEVELOPMENT **(9 Periods)**

Dynamics of social change- conscious participation - Information Explosion - Organized Articulation - National Conference - Common Forums - Participatory Development - New Issues Identified - Role of other Institutions.

UNIT V: WOMEN ENTREPRENEURSHIP **(9 Periods)**

Introduction–Definition-Concept- Traits of women Entrepreneurs- Role of women Entrepreneurs in India -Reasons of Women Entrepreneurship- Government schemes & Financial Institutions to develop Women Entrepreneurs - Key policy recommendations - Project Planning-Suggestions and measures to strengthen women entrepreneurship - Growth & Future challenges - Training and Opportunities - **Case Study:** Training Women as Hand-pump Mechanics- **Case Study** : Literacy for Empowering Craftswomen

Total Periods: 45

Topics for Self Study are provided in the Lesson Plan

TEXT BOOKS:

1. NayakSarojini, Nair Jeevan(2017), "Women's Empowerment in India". Pointer Publishers, Jaipur
2. SahaySushama(2013), "Women and Empowerment" Discovery Publishing House, New Delhi.

REFERENCE BOOKS:

1. Baluchamy. S (2010), "Women's Empowerment of Women". Pointer Publishers, Jaipur.
2. KhobragadeGrishma (2020), "Women's Empowerment: Challenges and Strategies Empowering Indian Women, BooksclinicPublishing,Chhattisgarh.
3. https://www.economicsdiscussion.net/entrepreneurship/women-entrepreneurs-in-india
4. https://www.businessmanagementideas.com/entrepreneurship-2/women-entrepreneurs

II B. Tech. - II Semester

(19BT4HS14) CONSTITUTION OF INDIA

(Open Elective-1)

(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: -

COURSE DESCRIPTION: Preamble and its Philosophy; Union Legislature; Federalism in India; Judiciary and Public Services; Nation Building

COURSE OUTCOMES:

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

CO1. Gain knowledge in Parliamentary proceedings, Election Commission, Public Services and Foreign Policy of India.

CO2. Apply the reasoning informed by the various aspects in the Constitution, its provisions to assess societal issues and the consequent responsibilities relevant to the professional engineering practice.

DETAILED SYLLABUS:

UNIT I: PREAMBLE AND ITS PHILOSOPHY   **(8 Periods)**

Introduction and Evolution of Indian Constitution, preamble and its philosophy

UNIT II: UNION LEGISLATURE   **(9 Periods)**

The Parliament, Parliamentary Structure, Process of Legislation; President of India – Powers and Functions; Vice President, Prime Minister and Council of Ministers; Constitution Amendment Procedure and Financial Legislation.

UNIT III: FEDERALISM IN INDIA   **(10 Periods)**

Features of Federal System, Centre-State relations, Directive Principles of State Policy, Administrative Relationship between Union and States; Governors - Powers and Functions; State Legislature - Composition and powers; Chief Ministers - Powers and Functions, Council of Ministers; The Election Commission – Powers and Functions.

UNIT IV: JUDICIARY AND PUBLIC SERVICES   **(9 Periods)**

The Union Judiciary - Supreme Court and High Court; Fundamental Rights and Duties All India Services - Central Civil Services - State Services - Local Services.

UNIT V: INTERNATIONAL PARTICIPATION   **(9 Periods)**

Foreign Policy of India; International Institutions Influence: UNO, WTO, WHO, SAARC, International Summits: BRICS, NSS, UNEP – India's Role in International Negotiations; Environmentalism in India.

Total Periods: 45

Topics for Self Study are provided in the Lesson Plan

TEXT BOOK:

1. Briji Kishore Sharma, Introduction to the Constitution of India, Prentice Hall of India, 2005.

REFERENCE BOOK:

1. Mahendra Pal Singh,V. N. Shukla's, Constitution of India, Eastern Book Company, 2011. 2. Pandey J. N., Constitutional Law of India - Central Law Agency, 1998.

II B. Tech. - II Semester
(19BT40205) RELIABILITY AND SAFETY ENGINEERING
(Open Elective-1)
(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks		L	T	P	C
40	60	100		3	-	-	3

PRE-REQUISITES: Courses onDifferential Equations and Multi-Variable Calculus & Transformation Techniques and Linear Algebra.

COURSE DESCRIPTION:

Fundamentals of reliability engineering;Network modeling and reliability evaluation; Markov chain and Markov processes; basics of safety concepts and safety techniques and applications.

COURSE OUTCOMES:

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

CO1. Develop mathematical model of a network to evaluate the parameters for assessing the reliability of a system.

CO2. Analyze the time dependent/independent characteristics of a repairable system and frequency durations techniques to assess reliability.

CO3. Understand various safety management, policy, and planning strategies for personal and industrial safety.

CO4. Understand various safety and hazard identification techniques and follow appropriate safety measures in industry and society.

DETAILED SYLLABUS:

UNIT-I: FUNDAMENTALS OF RELIABILITY ENGINEERING   (9 periods)

Random variables, probability concepts, rules for probabilities of events.Probability density and distribution functions.Binomial distribution - Expected value and standard deviation for binomial distribution. Reliability functions, $f(t)$, $F(t)$, $h(t)$ - Relationship between these functions, Exponential density and distribution functions, expected value and standard deviation of exponential distribution. Measures of reliability - MTTF, MTTR, MTBF.Bathtub curve.

UNIT-II: NETWORK MODELING AND RELIABILITY EVALUATION   (9 periods)

Basic concepts - Evaluation of network reliability/unreliability, series systems, parallel systems, series - Parallel configuration systems.Redundant systems and its types. Evaluation of network Reliability / Unreliability using conditional probability method, tie-set and cut-set based approach, complete event tree and reduced event tree methods.

UNIT-III: MARKOV CHAIN AND MARKOV PROCESSES   (9 periods)

Basic concepts, stochastic transitional Probability matrix, time dependent probability evaluation, Limiting State Probability evaluation, Absorbing states. Modelling concepts – State space diagrams, time dependent reliability evaluation of single component repairable model, two component repairable model.Frequency and duration techniques.

UNIT IV: BASICS OF SAFETY CONCEPTS   **(9 periods)**

Introduction, goals, need for safety, history of safety movement - evolution of modern safety concept, general concepts of safety management. Planning for safety-productivity, quality and safety, line and staff functions, budgeting for safety, safety policy.

UNIT V: SAFETY TECHNIQUES AND APPLICATIONS   **(9 periods)**

Introduction to safety techniques, Incident Recall Technique (IRT), disaster control, job safety analysis, safety survey, safety inspection, safety sampling, evaluation of performance of supervisors on safety. Hazard identification techniques, components of safety audit, types of audit, audit methodology, process of safety reporting. Applications of industrial Safety, environmental safety, health safety, electrical safety, fire safety.

Total Periods: 45

Topics for Self Study are provided in the Lesson Plan

TEXT BOOKS:

1. Roy Billintonand Ronald N Allen, *Reliability Evaluation of Engineering Systems*, 2nd edition, Springer, New York, 2013.

2. Frank R. Spellman, Nancy E. Whiting, *Safety Engineering: Principles and Practices*, 3rd edition, Rowman& Littlefield, 2018.

REFERENCE BOOKS:

1. Charles E. Ebeling, *An introduction to reliability and maintainability engineering*,2nd edition Tata McGraw-Hill Education, 2010.

2. Dan Petersen, *Techniques of Safety Management: A Systems Approach*, 4thedition american society of safety engineers, 2003.

ADDITIONAL LEARNING RESOURCES:

1. https://nptel.ac.in/courses/105/108/105108128/
2. https://nptel.ac.in/courses/110/105/110105094/
3. https://www.youtube.com/watch?v=uutg8jKrL9w
4. https://www.youtube.com/watch?v=_c-iZ2BAXPw
5. https://www.youtube.com/watch?v=GeMCF3s5EDk
6. https://www.youtube.com/watch?v=xYWyype7cxE

II B. Tech. - II Semester

(19BT50107) ENVIRONMENTAL POLLUTION AND CONTROL

(Open Elective-1)

(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PREREQUISITES: -

COURSE DESCRIPTION: Fundamentals ofair pollution;Dispersion of pollutants; Effects and control of air pollution; Water pollution;Soil pollution and control; Municipal solid waste management.

COURSE OUTCOMES:

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

CO1 Analyze air and noise pollution using appropriate tools and techniques to solve complex environmental issues following relevant standards considering society, environment and sustainability besides communicating effectively in graphical form.

CO2 Analyze air and noise pollution control measures using appropriate tools and techniques to solve complex environmental issues following relevant standards and latest developments considering society, environment and sustainability besides communicating effectively in graphical form.

CO3 Analyze water pollution and its control measures using appropriate tools and techniques to solve complex environmental issues following relevant standards and latest developments considering society, environment and sustainability besides communicating effectively in graphical form.

CO4 Analyze soil pollution and its control measures using appropriate tools and techniques to solve complex environmental issues following relevant standards and latest developments considering society, environment and sustainability besides communicating effectively in graphical form.

CO5 Analyze solid waste and its management measures using appropriate tools and techniques to solve solid waste disposal issues following relevant standards and latest developments considering society, environment and sustainability besides communicating effectively in graphical form.

DETAILED SYLLABUS:

UNIT– I: AIR AND NOISE POLLUTION   **(08 Periods)**

Air Pollution:Scope, Significance, Classification, Sources – Line, Area, Stationary, Mobile; Effects of air pollutants on man, material and vegetation; Global effects of air pollution; Air pollution meteorology - Lapse rate, Inversion, Plume pattern;Dispersion of air pollutants - Dispersion models and applications; Ambient air quality standards.

Noise Pollution: Sound pressure, Power and intensity,Impacts of noise, permissible limits of noise pollution, measurement of noise, Noise standards.

UNIT– II: AIR AND NOISE POLLUTIONCONTROL   **(10 Periods)**

Self cleansing properties of the environment,Dilution method, Control at source, Process changes and equipment modifications, Control of particulates–Types of equipment, Design and operation - Settlingchambers,Centrifugal separators, Bag house filters, Wet scrubbers, Electrostatic precipitators; Control of gaseouspollutants – Adsorption,

Absorption, Condensation, Combustion; Control of air pollution from automobiles, Control of noise pollution, Case studies, Latest developments in the air and noise pollution control.

UNIT– III: WATER POLLUTION AND CONTROL   (10 Periods)

Water pollution – Sources, Causes, Effects; Surface and groundwater quality – Physical, Chemical, Biological; Drinking water quality standards, Water purification – Processes, Engineered systems – Aeration, Solids separation, Settling operations, Coagulation, Softening, Filtration, Disinfection; Wastewater – Sources, Causes, Effects, Treatment process and disposal – Primary, Secondary, Tertiary; Case studies, Latest developments in the water pollution control.

UNIT – IV: SOIL POLLUTION AND CONTROL   (08 Periods)

Soil pollutants, Sources of soil pollution, Causes, Effectsand control of soil pollution, Diseases caused by soil pollution, Methods to minimize soil pollution, Effective measures to control soil pollution, Soil quality standards, Case studies, Latest developments in the soil pollution control.

UNIT – V: MUNICIPAL SOLID WASTE MANAGEMENT   (09 Periods)

Municipal solid waste – Types, Composition and characteristics; Methods of collection and transportation; Methods of disposal – Opendumping, Sanitary landfill, Composting and

Incineration; Utilization -6R Concept, Recovery and recycling and Energy Recovery; Latest developments in solid waste management

Total Periods: 45

Topics for Self Study are provided in the Lesson Plan

TEXT BOOKS:

1. Peavy, H. S, Rowe, D. R., and Tchobanoglous, G., *Environmental Engineering*, McGraw Hill Inc., 1985.
2. C.S.Rao, *Environmental Pollution Control Engineering*, New Age International Pvt. Ltd., 2nd Edition, 2007.
3. Ibrahim A. Mirsa, *Soil Pollution: Origin, Monitoring & Remediation*, Springer, UK, 2nd Edition, 2008.

REFERENCE BOOKS:

1. M.N. Rao and H.V.N. Rao, *Air Pollution,* Tata McGraw–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. V. M. Domkundwar, *Environmental Engineering*, DhanpatRai& Co. Pvt. Ltd., New Delhi, 2014.

ADDITIONAL LEARNING RESOURCES:

1. *National Ambient Air Quality Standards*, Central Pollution Control Board, New Delhi

2. *Specifications for Drinking Water Standards*, IS10500:2012

3. *Solid Waste Management Rules*, 2016

II B. Tech. - II Semester

(19BT50108) PLANNING FOR SUSTAINABLE DEVELOPMENT

(Open Elective-1)

(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks		L	T	P	C
40	60	100		3	-	-	3

PREREQUISITES: -

COURSE DESCRIPTION: Sustainable development; Environmental impact; Sustainable Policies; Governance; Theories and strategies; Media and education for sustainability.

COURSE OUTCOMES:

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

CO1   Compare sustainable development theories in national and global context to protect the society and environment.

CO2   Analyze the unforeseen environmental impacts on sustainable development to protect the society and environment.

CO3   Analyze policies and governance for sustainable development considering ethics, economics, society and environment.

CO4   Analyze systems and strategies for sustainable development using appropriate tools and techniques considering ethics, economics, society and environment.

CO5   Analyze the role of media and education in sustainable development using appropriate tools and techniques considering ethics, society and environment besides communicating effectively.

DETAILED SYLLABUS:

UNIT– I: SUSTAINABLE DEVELOPMENT   (09 Periods)

Definition and concepts of sustainable development, Capitalization of sustainability-National and global context; Sustainable development goals, Emergence and evolution of sustainability and sustainable development, Theories of sustainability, Case studies.

UNIT –II: ENVIRONMENTAL IMPACT   (09 Periods)

Climate change – Science, Knowledge and sustainability; Unforeseen environmental impacts on development, Challenges of sustainable development, Centrality of resources in sustainable development, Case studies.

UNIT– III: SUSTAINABLE POLICIES AND GOVERNANCE   (09 Periods)

Governance - Democracy and Eco–welfare; Global civil society and world civil politics, Civic environmentalism, Policy responses to sustainable development, Economics of sustainability, Social responsibility in sustainability, National action, ISO 14001: Environmental management system.

UNIT– IV: SUSTAINABLE SYSTEMS AND STRATAGIES   (09 Periods)

Need for system innovation, Transition and co–evolution, Theories and methods for sustainable development, Strategies for eco–innovation, Ecological foot print analysis, Socio ecological indicators – Eco labels; Policy programmes for system innovation, Case studies.

UNIT –V: MEDIA AND EDUCATION FOR SUSTAINABILITY   (09 Periods)

Role of emerging media, Remarkable design and communication art, Activism and the public interest, Education for sustainability, Participation in decision making, Critical thinking and reflection, Case studies.

Total Periods: 45

Topics for Self Study are provided in the Lesson Plan

TEXT BOOKS:

1. John Blewitt, *Understanding Sustainable Development*, Earth Scan Publications Ltd., 2nd Edition, 2008.
2. Jennifer A. Elliot, *An Introduction to Sustainable Development*, Earth Scan Publications Ltd., 4th Edition, 2006.

REFERENCE BOOKS:

1. Peter Rogers, Kazi F Jalal and John A Boyd, *An Introduction to Sustainable Development*, Earth Scan Publications Ltd., 2006.
2. Simon Dresner, *The Principles of Sustainability*, Earth Scan Publications Ltd., 2nd Edition, 2008.
3. Peter Bartelmus, *Environment Growth and Development: The Concepts and Strategies of Sustainability*, Routledge, 3rd Edition, 2003.
4. Gabriel Moser, Enric Pol, Yvonne Bernard, MiriliaBonnes, Jose Antonio Corraliza and Maria Vittoria Giuliani, *People Places and Sustainability*, Hogrefe& Huber Publishers, 2nd Edition, 2003.

ADDITIONAL LEARNING RESOURCES:

1. Anil Markandya , Climate Change and Sustainable Development: Prospects for Developing Countries, Routledge, 2002

II B. Tech. - II Semester

(19BT50109) RURAL TECHNOLOGY

(Open Elective-1)

(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PREREQUISITES: -

COURSE DESCRIPTION: Technology forrural development; Nonconventional energy; Technologies for rural development; Community development; IT in rural development.

COURSE OUTCOMES:

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

CO1   Compare various technologies for rural development by solving rural problems through different schemes by considering ethics, society, environment and sustainability.

CO2   Analyzenon conventional energy sources using appropriate tools and techniques to solve rural energy problems considering society, environment and sustainability besides communicating effectively in graphical form.

CO3   Select appropriate technologies in different areas of rural development to solve rural issues following latest developments considering society, environment and sustainability.

CO4   Relate water conservation, health, safety and rural employment issues for community development to solve rural problems through appropriate technologies considering ethics, society, environment and sustainability.

CO5   Analyze the impact of IT, public and private partnership on rural development to solve complex rural problems using appropriate tools and techniques considering ethics, society, environment and sustainability.

DETAILED SYLLABUS:

UNIT – I: TECHNOLOGY FOR RURAL DEVLOPMENT   (09 Periods)

India - Technology and rural development, Pre and post independence period, 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   (09 Periods)

Definition of energy, Types of alternative sources of energy, Sources of non conventional energy – Solar energy: Solar pump in agriculture, Solar dryer, Solar cooker, Solar heater; Biogas, Recycling and management, Wastes conservation, Assessment and production of biomass products and their utilization.

UNIT – III: TECHNOLOGIES FOR RURAL DEVELOPMENT   (09 Periods)

Food and agro based technologies, Tissue culture, Nursery, Building and construction technologies, Cultivation and processing of economic plants, Cottage and social industries, Latest developments in rural technologies.

UNIT – IV: COMMUNITY DEVELOPMENT **(09 Periods)**

Water conservation, Rain water Harvesting, Drinking water Standards and simple treatments used, Environment and Sanitation, Bio fertilizers, Medical and aromatic plants, Employment generating technologies–Apiculture, Pisciculture, Aquaculture.

UNIT – V: IT IN RURAL DEVELOPMENT **(09 Periods)**

Role of information technology (IT) in rural areas, Impact of IT 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 SaansadAdarsh Gram Yojana (SAGY), Village adoption schemes.

Total Periods: *45*

Topics for Self Study are provided in the Lesson Plan

TEXT BOOKS:

1. M. S. Virdi, *Sustainable Rural Technologies*, Daya Publishing House, 2nd Edition 2018.
2. S. V. Prabhath and P. Ch. Sita Devi, *Technology and Rural India*, Serials Publications, 1st Edition, 2012.

REFERENCE BOOKS:

1. R. Chakravarthy and P. R. S. Murthy, *Information Technology and Rural Development*, Pacific Book International, 1st Edition, 2012.
2. Shivakanth Singh, *Rural Development Policies and Programmes*, Northern Book Centre,   1st Edition, 2002.
3. Katar Singh and Anil Shishodia*, Rural Development: Principles, Policies, and Management,* SAGE Publications India Private Limited, 4th Edition, 2016.
4. A. Vinayak Reddy, M. YadagiraCharyulu, *Rural Development in India: Policies & Initiatives,* New Century Publications, 1st Edition, 2008.

ADDITIONAL LEARNING RESOURCES:

1. L. M. Prasad, *Principles and Practice of Management*, S. Chand & Sons, 9th Edition, 2019.

2. Venkata Reddy, K., *Agriculture and Rural Development - Gandhian Perspective*, Himalaya Publishing House, 1st Edition, 2017.

II B. Tech. - II Semester
(19BT50505) ETHICAL HACKING
(Open Elective-1)
(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PREREQUISITES: -

COURSE DESCRIPTION:

Ethical hacking, Network and computer attacks, Footprinting, Social engineering, Port scanning, System hacking, Sniffers, Denial of service, Hacking web servers, Wireless hacking, Cryptography, Network Protection System.

COURSE OUTCOMES:

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

CO1. Demonstrate knowledge on the computer security, social engineering and the intent of ethical hacking.

CO2. Select and apply footprinting and port scanning tools to discover vulnerabilities of the computer system.

CO3. Investigate hacking techniques and tools to maintain computer security.

CO4. Analyze cryptosystems and network protection systems for information security and intrusion prevention.

DETAILED SYLLABUS:

UNIT I -ETHICAL HACKING, NETWORK AND COMPUTER ATTACKS   (9 periods)

Introduction to Ethical Hacking: The role of security and penetration testers, Penetration-Testing methodologies, What you can and cannot do legally.

Network and Computer Attacks: Malicious software, Trojans, Backdoors, Viruses, and Worms, Protection against malware attacks, Intruder attacks on networks and computers, Addressing physical security.

UNIT II -TCP/IP CONCEPTS AND SOCIAL ENGINEERING   (9 periods)

TCP/IP Concepts: Overview of TCP/IP – Application layer, Transport layer, Internet layer; IP addressing – Planning IP address assignments, IPv6 addressing.

Social Engineering: What is social engineering, What are the common types of attacks, Understand insider attacks, Understand identity theft, Describe phishing attacks, Understand online scams, Understand URL obfuscation, Social engineering countermeasures.

UNITIII -FOOTPRINTING ANDPORT SCANNING   (9 Periods)

Footprinting: Using web tools for footprinting, Conducting competitive intelligence, Using domain name system zone transfers.

Port Scanning: Port scanning, Using port scanning tools, Conducting ping sweeps, Understanding scripting.

UNITIV -SYSTEM HACKING   (9 Periods)

System hacking -Password cracking techniques, Types of passwords, Key loggers and other spyware technologies, Escalating privileges, Root kits, How to hide files, Steganography technologies, How to cover your tracks and evidences; Sniffers - Protocols susceptible to sniffing, Active and passive sniffing, ARP poisoning, Ethereal capture and display filters, MAC flooding, DNS spoofing techniques, Sniffing countermeasures; Denial of Service - Types of DoS attacks, How DDoS attacks work, How BOTs/BOTNETs work, Smurf attack, SYN flooding, DoS/DDoS counter measures; Session hijacking - Spoofing vs. hijacking, Types of session hijacking, Sequence prediction, Steps in performing session hijacking, Preventing session hijacking.

UNITV -CRYPTOGRAPHY, NETWORK PROTECTION SYSTEMS   (9 periods)

Cryptography: Understanding Cryptography basics, Symmetric and asymmetric algorithms, Public key infrastructure, Cryptography attacks.

Network Protection Systems: Understanding routers, Firewalls, Honeypots.

Total Periods: 45

Topics for Self Study are provided in the Lesson Plan

TEXT BOOKS:

1. Michael T. Simpson, Kent Backman, James E. Corley, *Hands-On Ethical Hacking and Network Defense*, 3rdEdition, Cengage Learning, 2017.

2. Kimberly Graves, *CEH: Official Certified Ethical Hacker Review Guide*, Wiley, 2007.

REFERENCE BOOK:

1. Michael Gregg, *Certified Ethical Hacker (CEH) Cert guide*,3rdEdition, Pearson, 2019.

II B. Tech. - II Semester

(19BT51207) AI IN HEALTHCARE

(Open Elective-1)

(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PREREQUISITES: -

COURSE DESCRIPTION: Concepts of Artificial Intelligence (AI) in Healthcare; The Present State and Future of AI in Healthcare Specialties;The Role of Major Corporations in AI in Healthcare;Applications of AI in Healthcare.

COURSE OUTCOMES:

Aftersuccessful completion of this course, the students will be able to:

CO1. Understand the fundamental concepts of AI in Healthcare sector.
CO2. Understand the applications of AI in Healthcare specialties.
CO3. Demonstrate AI applications developed by corporate companies.
CO4. Demonstrate knowledge on future applications of Healthcare using AI.
CO5. Understand the principles of AI applications through case studies.

DETAILED SYLLABUS:

UNIT I - INTRODUCTION TO ARTIFICIAL INTELLIGENCE IN HEALTHCARE (08 periods)

Introduction to AI in Healthcare, Benefits and Risks, AI in the health sector, AI versus Human Intelligence, The future of AI in health sector, AI and Neural networks.

UNIT II - THE PRESENT STATE AND FUTURE OF AI IN HEALTHCARE SPECIALTIES (10 periods)

Artificial Intelligence in: preventive healthcare, Radiology, Pathology, Surgery, Anesthesiology, Psychiatry, Cardiology, Pharmacy, Dermatology, Dentistry, Orthopedics, Ophthalmology.

UNIT III - THE ROLE OF MAJOR CORPORATIONS IN AI IN HEALTHCARE

(08 periods)

IBM Watson, The role of Google and Deep mind in AI in Healthcare, Baidu, Facebook and AI in Healthcare, Microsoft and AI in Healthcare.

UNIT IV - FUTURE OF HEALTHCARE IN AI (10 periods)

Evidence-based medicine, personalized medicine, Connected medicine,Disease and Condition Management , Virtual Assistants, Remote Monitoring, Medication Adherence, Accessible Diagnostic Tests, Smart Implantables, Digital Health and Therapeutics, Education, Incentivized Wellness.Artificial Intelligence, Block chain, Robots, Robot-Assisted Surgery, Exoskeletons, Inpatient Care, Companions, Drones, Smart Places, Smart Homes, Smart Hospitals, Reductionism, Innovation vs. Deliberation.

UNIT V - APPLICATIONS OF AI IN HEALTHCARE (09 periods)

Case Study 1: AI for Imaging of Diabetic Foot Concerns and Prioritization of Referral for Improvements in Morbidity and Mortality.

Case Study 2: Outcomes of a Digitally Delivered, Low-Carbohydrate, Type 2 Diabetes Self-Management.

Case Study 3: Delivering a Scalable and Engaging Digital Therapy.

Case Study 4: Improving Learning Outcomes for Junior Doctors through the Novel Use of Augmented and Virtual Reality for Epilepsy

Case Study 5: Big Data, Big Impact, Big Ethics-Diagnosing Disease Risk from Patient Data.

Total Periods: 45

Topics for Self Study are provided in the Lesson Plan

TEXT BOOKS:

1. Dr. ParagMahajan, *Artificial Intelligence in Healthcare, MedManthra Publications*, First Edition 2019.

2. *ArjunPanesar, Machine Learning and AI for Healthcare Big Data for Improved Health*, Apress Publications, 2019.

REFERENCE BOOKS:

1. Michael Matheny, SonooThadaneyIsrani, Mahnoor Ahmed, and Danielle Whicher,*Artificial Intelligence in Health Care: The Hope, the Hype, the Promise, the Peril*, National Academy of Medicine Publication, First Edition, 2019.

ADDITIONAL LEARNING RESOURCES:

1. https://www.udacity.com/course/ai-for-healthcare-nanodegree--nd320

   (AI for Healthcare).

2. https://builtin.com/artificial-intelligence/artificial-intelligence-healthcare

   (Surgical robots, new medicines and better care: 32 examples of AI in healthcare).

3. https://healthtechmagazine.net/article/2020/02/future-artificial-intelligence-healthcare (Future of Artificial Intelligence in Healthcare).

II B. Tech. - II Semester

(19BT51506) **BIOINFORMATICS**

(Open Elective-1)

(Common to EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	-	-	3

PRE-REQUISITES: A course on Biology for Engineers.

COURSE DESCRIPTION:

Biological Data Acquisition, Databases, Data Processing, Methods of Analysis, Applications of Bio-informatics

COURSE OUTCOMES:

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

CO1.   Understand basic biological data acquisition in bioinformatics.

CO2.   Identify the proper databases for the information search by choosing the biological databases and also submission and retrieval of data from databases.

CO3.   Analyze the results of bioinformatics data using text and sequence-based searching techniques.

CO4.   Analyze the secondary and tertiary structures of proteins by applying different alignment programs

CO5.   Design biological databases and novel drugs by using contextual knowledge on bioinformatics.

DETAILED SYLLABUS:

UNIT I BIOLOGICAL DATA ACQUISITION   (9 Periods)

Biological information, Retrieval methods for DNA sequence, protein sequence and protein structure information

UNIT II DATABASES   (9 Periods)

Format and Annotation: Conventions for database indexing and specification of search terms, Common sequence file formats. Annotated sequence databases - primary and secondary sequence databases, protein sequence and structure databases.

UNIT III DATA PROCESSING   (9 Periods)

Data – Access, Retrieval and Submission: Standard search engines; Data retrieval tools – Entrez, DBGET and SRS; Submission of (new and revised) data; Sequence Similarity Searches: Local and global. Distance metrics. Similarity and homology. Scoring matrices, PAM and BLOSUM

UNIT IV METHODS OF ANALYSIS   (9 Periods)

Dynamic programming algorithms, Needleman-Wunsch and Smith-waterman.Heuristic Methods of sequence alignment, FASTA and BLAST; Multiple Sequence Alignment and

software tools for pair wise and multiple sequence alignment, CLUSTAL program, Prediction of Tertiary structure of proteins.

UNIT V APPLICATIONS   (9 Periods)

Genome Annotation and Gene Prediction; ORF finding; Phylogenetic Analysis, Genomics, Proteomics, Genome analysis – Genome annotation, DNA Microarray, computer aided drug design (CADD).

Total Periods: 45

Topics for Self Study are provided in the Lesson Plan

TEXT BOOKS:

1. Lesk, A. K., "Introduction to Bioinformatics" 4th Edition, Oxford University Press, 2013

2. Dan Gusfield, "Algorithms on Strings, Trees and Sequences: Computer Science and Computational Biology" Cambridge University Press, 1997.

REFERENCE BOOKS:

1. Baldi, P. and Brunak, S., "Bioinformatics: The Machine Learning Approach" 2nd Edition, MIT Press. 2001

2. Mount, D.W., "Bioinformatics Sequence and Genome Analysis" 2nd Edition, Cold Spring Harbor Laboratory Press, 2004

3. Tindall, J., "Beginning Perl for Bioinformatics: An introduction to Perl for Biologists" 1st Edition, O'Reilly Media, 2001

(19BT40432) ELECTRONIC CIRCUIT ANALYSIS AND DESIGN LAB

(Common to ECE & EIE)

Int. Marks	Ext. Marks	Total Marks		L	T	P	C
50	50	100		-	-	2	1

PREREQUISITES: A course on Electronic Devices and Circuits

COURSE DESCRIPTION: Design, Simulation and verification of BJT and FET Amplifiers; Multistage Amplifiers; Feedback Amplifiers; Oscillators; Power Amplifiers; Tuned Amplifiers.

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

CO1: Design Multistage amplifiers and determine Gain, Bandwidth, Input and Output impedances for specified applications.

CO2: Design negative feedback amplifiers to determine Gain, Bandwidth, Input and Output Impedances

CO3: Design Oscillator circuits to generate sustained oscillations

CO4: Analyze power amplifiers to determine efficiency.

CO5: Work individually and in groups to solve problems with effective communication.

List of Exercises/List of Experiments:

Part-A: Design and Simulation of the following circuits
(Minimum SEVEN experiments are to be conducted):

1. Two Stage RC Coupled Amplifier
2. Cascode Amplifier
3. Common Source MOSFET amplifier
4. Current shunt Feedback Amplifier
5. Voltage Series Feedback Amplifier
6. Wien Bridge Oscillator using Transistors
7. RC Phase Shift Oscillator using Transistor
8. Class A Power Amplifier (Transformer less)
9. Class B Complementary Symmetry Amplifier

Part-B: Design and verification of the following circuits
(Minimum THREE experiments are to be conducted):

1. Two Stage RC Coupled Amplifier
2. Cascode Amplifier
3. Current shunt Feedback Amplifier
4. Voltage Series Feedback Amplifier
5. LC Oscillator
6. RC Phase Shift Oscillator
7. Class A Power Amplifier

REFERENCE BOOKS/LABORATORY MANUALS:

1. Md H Rashid, *Introduction to PSpice Using OrCAD for Circuits and Electronics*, PHI, 3rd edition, 2012
2. S. Poorna Chandra, B. Sasikala, *Electronics Laboratory Primer*, S. Chand & Company Ltd. 1st Reprint Edition, 2014

SOFTWARE/Tools used:

PSPICE / Multisim

II B. Tech. – II Semester

(19BT40433) LINEAR AND DIGITAL IC APPLICATIONS LAB
(Common to ECE & EIE)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: A course on Switching Theory and Logic Design

COURSE DESCRIPTION: Design and verification of Op-Amp applications; Timers; ADC and DAC; Simulation and synthesis of combinational and sequential circuits; Simulation tools.

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

CO1. Design various op-amp applications and timers circuits for societal applications.

CO2. Implement filters, timers, D-A converter using Op-amps and digital circuits for specified applications

CO3. Analyze performance parameters for combinational and sequential circuits using any simulation tool.

CO4. Work independently and in teams to solve problems with effective Communication.

LIST OF EXPERIMENTS:

PART-A: Design the following circuits
(Minimum FIVE experiments are to be conducted):

1. RC Phase shift oscillator circuit using Op-Amp 741.
2. Instrumentation Amplifier using Op-Amp 741 with required gain.
3. Differentiator & Integrator using Op-Amp 741.
4. Applications of 555 timer (Monostable / Astable Multivibrator) with given duty cycle and frequency.
5. Active first and second order LPF / HPF filter for a given cut off frequency using Op-amp 741.
6. D-A converter (R-2R ladder) using Op-amp 741 with required voltage levels.

PART B: **Perform simulation and synthesis of the following Digital circuits**

(Minimum **FIVE** experiments are to be conducted using **Verilog HDL**)

1. Arithmetic and Logic Unit using IC 74x181

2. Barrel Shifter using 74x151 multiplexer

3. Floating Point Encoder

4. Dual Priority Encoder

5. Self-Correcting Ring Counter

6. Universal Shift Register using IC 74x194

7. 3-bit Linear Feedback Shift Register

REFERENCE BOOKS/LABORATORY MANUALS:

1. Ramakanth A. Gayakwad, *Op-Amps & Linear ICs*, PHI, 3rd Edition, 1998
2. John F. Wakerly, *Digital Design Principles & Practices*, Pearson Education Asia, 4th Edition, 2008

SOFTWARE/Tools used:

XILINX / Multisim

ADDITIONAL LEARNING RESOURCES:

1. https://www.multisim.com/ - Online tool used for linear circuit simulations.
2. http://vlabs.iitb.ac.in/vlabs-dev/vlab_bootcamp/bootcamp/cool_developers/index.html

II B. Tech. – II Semester

(19BT41031) INDUSTRIAL INSTRUMENTATION LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
50	50	100	-	-	2	1

PRE-REQUISITES: Electrical and Electronic Measurements, Transducers in Instrumentation

COURSE DESCRIPTION: LabVIEW basics; Circuit design and simulation in Multisim; Measurement of Torque, Temperature, Viscosity, Humidity, Pressure, Level and Flow.

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

CO1. Apply the LabVIEW functions in programming.

CO2. Simulate electrical circuits using Multisim.

CO3. Analyze the characteristics of measuring instruments by applying the fundamental concepts.

CO4. Develop PC based data logger systems by interfacing hardware devices like myRIO, ELVIS and required sensors for measurement.

CO5. Design and solve problems in the measurement of parameters for required specifications.

CO6. Work independently and in teams to solve problems with effective communication.

LIST OF EXPERIMENTS:

Minimum TEN experiments are to be conducted.

1. LabVIEW Basics : Practice of Virtual Instrumentation Course content

   Numeric, Boolean, Strings, For, While, Case Structures, Arrays, Clusters, Sequence: Flat, Stacked, Formula Node, SubVI's, Local/Global Variables.

2. Data Acquisition and analysis using Graphs, Charts, myRio/ELVIS and LabVIEW.

3. Data Logging and analysis of simulated or acquired signals using File I/O.

4. Design and verification of converters using op-amps in Multisim.

   A) I to V

   B) V to I

5. Design and verification of resistance measurement, conversion in Multsim using

   A) Op-Amp

   B) Wheatstone bridge for improving sensitivity, compensation and linearity.

6. Measurement of Humidity.

7. Measurement of Flow.

8. Measurement of Torque.

9. Measurement of Viscosity.

10. Design and verification of level measurement using LabVIEW & myRIO.

11. Design and verification of Speed measurement using LabVIEW & myRIO.

12. Design and verification of temperature measurement using LabVIEW & ELVIS.

REFERENCE BOOKS/LABORATORY MANUALS:

1. Travis Jeffrey, Jim Kring, *LabVIEW for Everyone*, Pearson Education, 2009.

2. Johnson Jennings, *LabVIEW Graphical Programming*, McGraw Hill, 4th Edition, 2014.

3. D. Roy Chowdhury, *Linear Integrated Circuits*, New Age International Pvt. Ltd., 4th Edition, 2010.

4. D. Patranabis, *Principles of Industrial Instrumentation*, TMH, 3rd Edition, 2010.

5. Ramon Pallás Areny, John G. Webster, *Sensors and Signal Conditioning*, John Wiley and Sons, 2nd Edition, 2000.

6. A. K. Sawhney, *A Course in Electrical and Electronics Measurements and Instrumentation*, Dhanpat Rai and Sons, 19th edition, 2011.

SOFTWARE/Tools used:

1. NI Labview 2018
2. NI Circuit Design Suite – Multisim 2019
3. NI myRIO
4. NI ELVIS

ADDITIONAL LEARNING RESOURCES:

1. https://www.ni.com/pdf/manuals/320999e.pdf
2. https://ieeexplore.ieee.org/document/8960023/
   A Different way of Level measurement for PBL in Education of Students using NI-LabVIEW, Multisim and MyRIO
3. http://www.ni.com/pdf/manuals/376047c.pdf
4. https://www.clemson.edu/cecas/departments/ece/document_resource/undergrad/lab_manuals/NI_ELIVS_II_Orientation_Manual.pdf
5. http://www.ni.com/pdf/manuals/374629c.pdf
6. http://www.ni.com/pdf/manuals/373363f.pdf

II B. Tech. – II Semester

(19BT315AC) DESIGN THINKING

(Audit Course)

(Common to EEE, ECE & EIE)

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

PRE-REQUISITES: -

COURSE DESCRIPTION:

Design thinking process, Design thinking phases, empathy tools; Idea generation, visualizing and empathizing; Fidelity for prototypes, prototyping; prototyping for physical products.

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

CO1: Analyze design thinking concepts and principles to perform human centered design process for creative problem solving.

CO2: Create empathy maps to visualize user attitudes and behavior for gaining insights of customers.

CO3: Develop innovative products or services for a customer base using ideation techniques.

CO4: Build prototypes for complex problems using gathered user requirements.

CO5: Apply design thinking tools techniques to produce good design and relevant products or services for a specific target market.

CO6: Improve prototype by testing it with a specific set of users for making it sustainable by following ethics.

DETAILED SYLLABUS:

UNIT - I: INTRODUCTION TO DESIGN THINKING   (6 Periods)

Design Thinking Process: Types of the thinking process, Common methods to change the human thinking process, Design thinking: Definition, Origin of design thinking, Importance of design thinking, Design vs Design thinking, Problem solving, Understanding design thinking and its process model, Design thinking tools.

UNIT - II: EMPATHIZE   (6 Periods)

Design thinking phases, How to empathize, Role of empathy in design thinking, purpose of empathy maps, Things to be done prior to empathy mapping, Activities during and after the session, Understanding empathy tools : Customer Journey Map, Personas.

UNIT - III: IDEATION   **(6 Periods)**

Challenges in idea generation, need for systematic method to connect to user, Visualize, Empathize, and Ideate method, Importance of visualizing and empathizing before ideating, Applying the method, Ideation Tools: How Might We? (HMW), Story board, Brainstorming.

UNIT - IV: PROTOTYPING   **(6 Periods)**

What is a prototype? - Prototyping as a mindset, prototype examples, prototyping for products; Why we prototype? Fidelity for prototypes, Process of prototyping- Minimum Viable prototype

UNIT - V: TESTING PROTOTYPES   **(6 Periods)**

Prototyping for digital products: What's unique for digital, Preparation; Prototyping for physical products: What's unique for physical products, Preparation; Testing prototypes with users.

Total Periods: 30

Topics for self-study are provided in the lesson plan

TEXTBOOK:

1. S.Salivahanan, S.Suresh Kumar, D.Praveen Sam, *Introduction to Design Thinking*, Tata Mc Graw Hill, First Edition,2019.

2. Kathryn McElroy, *Prototyping for Designers: Developing the best Digital and Physical Products*, O'Reilly,2017.

REFERENCE BOOKS

1. Michael G. Luchs, Scott Swan , Abbie Griffin, *Design Thinking – New Product Essentials from PDMA*, Wiley, 2015.

2. Vijay Kumar, *101 Design Methods: A Structured Approach for Driving Innovation in Your Organization*, 2012.

ADDITIONAL LEARNING RESOURCES:

1. https://www.interaction-design.org/literature/article/5-stages-in-the-design-thinking-process

2. https://www.ibm.com/design/thinking/page/toolkit

3. https://www.interaction-design.org/literature/article/define-and-frame-your-design-challenge-by-creating-your-point-of-view-and-ask-how-might-we

4. https://www.culturepartnership.eu/en/article/ten-tools-for-design-thinking

5. https://nptel.ac.in/courses/109/104/109104109/

6. https://nptel.ac.in/courses/110106124/