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Supporting Document for 1.1.3

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Courses having focus on

Employability/ Entrepreneurship/ skill Development

Program: B. Tech.- Mechanical Engineering

Regulations: SVEC-20

The Courses (with course outcomes) under SVEC-20 Regulations which focus on *employability/ entrepreneurship/ skill development* are highlighted with the following colours.

Skill

Employability

Entrepreneurship

I B. Tech. - I Semester
(20BT1BS01) DIFFERENTIAL EQUATIONS AND MULTIVARIABLE CALCULUS
(Common to CE, ME, EEE, ECE, EIE, CSE, CSSE, IT, CSE(AI), CSE(DS) and CSBS)

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

PRE REQUISITE: -

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

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

CO1. Solve the higher order linear differential equations and identify solutions by analytical methods related to various engineering problems involving electrical circuits.

CO2. Formulate and solve partial differential equations for engineering problems.

CO3. Determine maxima and minima of functions of two variables and analyze their behaviour at extreme values.

CO4. Evaluate and apply multiple integrals to determine areas of plane curves.

CO5. Identify solenoidal and irrotational vector fields and apply vector integral theorems in evaluating areas and volumes.

DETAILED SYLLABUS

UNIT I: ORDINARY DIFFERENTIAL EQUATIONS   (9 Periods)

Ordinary Differential Equation: Order and Degree of Differential Equation; 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 homogeneous 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 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 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 and Volume integral; Vector integral theorems: Theorems of Green, Gauss and Stokes (without proofs)-Problems related to theorems.

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.
3. Erwin kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, 9th edition, 2006.

I B. Tech. – I Semester
(20BT1BS02) ENGINEERING CHEMISTRY
(Common to CE, ME, CSE, CSSE and IT)

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

PRE REQUISITE: -

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

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

CO1. Analyze and solve problems associated with hardness of water, boiler troubles and address the societal, health and safety issues related to quality of water.

CO2. Apply the basic knowledge of quantum mechanical approach to atomic structure and bonding theories to identify shapes of different molecules.

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

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

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

DETAILED SYLLABUS:

UNIT I: WATER TREATMENT (10 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; softening of water– Ion exchange process, zeolite process, desalination of brackish water by reverse osmosis, 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 II: 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; 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 III: ELECTROCHEMISTRY AND APPLICATIONS (9 periods)

Introduction, Electrode potential, Nernst equation, reference electrode-Calomel electrode, electrochemical cell; Battery– Leclanche cell, lithium ion batteries; Fuel cells-Hydrogen-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 (Beer-lamberts Law), 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 and their applications, 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.

I B. Tech. – I Semester

(20BT10201) BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

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

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

PRE-REQUISITES: --

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

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

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

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

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

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

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. Energy Efficiency (Star rating) standards by BEE.

UNIT-III: TRANSFORMERS AND MACHINES   (10 Periods)

Construction and working of a single phase transformer, EMF Equation; Construction, working and applications of Permanent Magnet DC Motor, Brushless DC Motor, three phase induction motor; construction, working and applications of stepper motor, resistor start & capacitor start and run single phase induction motor.

UNIT-IV: SEMICONDUCTOR DEVICES   (9 Periods)

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

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, New Delhi, 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

(20BT10301) MATERIAL SCIENCE AND ENGINEERING

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

PRE-REQUISITES:

Courses on Engineering Chemistry and Intermediate Physics

COURSE DESCRIPTION: Materials Structure and Constitution of Alloys; Heat treatment of steels; Properties of ferrous materials and its alloys; Properties of non-ferrous materials and its alloys; Properties and applications of Ceramics, Polymers and Composite materials.

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

CO1. Analyze the structural, constitutional characteristics of alloys and calculate atomic packing factor of different structures.

CO2. Analyze the properties of materials and enhance the same through heat treatment processes.

CO3. Demonstrate knowledge of ferrous materials and its alloys for engineering applications.

CO4. Demonstrate knowledge of Non-ferrous materials and its alloys for engineering applications.

CO5. Demonstrate knowledge of Ceramics, Polymers, and Composite materials for suitable engineering applications.

DETAILED SYLLABUS:

UNIT I: MATERIALSSTRUCTURE AND CONSTITUTION OF ALLOYS   (10 periods)

Materials Structure: Space lattice, Unit cells and Metallic crystal structures (SC, BCC, FCC and HCP), Crystal defects: Point, Line, Interstitial and Volume, Primary and secondary bonding in materials.

Constitution of Alloys: Necessity of Alloying, Gibbs's phase and Hume Rothery rule, Iron-Iron-carbide diagram and its microstructural aspects.

UNIT II: HEAT TREATMENT OF STEELS   (9 periods)

Annealing, Normalizing, Tempering, Carburization and Hardening- Austempering, Martempering, Carburizing, Nitriding, Cyaniding, Carbo-Nitriding, Flame and Induction Hardening, Vacuum and Plasma Hardening, Time-Temperature-Transformation Diagrams and Continuous Cooling Transformation Diagrams.

UNIT III: FERROUS MATERIALS AND ALLOYS   (9 periods)

Steels: Structure, properties, classifications and applications of plain steels, Specifications of steels, Structure, properties, classifications and applications of low alloy steels, Hadfield manganese steels, Stainless steel and Tool steels.
Cast iron: Structure, properties and applications of Gray cast iron, White cast iron, Malleable cast iron, Nodular cast iron and Alloy cast iron.

UNIT IV: NON-FERROUS MATERIALS AND ALLOYS   (6 periods)

Structure, properties and applications of Copper and its alloys, Aluminium and its alloys, Titanium and its alloys, Nickel and its alloys, Magnesium and its alloys, Refractory and Precious metals.

UNIT V: CERAMICS, POLYMERS AND COMPOSITES MATERIALS   (11 p*eriods*)
Ceramics: Classifications, Properties and Applications, Glass-ceramics, Polymers: Classification, Properties and Applications, Polymerization Reaction, Composites: Classifications, Properties and Applications of Polymer matrix composites, Ceramic matrix composites, Metal matrix composites and Nanocomposites*.

Total Periods: *45*

TEXT BOOKS:

1. V. Raghavan, Materials Science & Engineering, Prentice Hall of India, 5th edition, 2004.
2. R. Balasubramaniam, Callister's Materials Science & Engineering, John Wiley and sons, 2nd edition, 2014.

REFERENCE BOOKS:

1. Sidney H. Avner, Introduction to Physical Metallurgy, Tata McGraw Hill, 2nd edition, 1997.
2. George E Dieter, Mechanical Metallurgy, Tata McGraw Hill, 3rd edition, 2013.
3. Kodigre V D, Material Science and Metallurgy, Everest Publishing House, 31st edition, 2011.

(20BT1BS31) ENGINEERING CHEMISTRY LABORATORY

(Common to CE, ME, CSE, CSSE and IT)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE REQUISITE: -

COURSE DESCRIPTION: Estimation of hardness ground water sample, alkalinity, dissolved oxygen of water samples, Iron, residual chlorine in drinking water and Strength of an acid in Pb-Acid battery by volumetric methods; Instrumental methods like conductivity meter, potentiometer, PH meter and colorimeter; Measurement of viscosity of lubricants; and Determination of the influence of pH on metallic corrosion.

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

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

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

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

List of Experiments

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

1. Determination of hardness of ground water sample

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. Estimation of residual chlorine in drinking water

6. Conductometric titration of strong acid Vs strong base

7. Estimation of Ferrous ion by Potentiometry

8. Determination of percentage of Iron in Cement sample by colorimetry

9. Determination of strength of acid by pHmetric method

10. Determination of Viscosity of liquids by Ostwald's viscometer

11. Determination of Strength of an acid in Pb-Acid battery

12. Determination of the influence of pH on metallic corrosion

TEXT BOOK:

1. Engineering Chemistry lab Manual (SVEC-20)

Reference 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.

(20BT10331) COMPUTER AIDED ENGINEERING DRAWING

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

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	1	4	3

PRE-REQUISITES: --

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

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

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

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

CO3: Work independently / 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

TEXTBOOKS:

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&Rajashekar Patil, *Computer Aided Engineering Drawing*, New Age International Publishers, 4th edition, 2012.

I B. Tech. – I Semester
(20BT10332) ENGINEERING WORKSHOP
(Common to CE, ME, EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks		L	T	P	C
30	70	100		-	-	3	1.5

PRE-REQUISITES: --

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

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

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

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

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

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

CO5: Develop electric circuits for series and stair case connections.

CO6: Demonstrate the knowledge on power tools, plumbing operation, 3D printing technology involved in different engineering applications.

CO7: Work independently / 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.

Exercises :

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

Exercises:

3. Prepare a cross lap joint
4. Prepare dovetail / bridle joints

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

Exercises:

5.   Fabricate a rectangular tray as per the dimensions

6.   Fabricate square vessel/cylinder 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

Exercises:

7.   Prepare a sand mold, using the given single piece pattern (stepped pulley/cube)

8.   Prepare a sand mold, using the given split piece pattern (pipe bent/dumbbell)

ELECTRICAL WIRING: Prepare electrical wiring with associated devices such as switches, distribution boards, sockets, and light fittings in a structure considering safety standards for design and installation.

Exercises:

9.   Prepare electrical circuits with Series.

10.   Prepare electrical circuits with Stair case connections.

DEMONSTRATION:

11.   Demonstrate the usage of power tools.

12.   Demonstrate the plumbing operation and identify the essential tool and materials required for plumbing.

13.   Demonstrate the working of 3D printer

Note: Student shall perform any **TwelveExercises**

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

(20BT10333) MATERIAL SCIENCE AND ENGINEERING LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: Intermediate Physics, Intermediate Chemistry

COURSE DESCRIPTION: Characterization of microstructures of steels, cast irons and non-ferrous metals; heat treatment procedures; data acquisition and recording; grain size analysis; phase segmentation; non-destructive tests.

COURSE OUTCOMES:

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

CO1.   Analyze metallographic study of various metals using tools & software.

CO2.   Determine the mechanical properties of heat treated materials using tools & equipment.

CO3.   Apply non-destructive methods to identify and analyze the metal defects.

CO4.   Work individually or in a team to solve problems with effective communication.

LIST OF EXPERIMENTS:

(**Note:** Student shall perform minimum of **Twelve** experiments.)

1. Study of metallurgical instruments & microscope

2. a) Preparation of specimen using cold setting die

   b) Preparation of specimen using hydraulic press

3. Preparation and study of the microstructure of cast irons

4. Preparation and study of the microstructure of carbon steels

5. Preparation and study of the microstructure of Non-Ferrous Alloys

6. Study of the microstructures of heat treated steels

7. Measurement of hardness of heat treated and untreated steels

8. Determination of hardenability of steel by Jominey End Quench Test

9. Determination of grain size, and phase distribution of specimens (any four materials) by Material Plus software

10. Experiment on Ultrasonic flaw detection

11. Experiment on Magnetic particle inspection

12. Experiment on Die-penetration

13. Study on Eddy current testing

REFERENCE BOOKS / LAB MANUALS:

1. Material Science and Engineering Lab Manual (SVEC-20)

I B.Tech. - I Semester

(20BT1HSAC) SPOKEN ENGLISH

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

(Audit Course)

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

PRE-REQUISITES: -

COURSE DESCRIPTION: Grammar; Functional English; Paragraph writing; Letter writing and Email writing.

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

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

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

DETAILED SYLLABUS

UNIT I - **GRAMMAR**   **(6 periods)**

Active voice and Passive voice – Auxiliary modals - Question Forms:Wh-word, Embedded, Yes/No - Disjunctive/Tags - Spotting Errors

UNIT II - **FUNCTIONAL ENGLISH**   **(6 periods)**

Vocabulary Building: (Vegetables, groceries, fruits, Parts of human body, relations) Greetings - Introduction - Self and others - Story telling - Speaking Activities

UNIT III - **PARAGRAPH WRITING**   **(6 periods)**

Topic sentence - cohesion and coherence - Unity - adequate development - Introduction to types -Compare-Contrast - Problem & Solution, Cause & Effect, Classification & Illustrative.

UNIT IV - **LETTER WRITING**   **(6 periods)**

Components of an Effective Letter - Communication in everyday life - Personal Correspondence, Internal Communication - Career and Employment Letters

UNIT V - **EMAIL WRITING**   **(6 periods)**

Do's & Don'ts - Tips for email effectiveness - Email Jargon - Sample Emails

Total Periods: 30

TEXT BOOKS:

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

- https://www.britishcouncil.in/programmes/english-partnerships/state/skillsprojects/AP-English-Skills.

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

I B. Tech. - II semester
(20BT2BS01) TRANSFORMATION TECHNIQUES AND LINEAR ALGEBRA
(Common to CE, ME, EEE, ECE, EIE, CSE, CSSE, IT, CSE(AI), CSE(DS) and CSBS)

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

PRE-REQUISITE: -

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

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

CO1. Construct the Fourier series for periodic functions and demonstrate the use of Fourier series and Fourier transform to connect the frequency and time domain systems.

CO2. Solve initial and boundary value problems in engineering fields through Laplace Transform techniques.

CO3. Apply the matrix theory in solving system of linear equations and determine the Eigen values and Eigen vectors.

CO4. Demonstrate the knowledge of Linear Transformations to intelligent systems.

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 $(0, 2\pi), (-\pi, \pi)$; Fourier series of even and odd functions; Half-range Fourier sine and cosine expansions in $(0, \pi)$; 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 transforms, existence conditions, Laplace transforms of standard functions, Properties of Laplace transforms (without proofs), Laplace transforms of derivatives, Laplace transforms of integrals, multiplication by t^n, division by t, Laplace transforms of periodic functions, Laplace transforms of unit step function and unit impulse function.

UNIT- III: INVERSE LAPLACE TRANSFORMS   (9 Periods)

Inverse Laplace transforms 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.

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).

Total Periods: 45

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.

(20BT1BS04) APPLIED PHYSICS

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

PREREQUISITES: --

COURSE DESCRIPTION: Fiber optics; Acoustics; Ultrasonics; Kinematics; Kinetics; Thermal Physics and Modern Engineering Materials.

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

CO1. Understand the electromagnetic wave propagation in various types of Optical Fibers.

CO2. Apply the basic knowledge of acoustics and ultrasonics to provide solutions for various engineering problems.

CO3. Analyze and solve the problems associated with kinetics and kinematics.

CO4. Acquire the basic knowledge in several heat transfer mechanisms and heat conduction through the compound media.

CO5.Demonstrate the knowledge on characteristics and applications of modern engineering materials.

DETAILED SYLLABUS:

Unit-I: FIBER OPTICS   (8 periods)

Introduction, structure of an optical fiber, total internal reflection, acceptance angle, acceptance cone and numerical aperture, modes of propagation, classification of optical fibers, V-number (qualitative), fabrication of optical fiber by double crucible technique, applications of optical fibers, sensors (temperature, displacement, liquid level detector).

UNIT-II: ACOUSTICS AND ULTRASONICS   (9 periods)

Acoustics - Introduction, classification of sound, sound intensity level (decibel), reverberation, reverberation time, Sabine's formula (qualitative),absorption coefficient and its determination, , factors affecting acoustics and their remedies, basic requirements of an acoustically good hall.

Ultrasonics - Introduction to ultrasonic waves, production of ultrasonic waves by magnetostriction method, piezoelectric method, detection of ultrasonics (qualitative), industrial applications (ultrasonic welding, ultrasonic soldering and ultrasonic drilling).

UNIT-III: KINEMATICS AND KINETICS   (10 periods)

Kinematics of particles – Introduction, Rectilinear motion (displacement-time curve, velocity-time curve, acceleration-time curve), curvilinear motion (velocity and angle of projection, equation of trajectory path, horizontal range) - inclined projection (equation of trajectory, maximum height, time of flight of projectile, horizontal range, angle of projection).

Kinetics - Bodies in rectilinear translation, kinetics of bodies rotating about fixed axis, work, energy, power, work-energy equation for translation.

UNIT-IV: THERMAL PHYSICS   **(8 periods)**

Introduction, modes of heat transfer (conduction, convection and radiation), coefficient of thermal conductivity, rectilinear flow of heat along a uniform bar, thermal conductivity of bad conductor (Lee's disc method), heat conduction through compound media (materials in series and parallel).

UNIT-V:MODERN ENGINEERING MATERIALS   **(10 periods)**
Metallic glasses - Introduction, preparation of metallic glasses by RF sputtering technique, properties (structural, thermodynamic, mechanical, electrical, chemical and optical), applications of metallic glasses.

Shape memory alloys (SMA) – Introduction, shape memory effect and its types, characteristics of SMA, properties of NiTi alloy, applications of SMA.

Composites - Introduction, types and applications.

                                                       Total periods: 45

TEXT BOOKS:

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

2. S. S. Bhavikatti and K. G. Rajashekarappa, Engineering Mechanics, New Age International Publishers, 2nd edition, 2015.

REFERENCE BOOKS:

1. B. K. Pandey and S. Chaturvedi, *Engineering Physics*, Cengage Learning, 2012.
2. Brij Lal and N. Subrahmanyam, *Heat and Thermodynamics,* S. Chand and Company Ltd., 1995.
3. William D. Callister, Jr. David, G. Rethwisch, Material Science and Engineering 9th Edition, Wiley 2013.

(20BT1HS01)COMMUNICATIVE ENGLISH
(Common to CE, ME, EEE, ECE and EIE)

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

PRE-REQUISITES: -

COURSE DESCRIPTION: Introduction to Communication; Active Listening; Effective Speaking; Reading and Technical Writing.

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

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

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

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

CO4: Communicate effectively in Conferences, Symposia, Seminars and in formal and real time situations by applying appropriate speaking techniques learnt by examining different communication styles used in similar contexts.

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)

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

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

UNIT IV - **READING**   **(9 periods)**

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

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

Total Periods: 45

TEXT BOOKS:

1. Meenakshi Raman & Sangeetha Sharma, Technical Communication, Oxford
   University Press, New Delhi, 2012.
2. Ashraf Rizvi, Effective Technical Communication, McGraw-Hill Education (India)
   Pvt. Ltd., New Delhi, 2018.

REFERENCE BOOKS:

1. Sanjay Kumar &Pushp Lata, *Communication Skills*, Oxford University Press, New
   Delhi, 2013.
2. Rajendra Pal and J. S. Korlahalli, *Essentials of Business Communication*, Sultan
   Chand and Son, New Delhi, 2010.

ADDITIONAL LEARNING RESOURCES

1. https://www.skillsyouneed.com/ips/active-listening.html: A useful summary of what
   active listening skills are.
2. https://en.wikipedia.org/wiki/Active_listening: Wikipedia entry about active
   listening.
3. https://www.forbes.com/sites/womensmedia/2012/11/09/10-steps-to-effective-
   listening/#4b27a2503891: Ten steps to Active Listening (by Forbes magazine).
4. https://goo.gl/t1Uqrt: 20 tips for organizing a conference.
5. https://goo.gl/kPMr9u: 10 important issues for speakers at a conference.
6. https://goo/gl/C5bDvv: Wikihow guide to organizing a conference.

I B. Tech. – II Semester

(20BT20541) PROGRAMMING IN C AND DATA STRUCTURES

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

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

PRE-REQUISITES: ACourse on Basic Mathematics

COURSE DESCRIPTION: Algorithms; Flowcharts;Introduction to C language; Operators and expressions; Input and output functions; Control statements; Arrays; Strings; Functions; Pointers; User-defined data types; Linked lists; Overview of data structures; Stack; Queue; Searching algorithms; Sorting algorithms.

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

CO1. Develop flowcharts, algorithms for given problems.

CO2. Design algorithmic solutions by analyzing programming problems and using appropriate C language constructs.

CO3. Apply linear data structures such as arrays, linked lists, stacks, queues for efficient data organization and manipulation.

CO4. Select appropriate techniques for searching and sorting problems.

DETAILED SYLLABUS:

UNIT I - INTRODUCTION TO C PROGRAMMING   (8 periods)

Introduction to Algorithms and Flowcharts: What is an algorithm, Different ways of stating algorithms, Key features of algorithm, What are variables, Subroutines, Flowcharts, Strategy for designing algorithms, Tracing an algorithm to depict logic, Specification for converting algorithms into programs.

Basis of C Programming: Introduction, Structure of a C program, Concept of a variable, Data types in C, Program statement, Declaration, How does the computer store data in memory, Tokens, Operators and expressions, Expressions revisited, Type conversion in C.

UNIT II - INPUT AND OUTPUT, CONTROL STATEMENTS   (9 periods)

Input and Output: Basic screen and keyboard I/O in C, Non-formatted input and output, Formatted input and output functions.

Control Statements: Specifying test condition for selection and iteration, Writing test expression, Conditional execution and selection, Iteration and repetitive execution, goto statement, Special control statements, Nested loops.

UNIT III - ARRAYS AND STRINGS, FUNCTIONS   (10 periods)

Arrays and Strings: One-dimensional array – Declaration, Initialization, Manipulation; Multi-dimensional arrays – Declaration, Initialization, Manipulation; Strings – Declaration, Initialization, String input/output, Character manipulation, String manipulation; Arrays of strings – Declaration, Initialization, Manipulation.

Functions: Concept of function, Using functions, Call by value mechanism, Working with functions, Passing arrays to functions, Scope and extent, Storage classes, Recursion.

UNIT IV – POINTERS, USER-DEFINED DATA TYPES, LINKED LISTS(10 periods)

Pointers in C: Understanding memory addresses, Address operator (&), Pointer, Arrays and pointers, Pointers and strings, Pointer arithmetic, Pointers to pointers, Array of pointers, Pointers to an array, Two-dimensional arrays and pointers, Dynamic memory allocation.

User-Defined Data Types: Structures - Declaration, Initialization, Accessing members, Arrays of structures, Arrays within structure, Structures and pointers, Structures and functions; Enumeration types.

Linked Lists: Single linked lists – Definition, Representation, Operations, Inserting a node, Deleting a node; Applications of linked lists, Disadvantages of linked lists, Array versus linked list revisited.

UNIT V – DATA STRUCTURES   (8 periods)

Basic Data Structures: Overview of data structures, Stack – Definition, Array representation, Implementation of stack operations using arrays; Queue - Definition, Array representation, Implementation of queue operations using array.

Searching and Sorting: Linear Search, Binary Search, Bubble sort, Selection sort.

Total Periods: 45

TEXT BOOKS:

1. Pradip Dey and Manas Ghosh, *Programming in C,* Oxford University Press, 2018.
2. DebasisSamanta, *Classic Data Structures,* 2nd Edition, PHI Learning, 2009.

REFERENCE BOOKS:

1. Byron S Gottfried and Jitender Kumar Chhabra, *Programming with C*, 4th Edition, McGraw Hill Education, 2019.
2. YashavantKanetkar, *Let Us C,* 17th Edition, BPB Publications, 2020.

ADDITIONAL LEARNING RESOURCES:

- E. Balagurusamy, *Programming in C*, 7th Edition, McGraw Hill, 2014.
- R. G. Dromey, *How to Solve it by Computer*, Pearson Education, 2007.
- https://nptel.ac.in/courses/106/104/106104128/
- https://nptel.ac.in/courses/106/103/106103069/

I B. Tech. – II Semester
(20BT20301) BASIC ENGINEERING MECHANICS

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

PRE-REQUISITES: - Applied Physics

COURSE DESCRIPTION: Statics of Particles and Rigid Bodies; Support Reactions; Analysis of Perfect Frames; Friction; Centroid, Centre of Gravity and Moment of Inertia; kinetics and Vibrations

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

CO1. Analyze the equilibrium of forces in static particles, rigid bodies, and effect of friction by applying the principles of Engineering Mechanics, and solve the problems..

CO2. Analyze composite areas and bodies to find centroid, centre of gravity and moment of inertia.

CO3. Apply D'Alembert's Principle for analyzing the kinetics of rigid bodies.

CO4. Apply the basic principles of Simple Harmonic Motion and vibrations to solve problems in mechanical systems

DETAILED SYLLABUS:

UNIT – I: STATICS OF PARTICLES   **(9 Periods)**
Basic concepts, System of units, System of concurrent coplanar forces in plane, Resultant of forces, Laws of mechanics, Parallelogram and triangular law of forces, Equilibrium of forces, Lami's theorem, Vectorial representation of forces, Vector operations of forces –addition, subtraction, dot product, cross product of vectors, principle of transmissibility.

UNIT – II: STATICS OF RIGID BODIES   **(9 Periods)**
Moment of a force, Varignon's theorem, Moment of a couple, Vectorial representation of moments and couples, Coplanar non-concurrent forces, Equilibrium of rigid bodies, Types of supports and loads, Types of frames, Perfect frame analysis, Method of joints, Method of sections, Principle of virtual work.

UNIT – III: FRICTION   **(9 Periods)**
Frictional force, Types of friction, Laws of friction, Co-efficient of friction, Angle of friction, Angle of repose, Cone of friction, Applications: Body on horizontal/inclined plane, Two bodies in contact, Ladder friction, Wedge friction.

UNIT–IV: CENTROID, CENTRE OF GRAVITY AND MOMENT OF INERTIA
          (9 Periods)
Centroids of simple and composite areas, centre of gravity of bodies, Theorems of Pappus and Guldinus, Parallel axis and perpendicular axis theorems, Moment of Inertia of Composite areas, Radius of gyration – Section modulus, Mass Moment of Inertia of simple and composite masses.

UNIT–V: KINETICS AND MECHANICAL VIBRATIONS   **(9Periods)**

Kinetics of Rigid Bodies:

Introduction, Problems on D'Alembert's principle, Impulse-momentum equation, Kinetics of circular motion, Rotation.

Mechanical Vibrations:

Definitions, Concepts – Simple Harmonic Motion – Free vibrations – Simple, compound and Tortional pendulum – Numerical problems.

Total Periods: *45*

TEXT BOOKS:

1. S. S. Bhavikatti and K. G. Rajashekarappa, Engineering Mechanics, New Age International (P) Ltd., 3rd Edition, 2009.

2. A. K. Tayal, Engineering Mechanics Statics and Dynamics, Umesh Publications, Delhi, 14th edition, 2011.

REFERENCE BOOKS:

1. S. Rajasekaran and G. Sankarasubramanian, Engineering Mechanics – Statics and Dynamics, Vikas Publishing House Pvt. Ltd., 3rd Edition, 2009.

2. Arthur P. Boresi and Richard J. Schmidt, Engineering Mechanics - Statics and Dynamics, Cengage Learning, 1st Edition, Indian Edition, 2008.

3. K. Vijaya Kumar Reddy and J. Suresh Kumar, Singer's Engineering Mechanics - Statics and Dynamics, BS Publications, 3rd Edition, 2010.

4. S. Timoshenko, D. H. Young and J. V. Rao, Engineering Mechanics, Tata McGraw-Hill Education Pvt. Ltd., Revised 4th Edition, Special Indian Edition, 2007.

(20BT1BS33)APPLIED PHYSICS LAB

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE REQUISITE: -

COURSE DESCRIPTION: Determination of acceleration due to gravity using Compound Pendulum; Moment of inertia of a Flywheel; rectangular body using Bifilar Pendulum; Rigidity Modulus of a wire using Torsional Pendulum and frequency of electrically vibrating tuning fork; Thermal conductivity of a bad conductor (Lee's disc method); Seebeck Effect using Thermocouple; Verification of Newton's Law of Cooling for any two liquids; Characteristics of Optical fiber; Experimental determination of carrier concentration and energy gap of a material by varying temperatures and Determination of spring constant of springs using Coupled Oscillator.

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

CO1. Demonstrate the experimental procedures to compute the frequency of a tuning fork, hall coefficient, energy gap, moment of inertia, rigidity modulus and thermal conductivity of materials.

CO2. Apply skills to plot various characteristic curves of an optical Fiber and also determine thermal conductivity, thermo emf and energy gap.

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

List of Experiments:

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

1. Determination of moment of inertia of a bar and acceleration due to gravity - Compound Pendulum.

2. Moment of inertia of a Flywheel.

3. Bifilar Pendulum - Moment of inertia of a rectangular body.

4. Melde's Experiment – Determine the frequency of electrically driven tuning fork.

5. Determination of thermal conductivity of a bad conductor (Lee's disc method).

6. Estimate the acceptance angle of an optical fiber.

7. Verification of Newton's Law of Cooling for any two liquids.

8. Determination of number of charge carriers per unit volume and hall coefficients of a given material using Hall Effect.

9. Rigidity Modulus of a material of a wire - Torsional Pendulum

10. Thermocouple - Seebeck Effect.

11. Determine the energy gap of a material by varying temperatures.

12. Determination of spring constant of springs using Coupled Oscillator.

TEXT BOOK:

1. Applied Physics Lab Manuel (SVEC-20)

REFERENCES:

1. Balasubramanian S, Srinivasan M.N and Ranganathan, *A Text book of Practical Physics,* R. Sultan Chand & Sons, 2017.

2. https://vlab.amrita.edu/index.php?sub=1&brch=194&sim=354&cnt=1

I B.Tech. - II Semester
(20BT1HS31) COMMUNICATIVE ENGLISH LAB
(Common to CE, ME, EEE, ECE and EIE)

Int. Marks	Ext. Marks	Total Marks		L	T	P	C
30	70	100		-	-	3	1.5

PRE REQUISITE: -

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

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

CO1: Demonstrate knowledge of Phonetics by examining and applying sounds of English through Phonetics.

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

CO3: Apply appropriate listening and reading skills by analyzing the context, and demonstrate through listening comprehension and reading comprehension.

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

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

*First ten exercises are mandatory among the following:

List of Exercises:

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, SVEC

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 SOFTWARES:
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.
   4. https://goo.glsvMHZ1: information and advice about describing line graphs
   5. https://goo.gl/NqFJuc: an informative presentation about using line graphs

I B. Tech. – II Semester

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	-	-	3	1.5

PRE-REQUISITES: A course on "Programming in C and Data Structures"

COURSE DESCRIPTION: Hands on practice in developing and executing simple programs using C Programming constructs – Control statements, Arrays, Strings, Functions, Pointers, Structures, Single linked lists, Stack, Queue, Searching and Sorting.

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

CO1.   Design algorithmic solutions by analyzing programming problems and using appropriate C language constructs.

CO2.   Implement linear data structures such as arrays, linked lists, stacks, queues for efficient data organization and manipulation.

CO3.   Select appropriate techniques for searching and sorting problems.

CO4.   Work independently and communicate effectively in oral and written forms.

LIST OF EXERCISES:

.   a)   Let a and b are two integer variables whose values are 10 and 13 respectively. Write a program to evaluate the following arithmetic expressions.
   i) a + b   ii) a–b   iii) a * b   iv) a/b   v) a % b

   b)   Write a program to evaluate the following algebraic expressions after reading necessary values from keyword.
   i)   (ax + b)/(ax – b)
   ii) $2.5 \log x + \cos 32^0 + | x^2 + y^2 |$
   iii) $x^5 + 10 x^4 + 8$ and $x^3 + 4 x + 2$
   iv) ae^{kt}

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

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

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

.   a)   Write a program that prints the given three integers in ascending order using if - else.

   b)   Write a program to calculate commission for the input value of sales amount. Commission is calculated as per the following rules:

     i) Commission is NIL for sales amount Rs. 5000.

     ii) Commission is 2% for sales when sales amount is >Rs. 5000 and<=Rs. 10000.

     iii) Commission is 5% for sales amount >Rs. 10000.

c) If cost price and selling price of an item is input through the keyboard, write a program to determine whether the seller has made profit or incurred loss. Also determine how much profit or loss he incurred in percentage.

.   a) An insurance company calculates premium as follows:

     i) If a person's health is excellent and the person is between 25 and 35 years of age and lives in a city and is a male then premium is Rs.4 per thousand and the policy amount cannot exceed Rs.2 lakhs.

     ii) If a person satisfies all the above conditions and is female then the premium is Rs.3 per thousand and the policy amount cannot exceed Rs.1 lakh.

     iii) If a person's health is poor and the person is between 25 and 35 years of age and lives in a village and is a male then premium is Rs.6 per thousand and the policy cannot exceed Rs. 10000.

     iv) In all other cases the person is not insured.

Write a program to determine whether the person should be insured or not, his/her premium rate and maximum amount for which he/she can be insured.

b) Write a program, which takes two integer operands and one operator as input from the user, performs the operation and then prints the result. (Consider the operators +, -, *, /, %. Use switch statement)

.   a) Write a program to find the sum of individual digits of a positive integer.

b) A Fibonacci sequence is defined as follows: The first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a program to generate the first N terms of the sequence.

.   a) Write a program to find the largest and smallest number in a given list of integers.

b) Write a program to perform addition of two matrices.

c) Write a program to determine whether the given string is palindrome or not.

.   a) Write a program using functions to perform the following operations:

     i) To convert a given decimal number into binary number

     ii) To convert a given binary number into decimal number

b) Write a program using functions insert a sub-string in main string at a specified position.

.   a) Write a C program to print the elements of an array in reverse order using pointers.

b) Write a program to accept the elements of the structure as: Employee-name, Basic pay. Display the same structure along with the DA, CCA and Gross salary for 5 employees.

Note: DA=51% of Basic pay, CCA=Rs.100 consolidated.

.   A college has N number of students and the following details of all the students are maintained – register number, name, branch, phone number. Write a program to store the details of the students using a singly linked list. Develop functions to perform the following operations on the data.

     i) Insert new student's details

     ii) Display the details of the students

     iii) Delete a given student's information

0. a) Develop a menu driven program to perform the following operations on a stack of integers (Array implementation of stack with maximum size MAX)
   i) Push an element
   ii) Pop an element
   iii) Display the status
   iv) Demonstrate overflow and underflow situations

   b) Develop a menu driven program to perform the following operations on a queue of characters (Array implementation of queue with maximum size MAX).
   i) Insert an element
   ii) Delete an element
   iii) Display the status
   iv) Demonstrate overflow and underflow situations

1. Store register numbers of students who attended placement training program in a random order in an array. Write a function to search whether a student has attended placement training program or not using
   a) Linear Search
   b) Binary Search

2. Given marks of N number of students in mathematics subject, write a program to display the marks of students in ascending order using
   a) Bubble Sort
   b) Selection Sort

TEXT BOOKS:
1. Pradip Dey and Manas Ghosh, Programming in C, Oxford University Press, 2018.
2. DebasisSamanta, Classic Data Structures, 2nd Edition, PHI Learning, 2009.

REFERENCE BOOKS:
1. Byron S Gottfried and Jitender Kumar Chhabra, Programming with C, 4th Edition, McGraw Hill Education, 2019.
2. YashavantKanetkar, Let Us C, 17th Edition, BPB Publications, 2020.

(20BT1MC01)UNIVERSAL HUMAN VALUES

(Mandatory Course)

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

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	-	-	2	-	-	-

PRE-REQUISITES: -

COURSE DESCRIPTION: Process for Value Education; Harmony in the Human Being - Harmony in Myself!;Harmony in Family and Society- Human Relationship; Harmony in the Nature and Existence – Coexistence; Implications of Holistic Understanding of Harmony on Professional Ethics.

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

CO1.   Understand Values and skills for sustained happiness and prosperity.

CO2.   Analyse realistic implications of a Holistic understanding of ethical human conduct, trustful and mutually fulfilling human behaviour.

CO3.   Apply holistic approach in personal life and profession through a positive understanding of the Human reality and existence.

DETAILED SYLLABUS:

UNIT I: VALUE EDUCATION   **(6 Periods)**

Human Values-Introduction; Self-Exploration - Natural Acceptance; Human Aspirations-Right understanding- the current scenario: understanding and living in harmony.

UNIT II: HUMAN BEING AND SELF   **(6 Periods)**

Understanding human being - I' and the material 'Body'; needs of Self ('I') and 'Body'-happiness and physical facility; Body as an instrument of 'I' - characteristics and activities of 'I' and harmony in 'I'; harmony of I with the Body.

UNIT III: FAMILY, THE SOCIETY AND THE NATIONS   **(6 Periods)**

Values in human relationship (nine universal values) - foundational values of relationship; Difference between intention and competence; Difference between respect and differentiation; harmony in the society; Universal harmonious order in society.

UNIT IV: HARMONY WITH THE NATURE   **(6 Periods)**

Harmony in the Nature; Interconnectedness and mutual fulfilment - the four orders of nature - Recyclability and Self-regulation; Existence as Co-existence; Holistic perception of harmony and existence.

UNIT V: HARMONY WITH PROFESSIONAL ETHICS   **(6 Periods)**

Acceptance of human values; Ethical Human Conduct; Basis for Humanistic Education; Competence in professional ethics; Case studies: Holistic technologies, Management Models and Production Systems; Socially and ecologically responsible engineers, technologists and managers - enriching institutions and organizations.

Total Periods: 30

TEXT BOOKS:

1. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria,

Excel Books,New Delhi, 2010

REFERENCE BOOKS:

1. JeevanVidya: EkParichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.