



**SREE VIDYANIKETHAN ENGINEERING COLLEGE**  
(AUTONOMOUS)

Sree Sainath Nagar, Tirupati

**Department of Electronics and Instrumentation Engineering**

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**Supporting Document for 1.1.3**

**Courses having focus on**  
**Employability/ Entrepreneurship/ skill Development**

**Program: B. Tech.- Electronics and Instrumentation 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.** 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)**

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, 13<sup>th</sup> edition, 2014.
2. B. S. Grewal, *Higher Engineering Mathematics*, Khanna publishers, 44<sup>th</sup> edition, 2017.

**REFERENCE BOOKS:**

1. Dennis G. Zill and Warren S. Wright, *Advanced Engineering Mathematics*, Jones and Bartlett, 6<sup>th</sup> edition, 2011.
2. R. K. Jain and S. R. K. Iyengar, *Advanced Engineering Mathematics*, Alpha Science International Ltd., 6<sup>th</sup> edition, 2017.
3. Erwin kreyszig, *Advanced Engineering Mathematics*, John Wiley & Sons, 9<sup>th</sup> edition, 2006.

**I B. Tech. – I Semester**  
(20BT1BS03) **ENGINEERING PHYSICS**  
(Common to EEE, ECE, EIE, CSE(AI) and CSE(DS))

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

**PRE-REQUISITES: -**

**COURSE DESCRIPTION:** Wave Optics; Electromagnetic Waves; Fiber Optics; Semiconductors; Optoelectronic Devices; Dielectrics; Magnetic materials; Superconductors and Nanomaterials.

**COURSE OUTCOMES:**

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

- CO1. Apply the knowledge of light waves to interpret the concepts of Interference, Diffraction and Polarization.
- CO2. Demonstrate the concepts of electromagnetic wave propagation in Optical fibers.
- CO3. Apply the basic knowledge of semiconductors to understand the functioning of various optoelectronic devices.
- CO4. Demonstrate the basic knowledge of dielectric and magnetic properties to understand the various dielectric polarizations and magnetic materials.
- CO5. Understand the concepts of superconductors and nanomaterials to familiarize their applications in relevant fields.

**DETAILED SYLLABUS:**

**Unit I: Wave Optics (9 Periods)**

Interference: Introduction- 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 (qualitative) - Double slit diffraction (qualitative) - Diffraction grating.

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 (9 Periods)**

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

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 - 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 and Optoelectronic Devices (10 Periods)**

Introduction - 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 Extrinsic semiconductors (qualitative) -

Drift and Diffusion currents -Direct and Indirect band gap semiconductors - Hall effect, Hall coefficient and Applications - pn junction

Optoelectronic devices : Light Emitting Diode(LED), Photodiode and Semiconductor diode laser.

#### **Unit IV: Dielectrics and Magnetic Materials (9 Periods)**

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

#### **Unit V: Superconductors and Nanomaterials (8 Periods)**

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

Basic principles of nanomaterials - Synthesis of nanomaterials by Ball Milling and Pulsed Laser Deposition(PLD) methods - Properties of nanomaterials (Physics, Electrical, Magnetic, Mechanical and Optical) - 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, 11<sup>th</sup> edition, 2019.
2. P. K. Palaniswamy, *Engineering Physics*, Scitech Publications India Private Limited, 2<sup>nd</sup> 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*, Dhanpat Rai Publications (P) Ltd, 2015.

**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., 3<sup>rd</sup> edition, New Delhi, 2009.
2. R. L. Boylestad and Louis Nashelsky, *Electronics Devices and Circuits*, PHI, 11<sup>th</sup> edition, 2009.

**REFERENCE BOOKS:**

1. M.S. Naidu, S. Kamakshiah, *Introduction to Electrical Engineering*, Tata McGraw-Hill Education, New Delhi, 2007.
2. D. Roy Chowdhury, *Linear Integrated Circuits*, New Age International Pvt. Ltd., 4<sup>th</sup> edition, 2011.

**I B.Tech. – I Semester**  
(20BT10341) **BASIC CIVIL AND MECHANICAL ENGINEERING**  
(Common to EEE, ECE and EIE)

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

**PRE-REQUISITES: --**

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

**COURSE OUTCOMES:**

After successful completion of 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**

#### **TEXT BOOKS:**

1. Shanmugam G and Palanichamy MS, *Basic Civil and Mechanical Engineering*, Tata McGraw Hill Publishing Co., New Delhi, 1<sup>st</sup> edition 2018.
2. R. Vaishnavi, Prof. M. Prabhakaran & Prof. V. Vijayan, *Basic Civil and Mechanical Engineering*, S.CHAND Publications, 2<sup>nd</sup> edition, 2013.
3. B.C Punmia, Ashok Kumar Jain, Arun kumar Jain, *Surveying (vol-I)*, Laxmi publications, 16<sup>th</sup> edition, 2005.
4. B.C Punmia, Ashok Kumar Jain, Arun kumar Jain, *Building Construction*, Laxmi publications, 10<sup>th</sup> edition, 2008.

#### **REFERENCE BOOKS:**

1. Seetharaman S., *Basic Civil Engineering*, Anuradha Agencies, 2005.
2. Ramamrutham S., *Basic Civil Engineering*, Dhanpat Rai Publishing Co.(P) Ltd.1999.
3. Kalpakjian, Serop, *Manufacturing Engineering and Technology*, Pearson Education, 7<sup>th</sup> 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, 1<sup>st</sup> edition, 2013.

**I B. Tech. – I Semester**  
(20BT1BS32) **ENGINEERING PHYSICS LAB**  
(Common to EEE, ECE, EIE, CSE(AI) and CSE(DS))

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

**PRE REQUISITE:** -

**COURSE DESCRIPTION:** Estimation of thickness of the wire using wedge shape method; Wavelength of monochromatic light source by diffraction grating; Newton's ring method; numerical aperture and acceptance angle of optical fiber; Characteristics of p-n junction diode; Photodiode and LED; Experimental determination of carrier concentration and energy gap of a semiconductor material; Determination resistivity of semiconductor by Four probe method and magnetic field along axial line of a current carrying coil.

**COURSE OUTCOMES:**

After successful completion of 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, 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.

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

**List of Experiments:**

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 using spectrometer by minimum deviation method
4. Estimation of magnetic field along the axis of a circular coil carrying current.
5. Determination the numerical aperture of a given optical fiber and hence to estimate its acceptance angle.
6. Determination of number of charge carriers and Hall coefficients of a given semiconductor using Hall Effect.
7. Determine the energy gap of a semiconductor.
8. Study the I-V characteristics of pn junction diode.
9. Estimation of threshold voltages of different LED's.
10. Study the characteristics of Photodiode.
11. Determination of wavelength of laser by using diffraction grating.
12. Determine the resistivity of semiconductor by Four probe method.

**TEXT BOOK:**

1. Engineering Physics Lab Manuel (SVEC-20)

**REFERENCE BOOKS:**

1. S. Balasubramaniam 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

## I B. Tech. – I Semester

### (20BT10231) **BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB**

(Common to EEE, ECE and EIE)

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

#### **PRE-REQUISITES: --**

**COURSE 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. Phasor analysis in R-L-C (Series / Parallel) circuits.
4. Measurement of Power factor and its improvement.
5. Study of Earthing – Pipe earthing and Plate earthing
6. Load test on 1-Phase Transformer.
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.

#### **REFERENCES BOOKS/ LAB MANUALS:**

1. P. S. Dhogal, *Basic Practicals in Electrical Engineering*, Standard Publishers, 2004.
2. YannisTsvividis, *A First Lab in Circuits and Electronics*, Wiley, 1<sup>st</sup> 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/>

**I B. Tech. – I Semester**  
(20BT10331) **COMPUTER AIDED ENGINEERING DRAWING**  
(Common to CE, ME, EEE, ECE and EIE)

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

**PRE-REQUISITES: --**

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

**COURSE OUTCOMES:**

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

- CO1:** Apply the principles of engineering drawing, Methods and CAD tools to draw the Geometries, Curves and Orthographic projections used to communicate in engineering field.
- CO2:** Develop lateral surfaces of solids and draw Isometric views of given objects for engineering communication using principles of engineering drawing and CAD tools.
- CO3:** Work independently / in groups & communicate effectively in oral and written forms.

**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, Involutés.

**Exercises:**

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

**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, 51<sup>st</sup> 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, 4<sup>th</sup> 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 work pieces using fitting tools.
- CO2. Develop different prototypes in the carpentry trade such as cross lap joint, dovetail / bridle joints and Mortise and Tenon joint using carpentry tools.
- CO3. Design and model different prototypes in the sheet metal forming trade such as rectangular tray, square vessel/cylinder, Funnel as per the dimensions using sheet metal forming tools.
- CO4. Develop sand mould using single piece pattern and split piece pattern in the foundry trade using foundry tools.
- CO5. Develop electric circuits for series and stair case connections.
- CO6. Demonstrate the knowledge on power tools, plumbing operation, 3D printing technology involved in different engineering applications.
- CO7. Work independently / in groups & communicate effectively in oral and written forms.

**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 work pieces
2. Make a V- mating from the given MS work pieces

**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:**

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

**List of 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

**List of Exercises:**

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

**List of 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 **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, 17<sup>th</sup> edition, 2012.
2. Kalpakjian, Serape, *Manufacturing Engineering and Technology*, Pearson Education, 7<sup>th</sup> edition, 2014.



**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**

**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 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/skills-projects/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.** 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  $(0, 2\pi)$ ,  $(-\pi, \pi)$ ; 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**

**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, 10<sup>th</sup> edition, 2016.
2. B. S. Grewal, *Higher Engineering Mathematics*, Khanna publishers, 44<sup>th</sup> edition, 2017.
3. David Poole, *Linear Algebra: A Modern Introduction*, Brooks/Cole, 2<sup>nd</sup> edition, 2005.

**REFERENCE BOOKS:**

1. B. V. Ramana, *Higher Engineering Mathematics*, Tata McGraw hill, 1<sup>st</sup> edition, 2017.
2. V. Krishna Murthy, Mainra and Arora: *An Introduction to Linear Algebra*, Affiliated East-West Press, 1993.

**I B. Tech. - II Semester**  
(20BT1BS02) **ENGINEERING CHEMISTRY**  
(Common to EEE, ECE and EIE)

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  $\Psi$  and  $\Psi^2$ , 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;  $\pi$ -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, 16<sup>th</sup> 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, 5<sup>th</sup> edition 2010.
2. Skoog and West, *Principles of Instrumental Analysis*, Thomson, 6<sup>th</sup> edition, 2007.
3. Peter Atkins, Julio de Paula and James Keelar, *Atkins' Physical Chemistry*, Oxford University Press, 10<sup>th</sup> edition, 2010.

**I B. Tech. - II Semester**  
(20BT1HS01) **COMMUNICATIVE ENGLISH**  
(Common to CE, ME, EEE, ECE and EIE)

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

**PRE-REQUISITES: -**

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

**COURSE OUTCOMES:**

After successful completion of this course, 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**

**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 & 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](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**  
(20BT20241) **NETWORK ANALYSIS**  
(Common for ECE and EIE)

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

**PRE-REQUISITES:**

Basic electrical and Electronics Engineering and Basic electrical and Electronics Engineering Lab

**COURSE DESCRIPTION:**

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

**COURSE OUTCOMES:**

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

- CO1. Analyze the electrical circuits by applying the networks reduction, node & mesh concepts and determine the electrical parameters for AC and DC excitations.
- CO2. Analyze the single phase electrical circuits to investigate the response and determine the electrical parameters.
- CO3. Analyze the electrical circuits by applying the network theorems and determine the electrical parameters for AC and DC excitations.
- CO4. Analyze the transient response of electrical circuits for AC and DC excitations.
- CO5. Evaluate two-port network parameters.

**DETAILED SYLLABUS:**

**Unit I: Fundamentals of Electric 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 Transform methods.

**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*, 5<sup>th</sup> edition, McGraw Hill Education (India) Private Limited, New Delhi, 2013.
2. A. Sudhakar, Shyammohan S Palli, *Circuits and Networks Analysis and Synthesis*, 5<sup>th</sup> edition, McGraw Hill Education (India) Private Limited, New Delhi, 2015.

**REFERENCE BOOKS:**

1. J.A.Edminister, M.D.Nahvi, *Theory and Problems of Electric Circuits*, 4<sup>th</sup> edition, Schaum's outline series, McGraw Hill, New Delhi, 2004.
2. W H Hayt, J E Kemmerly, S M Durbin, *Engineering Circuit Analysis*, 6<sup>th</sup> 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**  
**(20BT20541) PROGRAMMING IN C AND DATA STRUCTURES**

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

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

**PRE-REQUISITES:** A Course on Basic Mathematics

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

**COURSE OUTCOMES:**

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

- CO1. Develop flowcharts, algorithms for given problems.
- CO2. Design algorithmic solutions by analyzing programming problems and using appropriate C language constructs.
- CO3. Apply linear data structures such as arrays, linked lists, stacks, queues for efficient data organization and manipulation.
- CO4. Select appropriate techniques for searching and sorting problems.

**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**

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

**TEXT BOOKS:**

1. Pradip Dey and Manas Ghosh, *Programming in C*, Oxford University Press, 2018.
2. Debasis Samanta, *Classic Data Structures*, 2<sup>nd</sup> Edition, PHI Learning, 2009.

**REFERENCE BOOKS:**

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

**ADDITIONAL LEARNING RESOURCES:**

- E. Balagurusamy, *Programming in C*, 7<sup>th</sup> 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**  
**(20BT1BS31) ENGINEERING CHEMISTRY LAB**  
(Common to EEE, ECE, EIE, CSE(AI) and CSE(DS))

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

**PRE REQUISITE: -**

**COURSE DESCRIPTION:** Estimation of hardness ground water sample, alkalinity, dissolved oxygen of water samples, Iron, residual chlorine in drinking water and Strength of an acid in Pb-Acid battery by volumetric methods; Instrumental methods like conductivity meter, potentiometer, P<sup>H</sup> 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.

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

**List of Experiments**

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 pH metric 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.

**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.gl/svMHZ1>: information and advice about describing line graphs
5. <https://goo.gl/NqFJuc>: an informative presentation about using line graphs

**I B. Tech. – II Semester**  
**(20BT20551) PROGRAMMING IN C AND DATA STRUCTURES LAB**  
(Common to CE, ME, EEE, ECE and EIE)

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

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

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

**COURSE OUTCOMES:**

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

- CO1.** Design algorithmic solutions by analyzing programming problems and using appropriate C language constructs.
- CO2.** Implement linear data structures such as arrays, linked lists, stacks, queues for efficient data organization and manipulation.
- CO3.** Select appropriate techniques for searching and sorting problems.
- CO4.** Work independently and communicate effectively in oral and written forms.

**LIST OF EXERCISES:**

1. 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)  $2.5 \log x + \cos 32^\circ + |x^2 + y^2|$   
iii)  $x^5 + 10x^4 + 8$  and  $x^3 + 4x + 2$   
iv)  $ae^{kt}$
2. 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.



3. 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.
4. 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)
5. 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.
6. 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.
7. 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.
8. 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.100consolidated.

9. 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
10. 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
11. 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
12. 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. Debasis Samanta, *Classic Data Structures*, 2<sup>nd</sup> Edition, PHI Learning, 2009.

#### **REFERENCE BOOKS:**

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

**I B. Tech. - II Semester**  
**(20BT1MC01) UNIVERSAL HUMAN VALUES**  
(Mandatory Course)  
(Common to CE, ME, EEE, ECE and EIE)

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

**PRE-REQUISITES: -**

**COURSE DESCRIPTION:** Value education; Human being and self; Family, the society and the nations; Harmony with the nature and Harmony with professional ethics.

**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 OBJECTIVES:**

- To inculcate Values and skills among the students for sustained happiness and prosperity.
- To emphasize on realistic implications of a Holistic understanding of ethical human conduct, trustful and mutually fulfilling human behaviour.
- To imbibe an attitude of Holistic perspective among the students towards life and profession through a positive understanding of the Human reality and existence.

**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****Topics for Self-study are provided in the Lesson Plan****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. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.