**Bharati Vidyapeeth (Deemed to be University), Pune**
**Faculty of Engineering and Technology**
**Programme: B. Tech. (Electronics & Communication) –CBCS 2021 Course**

B. Tech. (Electronics & Communication)) Sem I

| Sr. No. | Course Code | Name of Course | Teaching Scheme (Hrs./Week) | | | Examination Scheme (Marks) | | | | | | Credits | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | L | P | T | ESE | IA | TW | OR | PR | Total | L | P | T | Total |
| 1. | | Linear Algebra, Calculus & SolidGeometry | 4 | 0 | 1 | 60 | 40 | 0 | 0 | 0 | 100 | 4 | 0 | 1 | 5 |
| 2. | | Chemistry & Economics ofMaterial Science | 4 | 2 | 0 | 60 | 40 | 50 | 0 | 0 | 150 | 4 | 1 | 0 | 5 |
| 3. | | Electronic Components & Devices | 4 | 2 | 0 | 60 | 40 | 50 | 50 | 0 | 200 | 4 | 1 | 0 | 5 |
| 4. | | Electrical Technology | 4 | 2 | 0 | 60 | 40 | 25 | 0 | 0 | 125 | 4 | 1 | 0 | 5 |
| 5. | | Computation &Programming Using C | 4 | 2 | 0 | 60 | 40 | 50 | 25 | 0 | 175 | 4 | 1 | 0 | 5 |
| | **Total** | | **20** | **08** | **1** | **300** | **200** | **175** | **75** | **00** | **750** | **20** | **4** | **1** | **25** |

**Bharati Vidyapeeth**
**(Deemed to be University)**
**College of Engineering, Pune**

| **B. Tech. (Electronics & Communication Engineering) Sem I**<br>**LINEAR ALGEBRA, CALCULUS AND SOLID GEOMETRY** | | |
|---|---|---|
| **TEACHING SCHEME:** | **EXAMINATION SCHEME:** | **CREDITS ALLOTTED:** |
| Theory: 04 | End Semester Examination(UE): 60 Marks | Credits : 04 |
| Practical:-- | Internal Assessment(IA): 40 Marks | |
| Tutorial: 01 | | Credit :01 |
| | Total:100 Marks | Total Credits:05 |

**Course Pre-requisites:**

The students should have knowledge of

| | |
|---|---|
| **1** | Basic algebra. |
| **2** | Ordinary derivative. |
| **3** | Plane geometry. |

**Course Objectives:**

| | |
|---|---|
| **1** | Rank, consistency of system of equations and concepts of solid geometry. |
| **2** | Partial derivative and maxima, minima for several variable |
| **3** | Methods of curve tracing and multiple integrals |

**Course Outcomes: After learning this course students will be able to**

| | |
|---|---|
| **1** | Apply & test rank of matrix for consistency of linear system. |
| **2** | Understand the partial derivative and apply to find errors and approximate values. |
| **3** | Test the functionality using Jacobian. |
| **4** | Trace curves of various types of mathematical functions. |
| **5** | Compute the coordinate system and apply it to locus problems. |
| **6** | Evaluate multiple integrals and apply it evaluate area and volume. |

| | | |
|---|---|---|
| **UNIT – I** | **Linear Algebra: Matrices** | **(08 Hours)** |
| | Rank, Normal form, System of Linear Equations, Linear Dependence and Independence, Linear and Orthogonal Transformations. Eigen values, Eigen Vectors, Cayley – HamiltonTheorem. Application to problems in Engineering. | |
| | | |
| **UNIT – II** | **Partial Differentiation and its applications** | **(08 Hours)** |
| | Functions of two or more variables, Partial derivatives, | |

| | | |
|---|---|---|
| | Homogeneous functions, Euler's theorem, Total derivative, Change of variables, Errors and Approximations. | |
| | | |
| **UNIT -III** | **Jacobian and Maxima and Minima Multivariable Calculus** | **(08Hours)** |
| | Partial derivative, Jacobians and their applications, Chain Rule, Functional Dependence. Maxima and Minima of Functions of two variables, Lagrange's method of undetermined multipliers. | |
| | | |
| **UNIT - IV** | **Fourier series, Integral Calculus and Curve Tracing** | **(08 Hours)** |
| | Definition, Dirichlet's conditions, Fourier Series and Half Range Fourier Series, Harmonic Analysis, Differentiation Under the Integral Sign, Error functions.<br>Tracing of Curves, Cartesian, Pola and Parametric Curves. Rectification of Curves. | |
| | | |
| **UNIT -V** | **Solid Geometry** | **(08Hours)** |
| | Cartesian, Spherical Polar and Cylindrical Coordinate Systems. Sphere, Cone and Cylinder. | |
| | | |
| **UNIT - VI** | **Multiple Integrals and their Application** | **(08 Hours)** |
| | Double and Triple integrations, Applications to Area, Volume, Mean and Root Mean Square Values | |

**Text Books:**

1. .P. N. Wartikar and J. N. Wartikar, "Applied Mathematics" (Volumes I and II), 7th Ed., Pune Vidyarthi GrihaPrakashan, Pune, 2013.

**References Books:**

1. B. S. Grewal, "Higher Engineering Mathematics", 42th Ed., Khanna Publication, Delhi
2. B.V. Ramana, "Higher Engineering Mathematics", 6th Ed., Tata McGraw-Hill, New Delhi, 2008.
3. Erwin Kreyszig, "Advanced Engineering Mathematics", 10th Ed., John Wiley & Sons, Inc., 2015.
4. Peter V. O'Neil, "Advanced Engineering Mathematics", 7th Ed., Cengage Learning, 2012.
5. Michael Greenberg,"Advanced Engineering Mathematics", 2nd Ed., Pearson Education, 1998.

**Project based learning:**

1. Find the eigen values and eigen vectors of any random matrix
2. Check the linear dependence / independence of vectors
3. Check the consistency and solve the linear equations
4. Solve the partial differential equations
5. Find the error using the concept of total derivative
6. Check the Functional Dependence using the concept of Jacobian

| |
|---|
| 7. Find the derivatives of error functions |
| 8. Find Maxima and Minima of functions of two variables |
| 9. Use differentiation under the integral Sign to solve integrals |
| 10. Trace the Cartesian curves |
| 11. Trace the polar curves |
| 12. Find the equation of sphere, cone and cylinder using the concept of solid geometry |
| 13. Find root mean square values using integrals |
| 14. Find the volume using triple integrals |
| 15. Find the area using double integral |

Students in a group of 3 to 4 shall complete any one project from the above list.

**Bharati Vidyapeeth**
**(Deemed To be University)**
**College of Engineering, Pune**

| **B. Tech. (Electronics & Communication Engineering) Sem I**<br>**CHEMISTRY AND ECONOMICS OF MATERIAL SCIENCE** | | |
|---|---|---|
| **TEACHING SCHEME:** | **EXAMINATION SCHEME:** | **CREDITS ALLOTTED:** |
| Theory: 04 | End Semester Examination(UE): 60 Marks | Credits : 04 |
| Practical:02 | Internal Assessment(IA): 40 Marks | |
| Tutorial: -- | TW:50 Marks | Credit: 01 |
| | Total:150 Marks | Total Credits:05 |

| **Course Pre-requisites:** | |
|---|---|
| The students should have knowledge of | |
| **1** | Structure property relationship, types of crystals, Capacitor, insulator, classification and properties of polymers, super capacitors , Green solvents |

| **Course Objectives:** | |
|---|---|
| **1** | To develop the interest among the students regarding chemistry and their applications in engineering. |
| **2** | To develop confidence among students about chemistry, how the knowledge of |
| **3** | The student should understand the concepts of chemistry to lay the groundwork for subsequent studies in the field such as E&C Engineering. |

| **Course Outcomes: After learning this course students will be able to** | |
|---|---|
| **1** | Describe the properties of materials and application of semiconductor electronics |
| **2** | The student will able to understand various structure of polymers and their effect on different properties of polymers. |
| **3** | Apply constitutive equations of composite materials and understand mechanical behavior at micro and macro levels. |
| **4** | To explain students the importance of economics and environmental issues in material science. |
| **5** | Design and develop sensors using optical methods with desired properties. |
| **6** | Identify the grand challenges of green chemistry and consider what it will take to resolve them. |

| **UNIT – I** | **Semi conductors, insulators and Superconductors** | **(08 Hours)** |
|---|---|---|
| | Semi conductivity in non-elemental materials, Preparations of semiconductors, Chalcogen photoconductors, photocopying process Introduction to Superconductors, types of Superconductors, Properties of superconductors, Applications of Superconductors, Electrical insulators or Dielectrics. | |

| | | |
|---|---|---|
| | | |
| **UNIT – II** | **Polymers for the Electronics Industry** | **(08 Hours)** |
| | Definition, Classification, Chain Architecture (Linear/Branched, Tacticity, Isomerism), homopolymers, copolymers, graft copolymers and their characteristic properties in reference to their applications. Conduction mechanism, Preparation of conductive polymers, Polyacetylene, Poly (p- phenlylene), Polyhetrocyclic systems, Polyaniline, Poly (Phenylene sulphide), Poly (1,6-heptadiyne), Applications, Photonic applications | |
| | | |
| **UNIT -III** | **COMPOSITES** | **(08Hours)** |
| | Introduction of Composites, Classification of Composites, Organic Matrix Composites, Metal Matrix Composites (MMC), Ceramic Matrix Materials (CMM), Classification Based on Reinforcements, Fiber Reinforced Composites/Fibre Reinforced Polymer (FRP) Composites, Laminar Composites, Particulate Reinforced Composites (PRC), Classification Based on Reinforcements and Matrices, Classification Based On Matrices, Metal Matrix Composites (MMC), Advantages and Limitations of Composites Materials,<br>Limitations of Composites | |
| | | |
| **UNIT -IV** | **ECONOMICS OF ENGINEERING MATERIALS** | **(08 Hours)** |
| | Introduction, economic considerations, green design, environmental and societal considerations of materials recycling of metals and non-metals recycling issues, limits of recycling, life cycle analysis and its use in design. | |
| | | |
| **UNIT -V** | **SENSORS** | **(08Hours)** |
| | MEMS, NEMS, Actuators, Biosensors, construction and working of Biosensors<br>and classification of Biosensors, Advantages of Biosensors,<br>Biochips or Biological computers. | |
| | | |
| **UNIT -VI** | **GREEN CHEMISTRY** | **(08 Hours)** |
| | Introduction, Twelve Principles of Green chemistry, numericals on atom economy,synthesis, adipic acid and indigo. Green solvents (ionic liquid supercritical CO2), and products from natural materials. | |
| | | |
| **Term Work:** | | |
| The term work shall consist of record of minimum eight experiments. | | |
| 1. To determine strength of strong acid using pH meter | | |
| 2. Titration of a mixture of weak acid and strong base using | | |

| |
|---|
| conductometer |
| 3. Preparation of polystyrene |
| 4. To determine molecular weight of a polymer by viscosity measurement |
| 5. To determine radius of macromolecule polystyrene/ polyvinyl alcohol by viscosity measurement. |
| 6. Study of corrosion of metals in medium of different pH. |
| 7. To determine pH of soil |
| 8. To determine Acidity of soil |
| 9. Determine the surface concentration of 1-butanol in aqueous solution. |
| 10. Preparation of a conducting polymer. |
| 11. Preparation of Urea-formaldehyde resins |
| 12. To determine strength of strong acid using pH meter |
| |
| **Text Books** |
| 1. Bhal & Tuli, "Text book of Physical Chemistry (1995)", S. Chand & Company, New Delhi. |
| 2. S. S. Dara , "A textbook of Engineering Chemistry", McGraw-Hill Publication, New Delhi. |
| |
| **Reference Books:** |
| 1. Jain P.C & Jain Monica , " Engineering Chemistry", Dhanpat Rai & Sons, Delhi, 1992. |
| 2. O. G. Palanna , "Engineering Chemistry", Tata McGraw-Hill Publication, New Delhi.. |
| 3. F. A. Cotton and G. Wilkinson, "Advanced Inorganic Chemistry (6th edition)", John Wiley |
| 4. P. Ghosh, " Polymer Science and technology (2nd Edition)" , Tata McGRAW Hill, 2008. |
| 5. J.M.G.Cowie , "Polymers: Chemistry & Physics of Modern Materials (2nd edition)", Blackie Academic & Professional, 1994. |
| 6. Shikha Agarwal , "Engineering Chemistry- Fundamentals and applications", Cambridge Publishers - 2015. |
| **Project based learning:** |
| 1. To Prepare and for synthesis of the following polymers,<br>a. Bakelite<br>b. Polystyrene<br>c. Epoxy Resin |
| 2. Synthesis properties and applications of polymer. |
| 3.To Prepare Glass Hybrid Fibres, Epoxy Composite material using Hand Layup Method |
| 4 To Prepare Fibre Reinforced Composites. |
| 5. To study - Bio diesel and Bio petrol & extraction process of Bio desial.<br>6. Effect of fertilizers in water |
| 7. Preparation of Gold Nanoparticles Using Tea: |
| 8. Determination of Mercury in Milk by Cold Vapor Atomic Fluorescence: |
| 9. Nitration of Phenols Using $Cu(NO_3)_2$ |
| 10 Solvent less and One-Pot Synthesis of Cu(II) Phthalocyanine Complex: |
| 11. Density Based Traffic Signal System using Microcontroller and IR Sensors |
| **12** Solar Energy Measurement System using Microcontroller |
| 13 To develop diagnostic biosensor. |
| 14 Electrochemical 3D printing |
| 15. Investigating cell mechanics with Fluid FM force spectroscopy. |

Students in a group of 3 to 4 shall complete any one project from the above list.

**Bharati Vidyapeeth**
**(Deemed To be University)**
**College of Engineering, Pune**

| **B. Tech. (Electronics & Communication Engineering) Sem I**<br>**ELECTRONIC COMPONENTS AND DEVICES** | | |
|---|---|---|
| **TEACHING SCHEME:** | **EXAMINATION SCHEME:** | **CREDITS ALLOTTED:** |
| Theory: 04 | End Semester Examination (UE): 60 Marks | Credits : 04 |
| Practical:02 | Internal Assessment(IA):40 Marks | |
| | TW : 50 Marks & Practical:50 Marks | Credits : 01 |
| | Total Marks:200 | Total Credits:05 |

| **Course Pre-requisites:** | |
|---|---|
| The students should have knowledge of | |
| **1** | Class XII level Physics & Mathematics. |

| **Course Objectives:** | |
|---|---|
| **1** | To make the students gain the knowledge of basic electronic passive components**.** |
| **2** | To provide detailed description of PN junction behavior at the circuit level and its role in the operation of diodes as rectifiers, clippers and clampers |
| **3** | To provide a comprehensive study of bipolar junction transistor. |
| **4** | To learn and analyze transistor biasing circuits. |
| **5** | To observe characteristics and working of FET and MOSFET |
| **6** | To get familiarized with various optoelectronic devices. |

| **Course Outcomes: After learning this course students will be able to** | |
|---|---|
| **1** | Identify various Passive components. |
| **2** | Demonstrate knowledge of working of diode with applications such as rectifier, clipper and clamper. |
| **3** | Analyze the characteristics of BJTs in various configurations (CB, CE, and CC). |
| **4** | Design the biasing circuits like fixed bias and voltage divider bias. |
| **5** | Describe the operation of FET and MOSFET. |
| **6** | Demonstrate knowledge of working of optoelectronic devices. |

| **UNIT – I** | **Passive Components** | **(08 Hours)** |
|---|---|---|
| | Introduction to the concept of active and passive electronic components, Resistors: types of resistors, construction and applications, Capacitor: types of capacitors, construction and applications, Inductor: types of inductors, construction and applications. | |
| | | |
| **UNIT –II** | **Diode and applications** | **(08 Hours)** |
| | Classification of material based on band gap theory, types of | |

| | | |
|---|---|---|
| | semiconductors (p-type and n-type), PN junction Diode: basic structure and operating principle, current-voltage characteristic, Zener breakdown, Avalanche breakdown.<br>Diode Applications: Rectifier circuits: Half-wave and full-wave rectifiers. Full wave Rectifier with capacitor filter.<br>Diode as clipper: series and parallel forms of clipper circuits, biased clipper, Diode as a clamper. | |
| | | |
| **UNIT -III** | **Bipolar Junction Transistor** | **(08 Hours)** |
| | Introduction to Bipolar Junction Transistors, it's construction and working mechanism, configuration of BJT in Common Base, Common Emitter and Common Collector configuration.<br>Input–output characteristics in all three configurations with relevant V-I expressions and definitions of DC gains. | |
| | | |
| **UNIT -IV** | **Transistor biasing and applications** | **(08 Hours)** |
| | Need of biasing, DC load line analysis, operating point, Thermal runaway. Requirements of a biasing circuit, Different biasing circuits: fixed bias, collector to base bias & voltage divider bias.<br>Stability factor, General expression for stability factor, stability factor for biasing circuits, Transistor as an amplifier. | |
| | | |
| **UNIT -V** | **FET & MOSFET** | **(08 Hours)** |
| | FET:<br>Types of FET, JFET Structure, Construction and working mechanism of JFET, V-I characteristics and transfer characteristics, Parameters of JFET.<br>MOSFET:<br>Types of MOSFET, MOSFET Structure,Working of Depletion and Enhancement type MOSFETs, Drain and Transfer Characteristics of D-MOS and E-MOS. | |
| | | |
| **UNIT-VI** | **Optoelectronic devices** | **(08 Hours)** |
| | Construction, V-I characteristics and applications of LED, LDR, Photodiode, Phototransistor, Photoconductive cell, Photovoltaic cell, optocoupler. | |

| |
|---|
| |
| **Term Work:** |
| The term work shall consist of record of minimum eight experiments. |
| 1. To plot V-I characteristics of PN junction diode |
| 2. To plot V-I characteristics of half wave rectifier |
| 3. To plot V-I characteristics of Full wave rectifier using Capacitor filter. |
| 4. To plot input-output characteristics of CE configuration of BJT. |
| 5. To analyze biasing techniques of BJT: Fixed bias and voltage divider bias |
| 6. To plot frequency response of single stage CE amplifier and find its bandwidth |
| 7.To plot frequency response of single stage FET amplifier and find its bandwidth |

| |
|---|
| 8.To plot optical characteristics of LED and LDR |
| 9.To plot optical characteristics of Photodiode and phototransistor |
| 10.To plot transfer characteristics of Optocoupler |
| |
| **Text Books:** |
| 1.Robert Boylestad, Electronic Devices and Circuit Theory, Pearson Publication. |
| 2**.** V.K.Mehta, Principles of Electronics, S Chand & Company Ltd. New Delhi. |
| 3. Millman,Halkies, Electronic Devices and Circuits, TMH publication |
| |
| **Reference Books:** |
| 1. Thomas L. Floyd , "Electronic Devices", Pearson |
| 2. Ben G. Streetman and Sanjay Banerjee, "Solid State Electronic Devices", Pearson Education India |
| 3. Malvino, "Electronic Principle", McGraw Hill Education |
| 4. Sedra& Smith, "Microelectronics Engineering", Oxford University Press |
| **Project Based Learning:** |
| Build the following circuits - |
| 1. PN junction diode in forward and reverse biasing mode. |
| 2. Conversion of AC to pulsating DC using half wave rectifier. |
| 3. AC to DC converter using Full wave rectifier (Center tap Transformer) |
| 4. AC to DC converter using Bridge Rectifier with capacitor filter |
| 5. BJT in CE configuration. |
| 6. Check stability of operating point using fixed bias method. |
| 7. Check stability of operating point using Voltage divider bias method. |
| 8. BJT Amplifier circuit. |
| 9. FET Amplifier Circuit. |
| 10. Optical characteristics of LED and LDR. |
| 11. Optical characteristics of Photodiode and Phototransistor. |
| 12. Characteristics of optocoupler. |
| 13. Zener diode in forward and reverse biasing mode. |
| 14. BJTs as a digital switch |
| 15. Automatic Street Light controller |

Students in a group of 3 to 4 shall complete any one project from the above list.

**Bharati Vidyapeeth**
**(Deemed To be University)**
**College of Engineering, Pune**

| **B. Tech. (Electronics & Communication Engineering) Sem I**<br>**ELECTRICAL TECHNOLOGY** | | |
|---|---|---|
| **TEACHING SCHEME:** | **EXAMINATION SCHEME:** | **CREDITS ALLOTTED:** |
| Theory: 04 | End Semester Examination(UE): 60 Marks | Credits : 04 |
| Practical: 02 | Internal Assessment(IA): 40 Marks | |
| Tutorial:-- | TW: 25 Marks | Credit: 01 |
| | Total Marks:125 | Total credits:05 |

| **Course Pre-requisites:** | |
|---|---|
| The Students should have knowledge of | |
| **1** | Basic physics. |
| **2** | Basic mathematics |

| **Course Objectives:** | |
|---|---|
| **1** | To study electrical circuit basics, network theorems, AC fundamentals, electrical machines, transformers, batteries, two port networks. |

| **Course Outcomes: After learning this course students will be able to** | |
|---|---|
| **1** | To find voltages and currents in a given network using various network reduction techniques and network theorems |
| **2** | To find parameters relating to a given series or a parallel resonant circuit. |
| **3** | Outline magnetic circuits and types of transformer. |
| **4** | Demonstrate AC and DC electrical machines. |
| **5** | Classify types of batteries. |
| **6** | To find any of the two port parameters of a given two port networks. |

| | | |
|---|---|---|
| **UNIT – I** | **Introduction to Electrical Circuits and Network Theorems** | **(08 Hours)** |
| | Circuit concepts, Voltage and Current Sources, Independent and Dependent sources, Voltage-Current relationship for passive elements, Source Transformation and Source shifting techniques, Network Reduction techniques-Series, Parallel, Series-Parallel, Star-to-Delta, Delta-to-Star Transformations, Kirchhoff's Laws, Node and Mesh Analysis, Super node and Super mesh. Thevenin's Theorem, Norton's Theorem, Superposition Theorem, Maximum Power Transfer Theorem | |
| | | |
| **UNIT –II** | **AC Fundamentals and circuits:** | **(08Hours)** |

| | | |
|---|---|---|
| | AC Fundamentals: Sinusoidal, square and triangular waveforms – average and effective values, form and peak factors, concept of phasors, phasor representation of sinusoidally varying voltage and current. Analysis of series, parallel and series-parallel RLC Circuits: apparent, active & reactive powers, power factor, causes and problems of low power factor, power factor improvement; resonance in series and parallel circuits, bandwidth and quality factor (simple numerical problems) | |
| | | |
| **UNIT -III** | **Magnetic circuits and Types of Transformer:** | |
| | Magnetic Circuit: Kirchhoff's laws for magnetic circuits. Magnetic circuit concepts, analogy between electric & magnetic circuits, magnetic circuits with DC and AC excitations, magnetic leakage, B-H curve, hysteresis and eddy current losses, magnetic circuit calculations, mutual coupling.<br>Faradays law of electromagnetic induction, statically and dynamically induced emf, self inductance, mutual inductance, coefficient of coupling.<br>Single Phase Transformer: Principle of operation, construction, e .m. f. equation, voltage ratio, current ratio, KVA rating ,determination of efficiency and regulation by direct load test, equivalent circuit, power losses,(simple numerical problems), introduction to auto transformer, Three phase transformer and its different winding connections.. | **(08 Hours)** |
| | | |
| **UNIT -IV** | **Electrical Machines: DC & AC:** | **(08 Hours)** |
| | Principles of electro mechanical energy conversion, DC machines: types, e. m. f. equation of generator and torque equation of motor, characteristics and applications of dc motors (simple numerical problems).Single Phase Induction motor: Principle of operation and introduction to methods of starting, applications. Three Phase Induction Motor: types, Principle of operation, slip-torque characteristics, applications (numerical problems related to slip only). | |
| | | |
| **UNIT -V** | **Batteries** | **(08 Hours)** |
| | Basic idea of primary and secondary cells, Construction, working principle and applications of Lead-Acid, Nickel Cadmium and Silver-Oxide batteries, Charging methods used for lead-acid battery (accumulator), Care and maintenance of lead-acid battery, Series and parallel connections of batteries, General idea of solar cells, solar panels and their applications, Introduction to maintenance free batteries, Safe disposal of Batteries; Fuel cell: Principle & Types of fuel cell. | |
| | | |
| **UNIT -VI** | **Two Port Networks** | **(08 Hours)** |

| | | |
|---|---|---|
| | Two port parameters: Z, Y, ABCD and H-parameters, Conditions for Reciprocity and Symmetry, Inter-relationship between two-port parameters, Interconnections between two port parameters. | |

| |
|---|
| **Term Work:** |
| The term work shall consist of record of minimum eight experiments. |
| 1. To verify Thevenin's, Norton's and Superposition Theorem. |
| 2. To find Steady State response of RL,RC and RLC circuits |
| 3. To find resonant frequencies of series and parallel circuit. |
| 4. Load test on single phase transformer. |
| 5. OS & SC test on single phase transformer to find efficiency and regulation |
| 6. Load test on DC machine. |
| 7. Speed control of DC motor |
| 8. Study of different types of starters for DC & AC Machine |
| 9. Testing and maintenance of batteries |
| 10. To find Z and Y parameters of given two port networks. |
| 11. To find H and ABCD parameters of given two port networks. |
| **Text Books:** |
| 1. B. L. Theraja, 'A Textbook of Electrical Technology', Vol.1, S. Chand & Company Ltd. New Delhi. |
| **2.** V. K. Mehta, 'Basic Electrical Engineering', S Chand & Company Ltd. New Delhi. |
| 3. I. J. Nagarath and Kothari, 'Theory and applications of Basic Electrical Engineering', Prentice Hall of India Pvt. Ltd. |
| 4. D. Roy Choudhury, 'Network and Systems', New Age International Publishers, Second Edition. |
| 5. Ravish Singh, "Network analysis and Synthesis, M. Graw Hill Education (India) Private Limited. |
| **Reference Books:** |
| 1. Edward Huges, 'Electrical Technology' Pearson |
| 2. D. P. Kothari, J Nagarath, 'Basic Electrical Engineering'. TMC |
| 3. M. E. Van Valkenburg, 'Network Analysis', PHI, 3rd Edition |
| **Project based learning:** |
| 1. Design a small circuit to study superposition theorem. |
| 2. Design small circuit to study Thevenin's Theorem. |
| 3. Design Small circuit to study Norton's Theorem. |
| 4. Design small circuit to study R-C series circuit. |
| 5. Design small circuit to study R-L series circuit. |
| 6. Design small circuit to study R-L-C series circuit. |
| 7. Design of small R-L parallel circuit for study. |
| 8. Design of small R-C parallel circuit for study. |
| 9. Design of small R-L-C parallel circuit for study. |
| 10. Design small two winding transformer. |
| 11. Design small electromagnet. |
| 12. Design of small chemical battery. |
| 13. Design of small two port network for study of ABCD parameters. |
| 14. Design of small electric circuit to study Kirchhoff's voltage laws. |
| 15. Design of small electric circuit to study Kirchhoff's current laws |

Students in a group of 3 to 4 shall complete any one project from the above list.

**Bharati Vidyapeeth**
**(Deemed To be University)**
**College of Engineering, Pune**

| **B. Tech. (Electronics & Communication Engineering) Sem I**<br>**COMPUTATION AND PROGRAMMING USING C** | | |
|---|---|---|
| **TEACHING SCHEME:** | **EXAMINATION SCHEME:** | **CREDITS ALLOTTED:** |
| Theory: 04 | End Semester Examination(UE): 60 Marks | Credits: 04 |
| Practical: 02 | Internal Assessment(IA): 40 Marks | |
| Tutorial:-- | TW : 50 Marks & Oral: 25 Marks | Credit: 01 |
| | Total Marks:175 Marks | Total Credits:05 |

**Course Pre-requisites:**

| | |
|---|---|
| **1** | Students must possess knowledge about basic fundamentals of computer and professional Microsoft office development tools. |

**Course Objectives:**

The students should have knowledge of

| | |
|---|---|
| **1** | This course will introduce the concepts of C language software development and compiling tool. By the end of the course, student will be familiar with various fundamentals of C- language. |

**Course Outcomes: After learning this course students will be able to**

| | |
|---|---|
| **1** | Understand the basic concept of C programming**.** |
| **2** | Write basic programs using conditional statement. |
| **3** | Use Array in programming. |
| **4** | Use Functions in programming. |
| **5** | Write basic programs using Pointers. |
| **6** | Write basic programs using structures. |

| | | |
|---|---|---|
| **UNIT – I** | **Introduction:** | **(08 Hours)** |
| | Basic of C**:** Structure of a C program, identifiers, basic data types and sizes. Constants, variables, arithmetic, relational and logical operators Managing input and output operations, Sample programs. | |
| | | |
| **UNIT – II** | **Conditional Statements and Loops:** | **(08 Hours)** |
| | Decision making within a program, conditions, if statement, if-else statement, loops: while loop, do while, for loop. Nested loops, infinite loops, switch statement, sample programs. | |

| | | |
|---|---|---|
| | | |
| **UNIT -III** | **Arrays & Strings** | **(08 Hours)** |
| | Arrays - concepts, declaration, definition, accessing elements, storing elements, Strings and string manipulations, 1-D arrays, 2-D arrays and character arrays, string manipulations, Array applications: Matrix Operations. | |
| | | |
| **UNIT -IV** | **Functions:** | **(08 Hours)** |
| | Basics, parameter passing, storage classes- extern, auto, register, static, scope rules, user defined functions, recursive functions, Recursive solutions for Fibonacci series, example c programs. Passing arrays & strings to functions. | |
| | | |
| **UNIT -V** | **Pointers:** | **(08 Hours)** |
| | concepts, initialization of pointer variables, pointers and function arguments, passing by address, address arithmetic, Character pointers and functions, pointers to pointers, pointers and multidimensional arrays. | |
| | | |
| **UNIT -VI** | **Structures and Linked list** | **(08 Hours)** |
| | Derived types- structures- declaration, definition and initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self-referential structures, unions, typedef, bit-fields, program applications. Concept of linked lists, Types & Advantages linked list, creating a linked list, Inserting and deleting linked list, Applications of linked list | |

| |
|---|
| **Term Work:** |
| The term work shall consist of record of minimum eight experiments. |
| 1. Write a C program to take user Input and print it on the screen.<br>a. Perform a C program to perform various mathematical and logical operations.<br>b. Perform a C program to find whether the entered input number is Odd or Even. |
| 2. Perform a C program to find out<br>Prime numbers. |
| 3. Write and perform C program to find out Fibonacci series. |
| 4. Perform and write a C program to find out Armstrong number. |
| 5. Perform a C programs to print different patterns. |
| 6. Perform and write a C program to do factorial using recursion. |
| 7. Perform a C program to sort the given array in Ascending & Descending order. |
| 8. Perform C programs to perform various operations on 2-D arrays |

| |
|---|
| 9. Perform a C program to perform different operations on strings. |
| 10. Use of Pointers<br>a. Write a C program to swap numbers using pointers<br>b. Write a C program to show the use of pointers in arrays.<br>c. Write a C program to use functions using pointers. |
| 11. Perform a C program to show the use of structure and linked list |
| 12. Perform a C program to create student mark sheet using structures and linked list. |
| |
| **Text Books:** |
| 1. E Balagurusamy, "Programming in ANSI C",5$^{th}$Edition-TMH |
| **Reference Books:** |
| 1. Yashwant Kanitkar , "Let Us C",PBP |
| **Project based learning:** |
| **1. Bank Management System** |
| **2. Diary management System** |
| **3. Calendar using C** |
| 4. Contact Management System |
| 5. Library Management System |
| 6. Snake Game |
| 7. Bus Reservation system |
| 8. Customer Billing system |
| 9. Hospital Management system |
| 10. Cyber management |
| 11. Cricket score display |
| 12. Employee management system |
| 13. Pacman Game |
| 14. Quiz game |
| 15. Phone-book application |
| 16. Election System |
| 17. Flight ticket booking |
| 18. Tourism Management system |
| 19. Simple Result system |
| 20. Stock Management system |

Students in a group of 3 to 4 shall complete any one project from the above list.

**Bharati Vidyapeeth (Deemed to be University), Pune**
**Faculty of Engineering and Technology**
**Programme: B. Tech. (Electronics & Communication) –CBCS 2021 Course**

B. Tech. (Electronics & Communication) Sem II

| Sr. No. | Course Code | Name of Course | Teaching Scheme (Hrs./Week) | | | Examination Scheme (Marks) | | | | | | Credits | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | L | P | T | ESE | IA | TW | OR | PR | Total | L | P | T | Total |
| 6 | | Integral Transforms & Vector Calculus | 4 | 0 | 1 | 60 | 40 | 0 | 0 | 0 | 100 | 4 | 0 | 1 | 5 |
| 7 | | Wave Theory & Photonics | 4 | 2 | 0 | 60 | 40 | 50 | 0 | 0 | 150 | 4 | 1 | 0 | 5 |
| 8 | | Electronic Communication | 4 | 2 | 0 | 60 | 40 | 50 | 50 | 0 | 200 | 4 | 1 | 0 | 5 |
| 9 | | Computer Aided Graphics | 4 | 2 | 0 | 60 | 40 | 25 | 0 | 0 | 125 | 4 | 1 | 0 | 5 |
| 10 | | Python Programming | 4 | 2 | 0 | 60 | 40 | 50 | 25 | 0 | 175 | 4 | 1 | 0 | 5 |
| | **Total** | | **20** | **08** | **1** | **300** | **200** | **175** | **75** | **00** | **750** | **20** | **4** | **1** | **25** |

**Bharati Vidyapeeth**
**(Deemed To be University)**
**College of Engineering, Pune**

| **B. Tech. (Electronics & Communication Engineering) Sem II**<br>**INTEGRAL TRANSFORMS AND VECTOR CALCULUS** | | |
|---|---|---|
| **TEACHING SCHEME:** | **EXAMINATION SCHEME:** | **CREDITS ALLOTTED:** |
| Theory: 04 | End Semester Examination(UE): 60 Marks | Credits : 04 |
| Practical:-- | Internal Assessment(IA): 40 Marks | |
| Tutorial: 01 | | Credit : 01 |
| | Total Marks: 100 Marks | Total Credits: 05 |

**Course Pre-requisites:**

The students should have knowledge of

| | |
|---|---|
| **1** | Integrals. |
| **2** | Fourier series. |
| **3** | Vector algebra. |

**Course Objectives:**

| | |
|---|---|
| **1** | Methods to solve differential equations |
| **2** | Various techniques of integral transform. |
| **3** | line, surface and volume integrals. |

**Course Outcomes: After learning this course students will be able to**

| | |
|---|---|
| **1** | Implement the methods for first order first degree differential equation. |
| **2** | Understand the modeling of physical systems and find the solutions. |
| **3** | Solve the nth order linear differential equation. |
| **4** | Compute the integral transform for various functions. |
| **5** | Apply the Laplace transform for solving differential equations |
| **6** | Understand vector calculus and apply it to evaluate line, surface and volume integrals. |

| | | |
|---|---|---|
| **UNIT – I** | **Differential Equation** | **(08 Hours)** |
| | Formation of the ordinary differential equations(ODEs), Solution of an ordinary differential equation, Equations of the first order and first degree, Linear differential equation, Bernoulli's equation, Exact differential equations, Equations reducible to exact equations, | |
| | | |
| **UNIT – II** | **Applications of Differential Equation** | **(08 Hours)** |
| | Applications of DE to Orthogonal Trajectories, Newton's Law of Cooling, Kirchoff's Law of Electrical Circuits, Motion under | |

| | | |
|---|---|---|
| | Gravity, Rectilinear Motion, Simple Harmonic Motion, One–Dimensional Conduction of Heat. | |
| | | |
| **UNIT - III** | **Linear Differential Equations** | **(08 Hours)** |
| | Solution of nth order LDE with Constant Coefficients, Method of Variation of Parameters, Cauchy's &Legendre's DE, Solution of Simultaneous & Symmetric Simultaneous DE, Modeling of Electrical Circuits. | |
| | | |
| **UNIT - IV** | **Z-transform** | **(08 Hours)** |
| | **Fourier Transform (FT)**: Complex Exponential Form of Fourier series, Fourier Integral Theorem, Sine & Cosine Integrals, Fourier Transform, Fourier Sine and Cosine Transform and their Inverses. Introductory<br>**Z-Transform (ZT)**: Definition, Standard Properties, ZT of Standard Sequences and their Inverses. Solution of Simple Difference Equations. | |
| | | |
| **UNIT -V** | **Laplace Transform** | **(08** |
| | Definition of LT, Inverse LT. Properties & theorems. LT of standard functions. LT of some special functions viz., Periodic, Unit Step, Unit Impulse, ramp, jump, . Problems on finding LT & inverse LT. Applications of LT and Inverse LT for solving ordinary differential equations. | |
| | | |
| **UNIT - VI** | **Vector Calculus** | **(08 Hours)** |
| | Physical Interpretation of Vector Differentiation, Vector Differential Operator, Gradient, Divergence and Curl, Directional Derivative, Solenoidal, Irrotational and Conservative Fields, Scalar Potential, Vector Identities. Line, Surface and Volume integrals, Work-done, Green's Lemma, Gauss's Divergence Theorem, Stoke's Theorem, Applications to Problems in Electro-Magnetic Fields. | |

**Text Books:**

2. P. N. Wartikar and J. N. Wartikar, "Applied Mathematics (Volumes I and II)", 7th Ed., Pune Vidyarthi Griha Prakashan, Pune, 2013.

**References Books:**

1. B. S. Grewal, "Higher Engineering Mathematics", 42th Ed., Khanna Publication, Delhi
2. B.V. Ramana, "Higher Engineering Mathematics", 6th Ed., Tata McGraw-Hill, New Delhi, 2008.
3. Erwin Kreyszig, "Advanced Engineering Mathematics", 10th Ed., John Wiley & Sons, Inc., 2015.

4. Peter V. O'Neil, "Advanced Engineering Mathematics", 7th Ed., Cengage Learning, 2012.
5. Michael Greenberg, "Advanced Engineering Mathematics", 2nd Ed., Pearson Education, 1998.

**Project based learning:**

1. Formation of differential equations
2. Evaluate the electric circuit problem using differential equations
3. Evaluate the heat conduction in 1-D using differential equations
4. Evaluate the rectilinear motion problem using differential equations
5. Evaluate the simple harmonic problem using differential equations
6. Obtain the solution of Simultaneous & Symmetric Simultaneous DE
7. Obtain the solution of Simple Difference Equations using Z-transforms
8. Find the Directional Derivatives
9. Find work done using Green's theorem
10. Find scalar potential using vectors
11. Evaluating integrals using Green's theorem, Gauss's and stoke's theorem
12. Use Laplace transform to solve differential equations
13. Use Laplace transform to solve integrals equations
14. Use Fourier transform to solve integrals
15. Applications of vector integration to solve problems in Electro-Magnetic Fields.
16. Find the conditions for Solenoidal and irrotational vector fields

Students in a group of 3 to 4 shall complete any one project from the above list.

**Bharati Vidyapeeth**
**(Deemed To be University)**
**College of Engineering, Pune**

| **B. Tech. (Electronics & Communication Engineering) Sem II**<br>**WAVE THEORY AND PHOTONICS** | | |
|---|---|---|
| **TEACHING SCHEME:** | **EXAMINATION SCHEME:** | **CREDITS ALLOTTED:** |
| Theory: 04 | End Semester Examination(UE): 60 Marks | Credits : 04 |
| Practical:02 | Internal Assessment(IA): 40 Marks | |
| Tutorial: -- | TW:50 Marks | Credit: 01 |
| | Total:150 Marks | Total Credits:05 |

| **Course Pre-requisites:** | |
|---|---|
| The students should have knowledge of | |
| **1** | Students are expected to have a basic understanding of physics and calculus. |

| **Course Objectives:** | |
|---|---|
| **1** | To impart knowledge of basic concepts in physics relevant to engineering applications in a broader sense with a view to lay foundation for the Electronics and Communication Engineering. |

| **Course Outcomes: After learning this course students will be able to** | |
|---|---|
| **1** | Connect the problems associated with architectural acoustics and give their remedies. and use ultrasonic as a tool in industry for non-destructive testing. |
| **2** | Summarize and solve the engineering problems on Electromagnetism |
| **3** | Develop competency and understanding of the principles and applications of lasers and fiber optics. |
| **4** | Solve quantum physics problems to electronic phenomena and solid-state physics |
| **5** | Apply the properties of photon in communication engineering |
| **6** | Interpret the need, importance and scope of non-conventional and alternate energy resources. |

| **UNIT – I** | **Acoustics and Ultrasonics** | **(08 Hours)** |
|---|---|---|
| | Acoustics: Intensity, Loudness, Absorption coefficient and its determination, Reverberation and Reverberation time, Factors affecting acoustics of buildings and their remedies, Sources and impacts of noise, Sound level meter, Strategies on controlling noise pollution.<br>Ultrasonic waves and properties, Methods of Ultrasonic production (Magnetostriction and Piezoelectric), Applications of Ultrasonics in Engineering and medicine. | |

| | | |
|---|---|---|
| | | |
| **UNIT – II** | **Electromagnetic Wave** | **(08 Hours)** |
| | Displacement current, Maxwell's equations (derivation), Wave equation for electromagnetic waves, Propagation in free space, Poynting theorem, Characteristic of Transverse electric and magnetic waves, Skin depth, Rectangular and circular waveguides. | |
| | | |
| **UNIT - III** | **Lasers and Fibre Optics** | **(08 Hours)** |
| | Lasers introduction, Characteristics of Lasers, Einstein's coefficients and their relations, Lasing action, Working principle and components of $CO_2$ Laser, Nd -YAG Laser, Semiconductor diode Laser, Excimer Laser and Free electron Laser, Applications in remote sensing.<br>Principle of Optical fiber, Acceptance angle and acceptance cone, Numerical aperture, V-number, Types of optical fibers (Material, Refractive index and mode), Photonic crystal fibers, Fiber optic communication, Fiber optic sensors. | |
| | | |
| **UNIT - IV** | **Quantum Mechanics and Crystal Physics** | **(08 Hours)** |
| | Quantum mechanics: Inadequacies of Classical Mechanics, De Broglie hypothesis for matter waves, Heisenberg's uncertainty principle, Schrödinger's wave equation, Particle confinement in 1D box (Infinite Square well potential).<br>Crystal Physics: Crystal directions, Planes and Miller indices, Symmetry elements, Quasi crystals, Diamond and HCP crystal structure, Packing factor, Reciprocal lattice, Diffraction of X-rays by crystal planes, Laue method and powder method | |
| | | |
| **UNIT -V** | **Photonics** | **(08Hours)** |
| | Quantum properties of radiation and matter, Photon properties, Duality nature of electromagnetic radiation, Group/phase velocity and dispersion, matter and its interaction, light modulation, Coherence-different types, Two-beam interference and interferometry, multi-wave interference, Fabry-Perot interferometer, Fraunhofer diffraction, Fresnel diffraction,<br>semiconductor junction characteristics, semiconductor light sources, semiconductor light detectors. | |
| | | |
| **UNIT - VI** | **Green Energy Physics** | **(08 Hours)** |
| | Introduction to Green energy, Solar energy: Energy conversion by photovoltaic principle, Solar cells, Wind energy: Basic components and principle of wind energy conversion systems, Ocean energy: Wave energy, Wave energy conversion devices, Tidal energy, single and double basin tidal power plants, Ocean Thermal Electric | |

| | | |
|---|---|---|
| | Conversion (OTEC), Geothermal energy: Geothermal sources (hydrothermal, geo-pressurized hot dry rocks, magma), Biomass: Biomass and biofuels, bio-energies from wastages, Fuel cells: $H_2O_2$, Futuristic Energy: Hydrogen, Methane Hydrates, Carbon capture and storage (CCS). | |

**Term Work:**

The term work shall consist of record of minimum eight experiments.

1. To determine the velocity of sound
2. Measurement of average SPL across spherical wavefront and behavior with the distance
3. Expansion chamber muffler: investigation of muffler response as a filter in the low frequency approximation by determining insertion loss
4. Interference of sound using PC speakers
5. Determination of velocity of sound in liquid by ultrasonic interferometer
6. Ultrasonic probe - a study
7. Determination of divergence of a laser beam
8. Particle size by semiconductor laser
9. Determination of wavelength of laser by diffraction grating
10. Determination of Planck's Constant by photoelectric effect
11. To study Hall effect and determine the Hall voltage
12. Calculation of conductivity by four probe method

**Text Books:**


1. M N Avadhanulu, P G Kshirsagar and TVS Arun Murthy, "A Textbook of Engineering Physics" , S. Chand Publishing (2018)
2. R K Gaur and S L Gupta, " Engineering Physics" , Dhanpat Rai Publishing Co Pvt Ltd (2015)
3. Arthur Beiser**,** Shobhit Mahajan and S. Rai Choudhury**, "**Concepts of Modern Physics" , McGraw Hill Education (2017)


**Reference Books:**


1. Jearl Walker, David Halliday and Robert Resnick, "Fundamentals of Physics", John Wiley and Sons (2013)
2. Francis Jenkins and Harvey White, "Optics" , Tata Mcgraw Hill (2017)
3. John W. Jewett, "Principles of Physics" , Cengage publishing (2013)
4. C. Kittel , "Introduction to Solid State Physics", Wiley and Sons (2004)
5. H. V. Keer , "Principles of Solid State Physics", New Age International (1993)
6. B. B. Laud, "Laser and Non-Linear Optics" , New Age International Private Limited (2011)
7. Dr. S. K. Kulkarni , "Nanotechnology: Principles and Practice" , Capital Publishing Company (2014)
8. C.M. Srivastava and C. Srinivasan, "Science of Engineering Materials", New Age International Pvt. Ltd. (1997)
9. David R. Griffiths, "Introduction to Electrodynamics", Pearson (2013)
10. Boyle, "Renewable Energy: Power for a Sustainable Future", Oxford University Press (2012)


**Project based learning:**

1. Measurement and effect of environmental noise in the college
2. Construction and application of heat sensor in process control
3. Design and simulation of automatic solar powered time regulated water pumping
4. Solar technology: an alternative source of energy for national development

| |
|---|
| 5. The study on the effect of length on the resistance of a copper wire (verification of ohms law r directly proportional to l) |
| 6. Possible effects of electromagnetic fields (emf) on human health |
| 7. The design and construction of the hearing aid device |
| 8. Design and construction of digital distance measuring instrument |
| 9. Design and construction of automatic bell ringer |
| 10. Design and construction of sound or clap activated alarm |
| 11. Electronic eye (Laser Security) as auto switch/security system |
| 12. Determination of velocity of O-ray and E-ray in different double refracting materials |
| 13. Quantum confinement effect in wide band semiconductors |
| 14. Small wind turbines as a source of electricity |
| 15. LiFi- wireless data transfer system using light |

Students in a group of 3 to 4 shall complete any one project from the above list.

**Bharati Vidyapeeth**
**(Deemed To be University)**
**College of Engineering, Pune**

| **B. Tech. (Electronics & Communication Engineering) Sem II**<br>**ELECTRONIC COMMUNICATION** | | |
|---|---|---|
| **TEACHING SCHEME:** | **EXAMINATION SCHEME:** | **CREDITS ALLOTTED:** |
| Theory: 04 | End Semester Examination ( UE): 60 Marks | Credits : 04 |
| Practical:02 | Internal Assessment (IA): 40 Marks | |
| | TW: 50 Marks & Oral: 50 Marks | Credits : 01 |
| | Total Marks:200 Marks | Total Credits:05 |

| **Course Pre-requisites:** | |
|---|---|
| The students should have knowledge of | |
| **1** | Solid State Devices |
| **2** | Basic Physics |
| **3** | Basic Mathematics |

| **Course Objectives:** | |
|---|---|
| **1** | To introduce the concepts of analogue communication systems. |
| **2** | To equip students with various techniques related to analogue communication such as modulation, demodulation. |
| **3** | To study noise, transmission media etc. |

| **Course Outcomes: After learning this course students will be able to** | |
|---|---|
| **1** | Outline the basic concept of communication system, need of modulation, some Terminologies in communication systems. |
| **2** | Classify the transmission media used in communication system. |
| **3** | Outline the different modern communication systems. |
| **4** | Classify the different sources of noise. |
| **5** | Classify& compare the amplitude modulation & demodulation techniques. |
| **6** | Classify & compare the Angle modulation & demodulation techniques. |

| **UNIT – I** | **Fundamentals of Communication Engineering** | **(08 Hours)** |
|---|---|---|
| | Signals: Basics of signal representation & its analysis, Bandwidth of Signals, Signal Shapes in Communication, Electromagnetic spectrum & typical applications, System: Baseband Systems, Pass band Systems, Communication System: Block diagram of communication systems, Analog Versus Digital Communication System, Modulation and Demodulation in Communication System, Need of Modulation, Classification of modulation techniques, Terminologies in Communication Systems. | |

| | | |
|---|---|---|
| | | |
| **UNIT – II** | **Transmission Media and Propagation Mechanisms** | **(08 Hours)** |
| | Wired Media: Twisted Pair, Optical fiber: Structure of a Fiber Optic Cable, Propagation Modes of Fiber Optic Cable, Calculation of Number of Modes in a Fiber, Optical Fiber Index Profile, Optical Fiber's Numerical Aperture (NA), Wireless Media, Wireless Propagation: Ground Wave Propagation, Sky Wave Propagation, Propagation Mechanism. | |
| | | |
| **UNIT - III** | **Modern Communication System**<br>Introduction to modern communication system: Operation of communication system, need of modern communications. Communication Technologies: The Internet, Basics of Networks, Optical communication: Introduction to optical communication, Development in optical communication, Wireless communications: Introduction to wireless communication, Wireless communication technologies, Mobile cellular communications, Satellite Communications: Basic principle of operation of satellite communication, Satellite orbits, Introduction to Underwater Communication, Radar. | **(08 Hours)** |
| | | |
| **UNIT -IV** | **Noise** | **(08 Hours)** |
| | Introduction, Sources of noise: External Noise, Internal Noise, Noise calculations(thermal noise),Noise figure: Signal to Noise ratio, definition of noise figure, Classification of noise figure, noise Figure from equivalent noise resistance, Noise Temperature. | |
| | | |
| **UNIT -V** | **Amplitude Modulation & Demodulation** | **(08 Hours)** |
| | Amplitude Modulation: Introduction, Mathematical expression for AM, Modulation index, Frequency spectrum and bandwidth of AM, Time domain representation of AM Power relation in AM, Generation of AM signal: Double sideband full carrier (DSBFC), Double sideband suppressed carrier (DSBSC), SSB, Generation of SSB: Filter method, phase shift method, Third method, Block diagram & working principle of AM Transmitters, AM Receivers: Performance's characteristic of receivers, Tuned radio frequency (TRF) receiver, Super heterodyne receiver, Demodulation of AM Signal. | |
| | | |
| **UNIT -VI** | **Angle Modulation& Demodulation** | **(08 Hours)** |
| | Introduction, Types of angle modulation techniques, Mathematical expression of FM, Modulation index for FM, Frequency spectrum and bandwidth of FM, Narrow band and wide band FM, Pre emphasis and de-emphasis, Generation of frequency modulation techniques: Direct method and indirect method, Pulse analog modulation techniques: Pulse Amplitude Modulation (PAM), Pulse | |

| | | |
|---|---|---|
| | Width Modulation, Pulse Position Modulation, Demodulation of Pulse analog modulated signal, Comparison of AM, FM and PM, Block diagram & working principle of FM Transmitters, Block Diagram & working principle of FM receiver. | |

**Term Work:**

The term work shall consist of record of minimum eight experiments.

12. Generate AM signals, study their time- and frequency-domain characteristics, and measure their modulation indices (Under modulation, Perfect modulation & Over modulation)
13. Demonstrate the modulation &demodulation process of DSB-SC.
14. Demonstrate the modulation &demodulation process of SSB-SC.
15. Generate &analyze frequency modulated signal &demodulate using FM demodulator.
16. Analysis of standard signals (square and triangular)and Modulated signals(all types of AM, FM) using spectrum analyzer.
17. Demonstrate the Pulse Amplitude Modulation & demodulation & their waveforms.
18. Demonstrate the Pulse Width Modulation & demodulation & their waveforms.
19. Demonstrate the Pulse Position Modulation & demodulation & their waveforms.
20. Examine the operation of PAM-TDM.
21. Study of Super heterodyne (AM) Receiver.

**Textbooks:**


1. S.Haykin , "Communication System" (IV Edition), John Wiley & Sons.
2. A.B. Carlson, " Communication Systems", McGraw-Hill.
3. B.Lathi , "Modern Analog And Digital Communication Systems", Oxford Univ.Press.
4. Taub & Schilling , "Communication Systems", TMH.
5. Kennedy, Davis , "Electronic Communication Systems", (4/e), McGraw Hill, Reprint 2008.
6. Djafar K. Mynbaev, Lowell L. Scheiner, "Essentials of modern communications" , Wiley.


**Reference Books:**


1. Matin, Mohammad Abdul , "Communication Systems for Electrical Engineers" , springer.


**Project Based Learning:**

1. Testing the connectivity of circuit using DMM.
2. Testing of devices using DMM.
3. Construct a circuit for sound amplifier.
4. Design of regulated power supply.
5. Construct a circuit for Analog signal multiplier using Op-amp.
6. Construct a circuit for Analog signal divider using Op-amp.
7. Construct a circuit for Walkie-talkie.
8. Construct a circuit for Wireless power transfer.
9. Construct a circuit for Crystal oscillator tester.
10. Construct a circuit for Mobile incoming call indicator.
11. Construct a circuit for FM transmitter.
12. Construct a circuit for AM Modulator.
13. Construct a circuit for PAM Modulator.
14. Construct a circuit for single transistor FM transmitter.

| |
|---|
| 15. Construct a circuit for solar energy operated mobile charger. |

Students in a group of 3 to 4 shall complete any one project from the above list.

**Bharati Vidyapeeth**
**(Deemed To be University)**
**College of Engineering, Pune**

| **B. Tech. (Electronics & Communication Engineering) Sem II**<br>**COMPUTER AIDED GRAPHICS** | | |
|---|---|---|
| **TEACHING SCHEME:** | **EXAMINATION SCHEME:** | **CREDITS ALLOTTED:** |
| Theory: 04 | End Semester Examination(UE): 60 Marks | Credits : 04 |
| Practical:02 | Internal Assessment(IA): 40 Marks | |
| Tutorial: -- | TW: 25 Marks | Credit: 01 |
| | Total Marks:125 Marks | Total Credits:05 |

| **Course Pre-requisites:** | |
|---|---|
| The students should have knowledge of | |
| **1** | Mathematics |

| **Course Objectives:** | |
|---|---|
| **1** | To understand the basic principles of engineering drawing and highlight the importance of Computer Aided Graphics in engineering. |
| **2** | To develop the graphical skills for communication of concepts & idea through technical drawings. |

| **Course Outcomes: After learning this course students will be able to** | |
|---|---|
| **1** | Understand the fundamental concepts of Drawing, different types of lines, curves and dimension technique with practical application. |
| **2** | Understand the concept of Orthographic projections and apply it to draw detail views by using 1st angle projection method. |
| **3** | Understand the concept of isometric projection and apply it to construct 3D view of a component. |
| **4** | Understand the concept of projections of Point, Line and plane; and apply to draw its projection by using 1st angle projection method and to locate its traces |
| **5** | Understand the concept of projections of different types of solids and apply to draw its projection by using 1st angle projection method. |
| **6** | Understand the concept of Development of Lateral surfaces; and apply to development of simple Solids. |

| **UNIT – I** | **Lines and Dimensioning in Engineering Drawing and Engineering Curves** | **(08 Hours)** |
|---|---|---|
| | Introduction to Engineering Drawing, Types of lines and Dimensioning, Layout and size of drawing sheets, Scales<br>Engineering Curves-Ellipse drawing by Focus-Directrix Circle Method and Concentric Circle Method, Involutes of a circle, Cycloid, Archimedean Spiral, Helix on cone and Cylinder.<br>Introduction to Auto CAD commands. | |

| | | |
|---|---|---|
| | | |
| **UNIT – II** | **Orthographic Projection** | **(08 Hours)** |
| | Basic principles of orthographic projection (First and Third angle method). Orthographic projection of objects by first angle projection method only. Procedure for preparing scaled drawing, sectional views and types of cutting planes and their representation, hatching of sections.<br>(Also using AutoCAD commands) | |
| | | |
| **UNIT - III** | **Isometric Projections** | **(08 Hours)** |
| | Isometric view, Isometric scale to draw Isometric projection, Non-Isometric lines, and construction of Isometric view from given orthographic views and to construct Isometric view.<br>(Also using AutoCAD commands) | |
| | | |
| **UNIT - IV** | **Projections of Points, Lines and Planes** | **(08 Hours)** |
| | Projections of points, projections of lines, lines inclined to one reference plane, Lines inclined to both reference planes. (Lines in First Quadrant Only), Traces of lines.<br>**Projections of Planes-** projection of perpendicular and oblique planes (polygonal and circular surfaces), Obtaining true shape of plane surface.<br>(Also using AutoCAD commands) | |
| | | |
| **UNIT -V** | **Projection of Solids** | **(08 Hours)** |
| | Introduction of solids- Types of solids, Projection of solid inclined both references plane, Projection of common solids such as prism, pyramid, cylinder and cone.<br>(Also using AutoCAD commands) | |
| | | |
| **UNIT - VI** | **Development of Lateral Surfaces of Solids** | **(08 Hours)** |
| | Introduction to development of lateral surfaces and its Industrial application, draw the development of lateral surfaces of cone, pyramid and prism.<br>(Also using AutoCAD commands) | |
| | | |
| **Term Work:** | | |
| The term work shall consist of record of minimum eight experiments. | | |
| 1. Types of lines, Dimensioning practice, free-hand lettering, 1nd and 3rd angle methods symbol | | |
| 2. Engineering curves. | | |

| |
|---|
| 3. Orthographic Projections. |
| 4. Isometric views. |
| 5. Projections of Points, Lines and planes. |
| 6. Projection of Solids. |
| 7. Development of lateral surfaces |
| |
| **Text Books:** |
| 1. N. D. Bhatt , "Elementary Engineering Drawing", Charotar Publishing house, Anand India, |
| 2. Munir Hamad ,"AutoCAD 2020 Beginning and Intermediate" , Mercury Learning & Information Publication, 2019. |
| 3. Venugopal K ,"Engineering Drawing and Graphics",., New Age International publishers. |
| |
| **Reference Books:** |
| 1. K.L.Narayana & P. Kannaiah ,"Text Book on Engineering Drawing" , Scitech Publications, Chennai. |
| 2. WarrenJ. Luzzader, "Fundamentals of Engineering Drawing", Prentice Hall of India, New Delhi, |
| 3. M. B. Shah and B.C. Rana,"Engineering Drawing", 1st Ed, Pearson Education, 2005 |
| 4. P. J. Shah, "Engineering Drawing", C. Jamnadas and Co., 1stEdition,1988 |
| 5. P.S.Gill ,"Engineering Drawing(GeometricalDrawing)",10thEdition,S.K.KatariaandSons,2005 |
| **Project Based Learning** |
| Following is the list topic for project based learning (Not Limited to) based on the syllabus contents: |
| To obtain industrial drawings to identify the types of lines, dimensioning methods and method of projection. |
| 2. To develop the model/charts based on engineering curves. |
| 3. To prepare model/chart for identification of engineering curves in nature for industrial, societal, etc application. |
| 4. To demonstrate different methods of orthographic projection. |
| 5. To demonstrate projection of Points. |
| 6. To demonstrate projection of Lines. |
| 7. To demonstrate projection of Planes. |
| 8. To demonstrate projection of Solids. |
| 9. To demonstrate developments of surfaces for solids. |
| 10. To demonstrate industrial application of development of surfaces such as steam carrying pipes, Ducts of air conditioning systems, etc. |
| 11. To demonstrate Isometric projection method through model of a cube. |

Students in a group of 3 to 4 shall complete any one project from the above list

**Bharati Vidyapeeth**
**(Deemed To be University)**
**College of Engineering, Pune**

| **B. Tech. (Electronics & Communication Engineering) Sem II**<br>**PYTHON PROGRAMMING** | | |
|---|---|---|
| **TEACHING SCHEME:** | **EXAMINATION SCHEME:** | **CREDITS ALLOTTED:** |
| Theory: 04 | End Semester Examination: 60 Marks | Credits : 04 |
| Practical:02 | Internal Assessment: 40 Marks | |
| Tutorial: -- | TW: 50 Marks & Oral: 25 Marks | Credits: 01 |
| | Total Marks:175 Marks | Total Credits:05 |

| **Course Pre-requisites:** | |
|---|---|
| The students should have knowledge of | |
| **1** | Students should have basic knowledge of programming. |

| **Course Objectives:** | |
|---|---|
| **1** | This course will introduce the concepts of Python language software development tool. By the end of the course, student will be familiar with various fundamentals of Python language. |

| **Course Outcomes: After learning this course students will be able to** | |
|---|---|
| **1** | Understand the basic concept of Python programming. |
| **2** | Write basic programs using control statement. |
| **3** | Use exception handling. |
| **4** | Learn object oriented programming. |
| **5** | Write basic programs using arrays. |
| **6** | Use Python for simple applications. |

| | | |
|---|---|---|
| **UNIT – I** | **Python Basics:** | **(08 Hours)** |
| | Python Introduction, Python Installation, Relational operators, Bitwise operators, Logical operators Python Data Types - Numbers (Integer, Floating Point, Complex Numbers), Strings,Lists, Tuples, Dictionaries, List comprehensions, Python Control Statements | |
| | | |
| **UNIT – II** | **Python Core:** | **(08 Hours)** |
| | Python Modules & Functions, Lambda, Scope, Python File Handling, Python Regular Expressions, Sequence Types, Input and output, Recursion, Flow Control, Immutable and Mutable Objects | |
| | | |
| **UNIT -** | **Python Exception Handling:** | **(08** |

| | | |
|---|---|---|
| **III** | | **Hours)** |
| | Meaning of Exception, Exception Hierarchy Diagram, Types of Exception- Checked Exception, Unchecked Exception, Exception Handling -TRY, CATCH, FINALLY, Raising an Exception, User Defined Exceptions | |
| | | |
| **UNIT - IV** | **OOPS, UML & OOAD:** | **(08 Hours)** |
| | Object Oriented Programming (OOPs) - Class & Object, Abstraction, Inheritance, Polymorphism, Encapsulation, Object Oriented (OO) Modelling, Object Oriented Analysis & Design (OOAD) | |
| | | |
| **UNIT -V** | **PYTHON MULTI-THREADING:** | **(08 Hours)** |
| | Threads in Python (a) Kernel Threads(b) User Space Threads or User Threads, Advantages ofThreading, Thread States: Life Cycle of a Thread, Thread & Threading Modules, Forking & Synchronizing Threads, Networking | |
| | | |
| **UNIT - VI** | **Python Packages and Graphics:** | **(08 Hours)** |
| | Numpy: Introduction, datatypes, arrays, arrays manuplation, ploting , testing anddebugging, Sharing Data using Sockets , pycharm in python ,Simple applications of python | |

| |
|---|
| |
| **Term Work:** |
| The term work shall consist of record of minimum eight experiments. |
| 1. Evaluate any given expression involving arithmetic operators |
| 2. Evaluate any given expression involving logical operators |
| 3. Develop python functions to produce given patterns such as diamond, pyramid, triangles. |
| 4. Usage of different functions present in “math” module |
| 5. Write a function that takes two numbers as input parameters and returns their least common multiple. |
| 6. Write a function that takes two numbers as input parameters and returns their greatestcommon divisor. |
| 7. Write a function that returns the sum of the digits of a number, passed to it as an argument. |
| 8. Write a program that takes a sentence as an input and displays the numbers of words inthe sentence. |
| 9. Program to interchange first and last elements in a list |
| 10. program to print even numbers in a list |
| 11. Ways to sort list of dictionaries by values in Python – Using lambda function |
| 12. Example using “matplotlib” module |
| 13. Example using “NUMPY” module |
| 14. Evaluate any given expression involving arithmetic operators |
| **Text Books:** |

| |
|---|
| 2. Sheetal Taneja,Naveen Kumar, “Python Programming,A modular approach”, Pearson publication |
| |
| **Reference Books:** |
| 1. Learning Python 5th Edition, Oreilly Publication. |
| 2. Magnus Lie Hetland, “Beginning Python: From Novice to Professional”, Third Edition,Appress Publication |
| 3. Allen Downey , Jeffrey Elkner , Chris Meyers, “Learning with Python”, DreamtechPublication. |
| 4. Paul Berry , “Head-First Python: A Brain-Friendly Guide” (2nd Edition), O'Reilly Media |
| 5. Magnus LieHetland , “Python Algorithms: Mastering Basic Algorithms in the Python Language”, Apress Pub. |
| **Project Based Learning** |
| 1. Design and development of Mad Libs generator. |
| 2. Design and development of electronic mail system (Read, write, send and delete operations). |
| 3. Design and development of store billing system. |
| 4. Design and development of typing speed check web application. |
| 5. Design and development of windows application for music player. |
| 6. Design and development of windows Quiz Application. |
| 7. Design and development of web application for daily expense tracker. |
| 8. Design and development of student portfolio management & CV generator system. |
| 9. Design and development of windows based to do list or sticky notes. |
| 10. Design and development of assignment plagiarism checker. |

Students in a group of 3 to 4 shall complete any one project from the above list