
# JBIET-R24

## Academic Regulations & Detailed Syllabus

## B.TECH

## ELECTRONICS AND COMPUTER ENGINEERING

# ACADEMIC REGULATIONS
# COURSE STRUCTURE & DETAILED SYLLABUS – R24

# ELECTRONICS AND COMPUTER ENGINEERING

## B.TECH DEGREE PROGRAMME
(For the Batches admitted from the Academic Year 2024- 25)

### B.TECH (LATERAL ENTRY SCHEME)

(For the Batches admitted from the Academic Year 2025-26)


**J.B. INSTITUTE OF ENGINEERING AND TECHNOLOGY**
(UGC AUTONOMOUS)
Bhaskar Nagar, Yenkapally (V), Moinabad (M), Hyderabad – 500075, Telangana, India

| JBIET-R24 | J. B. Institute of Engineering and Technology (UGC Autonomous) | B. Tech-ECM |
|---|---|---|
| B. Tech Course Structure | | |

| I Year I Semester | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| S. No | Code | Course Title | L | T | P | D | Credits | Category | common Subject (Y/N) | Approving BOS |
| 1. | M110A | Matrices and Calculus | 3 | 1 | 0 | 0 | 4 | BS | Y | Maths |
| 2. | M110D | Engineering Chemistry | 3 | 1 | 0 | 0 | 4 | BS | Y | Chemistry |
| 3. | M110C | English for Skill Enhancement | 3 | 0 | 0 | 0 | 3 | HS | Y | English |
| 4. | M115B | Programming for Problem Solving | 3 | 0 | 0 | 0 | 3 | ES | Y | CSE |
| 5. | M117A | Elements of Electronics and Computer Engineering | 2 | | 0 | 0 | 1 | ES | N | ECM |
| 6. | M1103 | English Language and Communication Skills Lab | 0 | 0 | 2 | 0 | 1 | HS | Y | English |
| 7. | M1102 | Chemistry Laboratory | 0 | 0 | 2 | 0 | 1 | BS | Y | Chemistry |
| 8. | M1151 | Programming for Problem Solving Lab | 0 | 0 | 2 | 0 | 1 | ES | Y | CSE |
| 9. | M1132 | Computer Aided Engineering Graphics | 0 | 0 | 4 | 0 | 2.5 | ES | Y | MECH |
| 10. | M11AC2 | Human Values and Professional Ethics | 2 | 0 | 0 | 0 | - | AC | Y | MBA |
| | | **Total** | **16** | **2** | **10** | **0** | **20.5** | | | |

| I Year II Semester | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| S. No | Code | Course Title | L | T | P | D | Credits | Category | common Subject (Y/N) | Approving BOS |
| 1. | M120A | Differential Equations and Vector Calculus | 3 | 1 | 0 | 0 | 4 | BS | Y | Maths |
| 2. | M120B | Applied Physics | 3 | 1 | 0 | 0 | 4 | BS | Y | Physics |
| 3. | M122A | Basic Electrical Engineering | 3 | 0 | 0 | 0 | 3 | ES/PC | Y | EEE |
| 4. | M124A | Basic Electronics Engineering | 3 | 0 | 0 | 0 | 3 | ES/PC | Y | ECE |
| 5. | M1201 | Physics Lab | 0 | 0 | 2 | 0 | 1 | BS | Y | Physics |
| 6. | M1221 | Basic Electrical Engineering Lab | 0 | 0 | 2 | 0 | 1 | ES/PC | Y | EEE |
| 7. | M1241 | Basic Electronics Engineering Lab | 0 | 0 | 2 | 0 | 1 | ES/PC | Y | ECE |
| 8. | M1231 | Engineering Workshop and Digital fabrication Practices | 1 | 0 | 0 | 3 | 2.5 | ES | Y | MECH |
| 9. | M12AC1 | Cambridge Lingua skills | 2 | 0 | 0 | 0 | 0 | AC | Y | ENGLISH |
| | | **Total** | **14** | **2** | **6** | **4** | **19.5** | | | |

| II Year I Semester | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| S. No | Code | Course Title | L | T | P | D | Credits | Category | common Subject (Y/N) | Approving BOS |
| 1. | M210A | Probability and Statistics | 3 | 1 | 0 | 0 | 4 | BS | Y | Maths |
| 2. | M217A | Digital Logic Design | 3 | 1 | 0 | 0 | 4 | ES | N | ECM |
| 3. | M217B | Analog Electronics | 3 | 1 | 0 | 0 | 4 | PC | N | ECM |
| 4. | M215A | Data Structures | 3 | 0 | 0 | 0 | 3 | PC | N | CSE |
| 5. | M217C | Computer Organization | 3 | 0 | 0 | 0 | 3 | PC | N | ECM |
| 6. | M2171 | Analog Electronics Lab | 0 | 0 | 2 | 0 | 1 | PC | N | ECM |
| 7. | M21D1 | Data Structures Lab | 0 | 0 | 2 | 0 | 1 | PC | N | CSE |
| 8. | M2173 | Internship-1 | 0 | 0 | 2 | 0 | 1 | PW | Y | ECM |
| 9. | M21MC1 | Environmental Science (Mandatory Course-I) | 2 | 0 | 0 | 0 | 0 | MC | Y | English |
| | | **Total** | **17** | **3** | **6** | **0** | **21** | | | |

| II Year II Semester | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| S. No | Code | Course Title | L | T | P | D | Credits | Category | common Subject (Y/N) | Approving BOS |
| 1. | M2219A | Pulse and Digital Circuits | 3 | 1 | 0 | 0 | 4 | ES | N | ECM |
| 2. | M226A | Object Oriented Programming through Java | 3 | 0 | 0 | 0 | 3 | PC | Y | IT |
| 3. | M225A | Operating Systems | 3 | 0 | 0 | 0 | 3 | PC | Y | CSE |
| 4. | M225B | Design and Analysis of Algorithms | 3 | 0 | 0 | 0 | 3 | PC | Y | CSE |
| 5. | M2219C | Electronic Instrumentation And Measurements | 3 | 0 | 0 | 0 | 3 | PC | N | ECM |
| 6. | M22192 | Pulse and Digital Circuits Lab | 0 | 0 | 2 | 0 | 1 | PC | N | ECM |
| 7. | M226A | Object Oriented Programming through Java Lab | 0 | 0 | 2 | 0 | 1 | PC | Y | IT |
| 8. | M2251 | Operating Systems Lab | 0 | 0 | 2 | 0 | 1 | PC | Y | CSE |
| 9. | M22MC2 | Gender Sensitization (Mandatory Course-II) | 2 | 0 | 0 | 0 | 0 | MC | Y | English |
| | | **Total** | **17** | **1** | **6** | **0** | **19** | | | |

| III Year I Semester | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| S. No | Code | Course Title | L | T | P | D | Credits | Category | common Subject (Y/N) | Approving BOS |
| 1. | BTECME1 | PE-I | 3 | 0 | 0 | 0 | 3 | PE | N | CSE |
| 2. | BTECMO1 | OE-I | 3 | 0 | 0 | 0 | 3 | OE | N | |
| 3. | M327B | Linear and Digital IC Applications | 3 | 0 | 0 | 0 | 3 | PC | Y | ECM |
| 4. | M315A | Python Programming | 3 | 1 | 0 | 0 | 4 | PC | N | CSE |
| 5. | M324A | Microprocessors and Microcontrollers | 3 | 0 | 0 | 0 | 3 | PC | Y | ECE |
| 6. | M3151 | Python Programming Lab | 0 | 0 | 2 | 0 | 1 | PC | N | CSE |
| 7. | M3271 | Linear and Digital IC Applications Laboratory | 0 | 0 | 2 | 0 | 1 | PC | Y | ECM |
| 8. | M3241 | Microprocessors and Microcontrollers Lab | 0 | 0 | 2 | 0 | 1 | PC | Y | ECE |
| 9. | M3173 | Internship-2 | 0 | 0 | 2 | 0 | 1 | PW | Y | ECM |
| 10. | M31MC4 | Cyber Security (Mandatory Course -III) | 2 | 0 | 0 | 0 | 0 | MC | Y | IT |
| 11. | M31AC4 | Foundations of Entrepreneurship (Audit course - III) | 2 | 0 | 0 | 0 | 0 | AC | Y | MBA |
| | | **Total** | **19** | **1** | **6** | **0** | **20** | | | |

| III Year II Semester | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| S. No | Code | Course Title | L | T | P | D | Credits | Category | common Subject (Y/N) | Approving BOS |
| 1. | M32EA | Business Economics & Financial Analysis | 3 | 1 | 0 | 0 | 4 | HS | Y | MBA |
| 2. | BTECME2 | PE-II | 3 | 0 | 0 | 0 | 3 | PE | N | ECE |
| 3. | BTECME3 | PE-III | 3 | 0 | 0 | 0 | 3 | PE | N | ECM |
| 4. | BTECMO2 | OE-II | 3 | 0 | 0 | 0 | 3 | OE | N | |
| 5. | M316B | Database Management Systems | 3 | 1 | 0 | 0 | 4 | PC | Y | IT |
| 6. | M3162 | Database Management Systems lab | 0 | 0 | 2 | 0 | 1 | PC | Y | IT |
| 7. | M3201 | Life Skills and Professional Skills Lab | 0 | 0 | 4 | 0 | 2 | HS | Y | English |
| 8. | M32MC3 | Artificial Intelligence (Mandatory Course -IV) | 2 | 0 | 0 | 0 | 0 | MC | Y | IT |
| 9. | M32AC3 | Indian Constitution (Audit course - IV) | 2 | 0 | 0 | 0 | 0 | AC | Y | MBA |
| | | **Total** | **19** | **2** | **8** | **0** | **20** | | | |

| IV Year I Semester | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| S. No | Code | Course Title | L | T | P | D | Credits | Category | common Subject (Y/N) | Approving BOS |
| 1. | BTECME4 | PE-IV | 3 | 0 | 0 | 0 | 3 | PE | N | ECM |
| 2. | BTECME5 | PE-V | 3 | 0 | 0 | 0 | 3 | PE | N | ECM |
| 3. | BTECMO3 | OE-III | 3 | 0 | 0 | 0 | 3 | OE | N | |
| 4. | M416C | Object Oriented Analysis and Design | 3 | 0 | 0 | 0 | 3 | PC | N | IT |
| 5. | M417A | Internet of Things | 3 | 0 | 0 | 0 | 3 | PC | Y | ECM |
| 6. | M4172 | Industry Oriented Mini Project | 0 | 0 | 4 | 0 | 2 | PW | Y | ECM |
| 7. | M4173 | Major Project Phase-I | 0 | 0 | 4 | 0 | 2 | PW | Y | ECM |
| 8. | M4164 | Object Oriented Analysis and Design Lab | 0 | 0 | 2 | 0 | 1 | PC | N | IT |
| 9. | M41MC5 | Computer Forensics (Mandatory Course-V) | 2 | 0 | 0 | 0 | 0 | MC | Y | CSE |
| | | **Total** | **17** | **0** | **10** | **0** | **20** | | | |

| IV Year II Semester | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| S. No | Code | Course Title | L | T | P | D | Credits | Category | common Subject (Y/N) | Approving BOS |
| 1. | BTECME6 | PE-VI | 3 | 0 | 0 | 0 | 3 | PE | N | ECM |
| 2. | BTECMO4 | OE-IV | 3 | 0 | 0 | 0 | 3 | OE | N | |
| 3. | M425C | Cloud Computing | 3 | 0 | 0 | 0 | 3 | PC | N | CSE |
| 4. | M4271 | Major Project Phase-II | 0 | 0 | 20 | 0 | 10 | PW | Y | ECM |
| 5. | M4272 | Seminar | 0 | 0 | 2 | 0 | 1 | PW | Y | ECM |
| | | **Total** | **9** | **0** | **22** | **0** | **20** | | | |

| Professional Elective-I | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| S. No | Code | Course Title | L | T | P | D | Credits | Category | common Subject (Y/N) | Approving BOS |
| 1. | M315E | Computer Networks | 3 | 0 | 0 | 0 | 3 | PE-I | N | CSE |
| 2. | M415G | Block Chain Technology | 3 | 0 | 0 | 0 | 3 | PE-I | N | CSE |
| 3. | M316A | Software Engineering | 3 | 0 | 0 | 0 | 3 | PE-I | N | CSE |

| Professional Elective-II | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| S. No | Code | Course Title | L | T | P | D | Credits | Category | common Subject (Y/N) | Approving BOS |
| 1. | M324C | Cellular and Mobile Communications | 3 | 0 | 0 | 0 | 3 | PE-II | Y | ECE |
| 2. | M324K | Communication Systems | 3 | 0 | 0 | 0 | 3 | PE-II | N | ECE |
| 3. | M324J | Wireless Sensor Networks | 3 | 0 | 0 | 0 | 3 | PE-II | Y | ECE |

| Professional Elective-III | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| S. No | Code | Course Title | L | T | P | D | Credits | Category | common Subject (Y/N) | Approving BOS |
| 1. | M325A | Compiler Design | 3 | 0 | 0 | 0 | 3 | PE-III | N | CSE |
| 2. | M327C | Network Security | 3 | 0 | 0 | 0 | 3 | PE-III | N | ECM |
| 3. | M327D | Data Science | 3 | 0 | 0 | 0 | 3 | PE-III | N | ECM |

| Professional Elective-IV | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| S. No | Code | Course Title | L | T | P | D | Credits | Category | common Subject (Y/N) | Approving BOS |
| 1. | M414B | VLSI Design | 3 | 0 | 0 | 0 | 3 | PE-IV | N | ECE |
| 2. | M327E | Fibre Optic Communications | 3 | 0 | 0 | 0 | 3 | PE-IV | N | ECM |
| 3. | M327F | Image Processing and Pattern Recognition | 3 | 0 | 0 | 0 | 3 | PE-IV | N | ECM |

| Professional Elective-V | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| S. No | Code | Course Title | L | T | P | D | Credits | Category | common Subject (Y/N) | Approving BOS |
| 1. | M416D | Data Warehousing and Data Mining | 3 | 0 | 0 | 0 | 3 | PE-V | Y | IT |
| 2. | M417B | Neural Networks | 3 | 0 | 0 | 0 | 3 | PE-V | N | ECM |
| 3. | M41DB | Big Data Analytics | 3 | 0 | 0 | 0 | 3 | PE-V | N | AIDS |

| Professional Elective-VI | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| S. No | Code | Course Title | L | T | P | D | Credits | Category | common Subject (Y/N) | Approving BOS |
| 1. | M427A | Storage Area Networks | 3 | 0 | 0 | 0 | 3 | PE-VI | N | ECM |
| 2. | M425F | Android Application Development | 3 | 0 | 0 | 0 | 3 | PE-VI | N | CSE |
| 3. | M42AB | Deep Learning | 3 | 0 | 0 | 0 | 3 | PE-VI | N | AIML |

| Open Electives | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| S. No | Code | Course Title | L | T | P | D | Credits | Category | Approving BOS |
| 1 | M317OG | Introduction to Natural Language Processing | 3 | 0 | 0 | 0 | 3 | OE-I | ECM |
| 2 | M327OG | Introduction to Mobile Application Development | 3 | 0 | 0 | 0 | 3 | OE-II | ECM |
| 3 | M417OG | Introduction to Image Processing | 3 | 0 | 0 | 0 | 3 | OE-III | ECM |
| 4 | M427OG | Introduction to Sensors and Transducers | 3 | 0 | 0 | 0 | 3 | OE-IV | ECM |

| AY: 2024-25 Onwards | J. B. Institute of Engineering and Technology (UGC Autonomous) | B. Tech ECM I Year-I Sem | | | |
|---|---|---|---|---|---|
| Course Code: **J110A** | **MATRICES AND CALCULUS** (COMMON TO: CE, EEE, ME, ECE, CSE, IT, ECM, CSE(DS), CSE(AIML), AIML, AIDS & MIE) | L | T | P | D |
| Credits: **4** | | **3** | **1** | **0** | **0** |

**Pre-Requisites:** Mathematical Knowledge at pre-university level

**Course Objectives:**

The students should be able

1. Types of matrices and their properties.
2. Concept of a rank of the matrix and applying this concept to know the consistency and solving the system of linear equations.
3. Concept of eigenvalues and eigenvectors and to reduce the quadratic form to canonical form Geometrical approach to the mean value theorems and their application to the mathematical problems
4. Evaluation of surface areas and volumes of revolutions of curves.
5. Evaluation of improper integrals using Beta and Gamma functions.
6. Partial differentiation, concept of total derivative
7. Finding maxima and minima of function of two and three variables.
8. Evaluation of multiple integrals and their applications

**Module 1: Matrices and system of equations [10L]**

Types of Matrices, Symmetric, Skew-symmetric, rank of a matrix by Echelon form and Normal form, Gauss elimination, Inverse of non-singular matrices by Gauss-Jordan method. System of linear equations, solving system of Homogeneous and Non-Homogeneous equations.

**Module 2: Eigen values, Eigen Vectors [8 L]**

Eigen values, Eigen vectors and their properties, Diagonalization of matrix. Calculation of powers of Matrix, Cayley - Hamilton theorem (without proof), Inverse and powers of a matrix using Cayley - Hamilton theorem.

**Module 3: Quadratic Forms [8 L]**

Definitions of Hermitian, Skew-Hermitian, orthogonal matrices, Unitary Matrices, Linear Transformation and Orthogonal Transformation, Quadratic forms, rank and nature of the quadratic forms, index and signature, reduction of quadratic forms into canonical form using Linear Transformation and Orthogonal Transformations.

**Module 4: Mean value theorems and Functions of Multi variables [12 L]**

Mean value theorems: Rolle's theorem, Lagrange's Mean value theorem with their Geometrical Interpretation and applications, Cauchy's Mean value Theorem. Taylor's Series

Functions of Multi variables: Limits, Continuity, Partial differentiation, partial derivatives of first and second order, Jacobian, Taylor's theorem of two variables (without proof). Maxima and Minima of two variables, Lagrange's method of undetermined Multipliers.

**Module 5: Improper and Multiple Integrals [12L]**

Definition of Improper Integrals, Beta functions: Properties and other forms of beta functions (statements only) and problems, Gamma functions: Properties of Gamma functions (statements only), Relation between the Beta and Gamma functions (without proofs) and Evaluation of improper integrals using Beta and Gamma functions Evaluation of double integrals, change of order of integration, change of variables, evaluation of triple integrals, change of variables.

**Text Books**

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 2015
2. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons,2006.
3. R.K.Jain & S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5th Edition, 2019.

**Reference Books**

1. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
2. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi,11thReprint, 2010.
3.

**E-Resources**

1. https://nptel.ac.in/courses/111/108/111108098/
2. https://en.wikipedia.org/wiki/Eigenvalues_and_eigenvectors
3. https://nptel.ac.in/courses/111/107/111107108/
4. https://www.cheric.org/files/education/cyberlecture/e200303/e200303-301.pdf
5. https://www.whitman.edu/mathematics/calculus_online/chapter16.html

**Course outcomes:**

At the end of the course, the student will be able to:

**CO1:** Write the matrix representation of a set of linear equations and to analyse the solution of the system of equations

**CO2:** Find the Eigenvalues and Eigen vectors

**CO3:** Reduce the quadratic form to canonical form using orthogonal transformations.

**CO4:** Solve the applications on the mean value theorems.

**CO5:** Evaluate the improper integrals using Beta and Gamma functions

**CO6:** Find the extreme values of functions of two variables with/ without constraints

**CO-PO/PSO Mapping**

| Course Outcomes | Program Outcomes (POs)/Program Specific Outcomes (PSOs) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
| **CO1** | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO2** | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO3** | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO4** | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO5** | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **Average** | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

**Correlation: 3–Strong; 2–Medium; 1-Weak**

| AY: 2024-25 Onwards | J. B. Institute of Engineering and Technology (UGC Autonomous) | B. Tech ECM I Year-I Sem | | | |
|---|---|---|---|---|---|
| Course Code: | ENGINEERING CHEMISTRY (COMMON TO: EEE, ECE, CSE, IT & ECM) | L | T | P | D |
| Credits: **4** | | **3** | **1** | **0** | **0** |

**Pre-Requisites:**

## Course Objectives:

The students should be able

1. To know the suitability of water for domestic and industrial purposes.
2. To acquire knowledge about different types of batteries and to understand the concepts of corrosion.
3. To facilitate successful pursuit of advanced degrees to support interdisciplinary ideas in engineering or other related fields
4. Gain the knowledge of chemical reactions those are used in the synthesis of molecules.

## Module 1: Water and Its Treatment [11L]

Introduction – hardness of water – Causes of hardness - Types of hardness- temporary and permanent hardness – Units of hardness of water - Numerical problems – Estimation of hardness of water by complexometric method. Boiler troubles: scale and sludge, causes and effects. Potable water and Industrial water its specifications. Softening of water - Internal treatment of boiler feed water– Calgon conditioning, Phosphate conditioning and Colloidal conditioning. External treatment of water – Ion exchange process. Desalination of brackish water – Reverse osmosis. Steps involved in potable water treatment – Disinfection of water by chlorination, Breakpoint chlorination and Ozonization.

## Module 2: Battery and Corrosion [12 L]

**Batteries [7L]**

Introduction– Classification of batteries - Primary (Li-MnO2 cell) and secondary batteries (Lithium ion battery)- Applications

Fuel cells – Methanol - Oxygen fuel cell – Engineering applications

Solar cells –Principle and applications of solar cells

**Corrosion[5L]**

Causes and effects of corrosion–chemical and electrochemical corrosion – mechanism of electrochemical corrosion by hydrogen evolution method, types of corrosion-galvanic and waterline corrosion. Factors influencing rate of corrosion - Corrosion control methods- Cathodic protection – Sacrificial anodic and impressed current cathodic methods - Hot dipping (Galvanizing and Tinning).

## Module 3: Chemical Fuels [9 L]

**Fuels:** Definition, Classification, Characteristics of a good fuel - Types of Calorific value (CV) – Calculation of CV using Dulong's formula, Numerical.

**Soild Fuels:** Coal - Composition - Proximate & Ultimate Analysis - Significance.

**Liquid Fuels:** Gasoline and its Composition, Cracking: Fixed bed catalytic cracking method – Knocking, Anti- Knocking agents and its significance, Octane number, Cetane number.

**Gaseous Fuels:** Composition, characteristics and applications of natural gas, LPG and CNG.

## Module 4: Polymers [10 L]

**Polymers:** Definition–Monomer, Polymer, Polymerization. Types of polymerizations – addition and condensation polymerization with examples.

**Plastics:** Definition - thermoplastic and thermosetting plastics, compounding and fabrication of plastics (compression and injection moulding). Preparation, Properties and Engineering Applications of PVC. Urea-Formaldehyde.
**Fibers:** Preparation, Properties and engineering applications of Nylon-6, 6.
**Conducting Polymers**- Definition, Classification, Applications.

**Module 5: Engineering Materials & Drugs [8L]**

**Nanomaterials**
Introduction, Synthesis of Sol-gel method, General Applications of Nanomaterials.
**Carbon Nanotubes** - Properties and applications.
**Portland Cement:** Chemical constituents, Manufacturing of Portland cement, Setting and Hardening and applications of cement.
**Drugs:** Antipyretic (Paracetamol) – Medicinal Applications

**Text Books**


1. Engineering Chemistry: Prof. Jaya Shree Anireddy, Wiley Publications.
2. Engineering Chemistry: P. C. Jain & M. Jain, Dhanpat Rai Publications, New Delhi.
3. Engineering Chemistry: Shashi Chawla, Dhanpat Rai Publications (2019), New Delhi.


**Reference Books**


1. Engineering Chemistry by M. Thirumalachary and E. Laxminarayana, Scitech Publications.
2. Text Book of Engineering Chemistry by Cengage Learning, B. Rama Devi, Ch. Venkata Ramana Reddy and Prasanth Rath.
3. Engineering Chemistry (NPTEL Web-book) by B.L. Tembe, Kamaluddin and M.S.Krishnan.


**E-Resources**

1. https://www.imnh.isu.edu/digitalatlas/hydr/basics/main/chmtxt.
2. https://chem.libretexts.org/Core/.../Electrochemistry/Basics_of_Electrochemistry
3. https://www2.chemistry.msu.edu/faculty/reusch/virttxtjml/polymers.htm
4. https://www.youtube.com/watch?v=W0-CvvAGtEM
5. https://sengerandu.wordpress.com/tutorials/physical-metallurgy/engineering-materials

**Course outcomes:**

At the end of the course, the student will be able to:
**CO1:** Recognize and select the domestic and industrial problems caused by hard water and also learn about the municipal water treatment using various methods.
**CO2:** Understand and interpret the important fundamental concepts of electrochemical procedures related to corrosion and its control.
**CO3:** Rate the fuels and suggest methods for enhancement of the quality of fuels for the required output.
**CO4:** Identify & recognize the role of polymers in everyday life.
**CO5:** Apply the Knowledge of engineering materials and drugs in daily life.

**CO-PO/PSO Mapping**

| Course Outcomes | Program Outcomes (POs)/Program Specific Outcomes (PSOs) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
| **CO1** | 3 | - | - | - | - | 3 | 2 | - | - | - | - | 3 | - | - |
| **CO2** | 3 | - | - | - | - | 3 | 2 | - | - | - | - | 3 | - | - |
| **CO3** | 3 | 2 | - | - | - | 3 | 3 | - | - | - | - | 3 | - | - |
| **CO4** | 1 | 2 | - | - | - | 3 | 2 | - | - | - | - | 2 | - | - |
| **CO5** | 3 | - | - | - | - | 2 | 3 | - | - | - | - | 1 | - | - |
| **Average** | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

**Correlation: 3–Strong; 2–Medium; 1-Weak**

| AY: 2024-25 Onwards | J. B. Institute of Engineering and Technology (UGC Autonomous) | B. Tech ECM I Year-I Sem | | | |
|---|---|---|---|---|---|
| Course Code: | ENGLISH FOR SKILL ENHANCEMENT (COMMON TO CSE, IT, ECM, ECE, EEE) | L | T | P | D |
| Credits: **3** | | **3** | **0** | **0** | **0** |

**Pre-Requisites:** NIL

**Course Objectives:**

1. The students should be able
2. Enhancing understanding of key concepts related to language structures and language usage.
3. Ensuring the ability to write grammatically correct and diverse sentences, free from punctuation and spelling errors.
4. Improving students' proficiency in English required for technical education.
5. Building academic competence and confidence to use language effectively.
6. Developing life skills to tackle different challenges.

**Module 1** **[10L]**

**Lesson:** 'Toasted English' by R. K. Narayan

**Vocabulary:** The Concept of Word Formation -The Use of Prefixes and Suffixes - Acquaintance with Prefixes and Suffixes from Foreign Languages to form Derivatives - Synonyms and Antonyms

**Grammar:** Identifying Common Errors in Writing with Reference to Articles and Prepositions.

**Reading:** Reading and Its Importance- Techniques for Effective Reading.

**Writing:** Sentence Structures -Use of Phrases and Clauses in Sentences- Importance of Proper Punctuation- Techniques for writing precisely – Paragraph Writing – Types, Structures and Features of a Paragraph - Creating Coherence-Organizing Principles of Paragraphs in Documents.

**Module 2** **[9 L]**

**Lesson:** 'Appro JRD' by Sudha Murthy

**Vocabulary:** Words Often Misspelt - Homophones, Homonyms and Homographs

**Grammar:** Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement and Subject-verb Agreement.

**Reading:** Sub-Skills of Reading – Skimming and Scanning – Exercises for Practice

**Writing:** Nature and Style of Writing- Defining /Describing People, Objects, Places and Events – Classifying- Providing Examples or Evidence.

**Module 3** **[8 L]**

**Lesson:** Elon Musk

**Vocabulary:** Words Often Confused - Words from Foreign Languages and their Use in English.

**Grammar:** Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses.

**Reading:** Sub-Skills of Reading – Intensive Reading and Extensive Reading – Exercises for Practice.

**Writing:** Format of a Formal Letter-Writing Formal Letters E.g.., Letter of Complaint, Letter of Requisition, Email Etiquette, Job Application with CV/Resume.

**Module 4** **[8 L]**

**Lesson:** Art and Literature by Dr. Abdul Kalam

**Vocabulary:** Standard Abbreviations in English

**Grammar:** Redundancies and Clichés in Oral and Written Communication.

**Reading:** Survey, Question, Read, Recite and Review (SQ3R Method) - Exercises for Practice

Writing: Writing Practices- Essay Writing-Writing Introduction and Conclusion -Précis Writing.

## Module 5 [8L]

**Lesson:** Go, Kiss the World' by Subroto Bagchi
**Vocabulary:** Technical Vocabulary and their Usage
**Grammar:** Common Errors in English (Covering all the other aspects of grammar which were not covered in the previous units)
**Reading:** Reading Comprehension-Exercises for Practice
**Writing:** Technical Reports- Introduction – Characteristics of a Report – Categories of Reports Formats- Structure of Reports (Manuscript Format) -Types of Reports - Writing a Report

### Text Books

1. "English: Language, Context and Culture" by Orient BlackSwan Pvt. Ltd, Hyderabad. 2022. Print.

### Reference Books


1. Swan, M. (2016). Practical English Usage. Oxford University Press.
2. Kumar, S and Lata, P. (2018). Communication Skills. Oxford University Press.
3. Wood, F.T. (2007). Remedial English Grammar. Macmillan.
4. Zinsser, William. (2001). On Writing Well. Harper Resource Book.
5. Hamp-Lyons, L. (2006). Study Writing. Cambridge University Press.
6. Exercises in Spoken English. Parts I –III. CIEFL, Hyderabad. Oxford University Press.


### E-Resources

1. https://sharmadkm.wordpress.com/2022/12/11/toasted-english-by-r-k-narayan/
2. https://sharmadkm.wordpress.com/2022/12/20/apro-jrd-summary/
3. Cambridge English
4. BBC Learning English - Learn English with BBC Learning English - Homepage

### Course outcomes:

At the end of the course, the student will be able to:
**CO1:** Expand their vocabulary through mastery of word roots, prefixes, and suffixes.
**CO2:** Demonstrate proficiency in grammar fundamentals, including sentence structure and parts of speech.
**CO3:** Exhibit competence in reading and writing skills for effective communication in diverse contexts.
**CO4:** Apply critical thinking and analytical skills to analyse texts and synthesize information.
**CO5:** Express themselves confidently and coherently through oral presentations, discussions, and written compositions.

### CO-PO/PSO Mapping

| Course Outcomes | Program Outcomes (POs)/Program Specific Outcomes (PSOs) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
| **CO1** | - | - | - | - | - | - | - | - | 2 | 2 | - | 3 | - | - |
| **CO2** | - | - | - | - | - | - | - | - | 2 | 2 | - | 3 | - | - |
| **CO3** | - | - | - | - | - | - | - | - | 2 | 2 | - | 3 | - | - |
| **CO4** | - | - | - | - | - | - | - | - | 2 | 2 | - | 3 | - | - |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO5** | - | - | - | - | - | - | - | - | 2 | 2 | - | 3 | - | - |
| **Average** | - | - | - | - | - | - | - | - | **2** | **2** | - | **3** | - | - |

**Correlation: 3–Strong; 2–Medium; 1-Weak**

| AY: 2024-25 Onwards | J. B. Institute of Engineering and Technology (UGC Autonomous) | B. Tech ECM I Year-I Sem | | | |
|---|---|---|---|---|---|
| Course Code: | PROGRAMMING FOR PROBLEM SOLVING (Common to all) | L | T | P | D |
| Credits: 3 | | 3 | 0 | 0 | 0 |

**Pre-Requisites:**

1. Mathematical Knowledge.
2 Analytical Skills.

## Course Objectives:

1. The students should be able
2. Learn the fundamentals of computers.
3. Understand the various steps in program development.
4. Understand the syntax and semantics of C programming language.
5. Learn the usage of structured programming approach in solving problems.
6. Gain the knowledge on searching and sorting methods.

## Module 1

**Introduction to Algorithms:** steps to solve logical and numerical problems. Representation of Algorithm, Flowchart/Pseudo code with examples, Program design and structured programming.

**Introduction to C Programming Language:** Basic concepts of a C program, Declaration, Assignment & Print statement, Types of operators and expressions, Programming examples and exercise. variables (with data types and space requirements),

Syntax and Logical Errors in compilation, object and executable code, Operators, expressions and precedence, Expression evaluation, Storage classes (auto, extern, static and register), type conversion, The main method and command line arguments

**Bitwise operations:** Bitwise AND, OR, XOR and NOT operators Conditional Branching and Loops: Writing and evaluation of conditionals and consequent branching with if, if-else, switchcase, ternary operator, goto, Iteration with for, while, do- while loops.I/O: Simple input and output with scanf and printf, formatted I/O, Introduction to stdin, stdout and stderr.

## Module 2: Arrays, Strings, Structures and Preprocessor

**Arrays:** one- and two-dimensional arrays, creating, accessing and manipulating elements of arrays.

**Strings:** Introduction to strings, handling strings as array of characters, basic string functions available in C (strlen, strcat, strcpy, strstr etc.), arrays of strings Structures: Defining structures, initializing structures, unions, Array of structures.

**Preprocessor:** Commonly used Preprocessor commands like include, define, undef, If, ifdef, ifndef.

## Module 3: Pointers And File Handling in C

**Pointers:** Idea of pointers, defining pointers, Pointers to Arrays and Structures, Use of Pointers in self-referential structures, usage of self-referential structures in linked list (no implementation) Enumeration data type. Array of pointers,

**Files:** Text and Binary files, Creating and Reading and writing text and binary files, appending data to existing files, Writing and reading structures using binary files, Random access using fseek, ftell and rewind functions.

## Module 4: Function and Dynamic Memory Allocation

**Functions:** Designing structured programs, declaring a function, Signature of a function, Parameters and return type of a function, passing parameters to functions, call by value, passing

arrays to functions, passing pointers to functions, idea of call by reference, Some C standard functions and libraries.

**Recursion:** Simple programs, such as Finding Factorial, Fibonacci series etc., Limitations of Recursive functions.

**Dynamic memory allocation:** Allocating and freeing memory, Allocating memory for arrays of different data types. Dynamic allocations methods- malloc(), calloc(), realloc(),free()

## Module 5: Introduction to Algorithms

Basic searching algorithms (linear and binary search techniques), Basic sorting algorithms (Bubble, Insertion, Quick, Merge and Selection sort algorithms) Basic concept of order of complexity through the example programs

## Text Books

1. Ream Thareja, Programming in C, Oxford university press.
2. B.A. Forouzan and R.F. Gilberg, C Programming and Data Structures, Cengage Learning,
3. (3rdEdition).

## Reference Books

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India.
2. R.G. Dromey, How to solve it by Computer, Pearson (16thImpression)
3. Stephen G. Kochan, Programming in C, Fourth Edition, PearsonEducation.
4. 4. Herbert Schildt, C: The Complete Reference, McGraw Hill, 4thEdition
5. 5. Byron Gottfried, Schaum‟sOutline of Programming with C,McGraw-Hil

## E-Resources

1. https://fresh2refresh.com/c-programming/
2. https://www.studytonight.com/c/
3. https://beginnersbook.com/2014/01/c-tutorial-for-beginners-with examples/
4. https://www.programiz.com/c-programming
5. http://www.gtucampus.com/uploads/studymaterials/Degree%20EngineeringSandipFundaments_of_C.pdf
6. http://cs.indstate.edu/~cbasavaraj/cs559/the_c_programming_language_2.pdf

## Course outcomes:

At the end of the course, the student will be able to:

**CO1:** Design the algorithms/flowcharts of C-programs

**CO2:** Write the Code and test a given logic in C programming language

**CO3:** Decompose a problem into functions and to develop modular reusable code.

**CO4:** Make Use of arrays, pointers, strings and structures to write C Programs.

**CO5:** Apply searching and sorting algorithms.

**CO-PO/PSO Mapping**

| Course Outcomes | Program Outcomes (POs)/Program Specific Outcomes (PSOs) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
| **CO1** | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO2** | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO3** | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO4** | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO5** | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **Average** | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

**Correlation: 3–Strong; 2–Medium; 1-Weak**

| AY: 2024-25 Onwards | J. B. Institute of Engineering and Technology (UGC Autonomous) | B. Tech ECM I Year-I Sem | | | |
|---|---|---|---|---|---|
| Course Code: | ELEMENTS OF ELECTRONICS AND COMPUTER ENGINEERING | L | T | P | D |
| Credits: **1** | | **0** | **0** | **2** | **0** |

**Pre-Requisites:** Electronics and Computer Knowledge.

## Course Objectives:

1. Know about electronic components
2. Understand the Electronic Measurement Devices
3. Know the working principles of functional units of a basic Computer
4. Understand program development, the use of data structures and algorithms in problem solving.
5. Know the need and types of operating system, database systems.

## Unit-1

**Study of Electronic Components**- Different passive and active components, Color code of resistors, finding the types and values of capacitors, Digital and Analog ICs

## Unit- 2

**Basics of Electronic Measurement Devices**- Voltage, current and resistance measuring devices, study of cathode ray oscilloscope.

## Unit- 3

**Basics of a Computer –** Hardware, Software, Generations of computers. Hardware - functional units, Components of CPU, Memory – hierarchy, types of memory, Input and output devices. Software – systems software, application software, packages, frameworks, IDEs.

## Unit-4

**Software development –** waterfall model, Agile, Types of computer languages – Programming, markup, scripting Program Development – steps in program development, flowcharts, algorithms, data structures – definition, types of data structures

## Unit- 5

**Operating systems:** Functions of operating systems, types of operating systems, Device & Resource management

**Database Management Systems:** Data models, SQL, Database Transactions, data centres

## Text Books


1. Basic Electronics, ML Anand S. Chand Publication.
2. Invitation to Computer Science, G. Michael Schneider, Macalester College, Judith L. Gersting University of Hawaii, Hilo, Contributing author: Keith Miller University of Illinois, Springfield.


## Reference Books


1. Principles of Electronics, VK Mehta and Rohit Mehta, S. Chand Publication.
2. Fundamentals of Computers, Reema Thareja, Oxford Higher Education, Oxford University Press.
3. Introduction to computers, Peter Norton, 8th Edition, Tata McGraw Hill.


## Course outcomes:

At the end of the course, the student will be able to:

**CO1:** Know about electronic components

**CO2:** Understand the Electronic Measurement Devices

**CO3:** Know the working principles of functional units of a basic Computer.

**CO4:** Understand program development, the use of data structures and algorithms in problem solving.

**CO5:** Know the need and types of operating system, database systems.

## CO-PO/PSO Mapping

| Course Outcomes | Program Outcomes (POs)/Program Specific Outcomes (PSOs) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
| **CO1** | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO2** | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO3** | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO4** | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO5** | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **Average** | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

**Correlation: 3–Strong; 2–Medium; 1-Weak**

| AY: 2024-25 Onwards | J. B. Institute of Engineering and Technology (UGC Autonomous) | B. Tech ECM I Year-I Sem | | | |
|---|---|---|---|---|---|
| Course Code: | ENGLISH LANGUAGE & COMMUNICATION SKILLS LAB (COMMON TO CSE, IT, ECM, ECE, EEE) | L | T | P | D |
| Credits: **1** | | **0** | **0** | **3** | **0** |

**Pre-Requisites:** NIL

**Course Objectives:**

The students should be able

1. To use accurate and appropriate pronunciation through the practice of phonetic sounds, symbols, word accent and into nation.
2. To improve their fluency in spoken English and neutralize their mother tongue influence through JAM Sessions, Role-play, etc.
3. To comprehend the speech of people of various regions through Listening practice exercises.
4. To enable students to transfer information verbally with the right usage of Body language through individual and group activities.
5. To understand nuances of English language by practicing various exercises at multi-media lab.

**English Language and Communication Sills Lab (ELCS) will have two divisions:**

**a) Computer Assisted Language Learning Lab (CALL)**

**b) Interactive Communication Skills Lab (ICS)**

**Module 1 [9L]**

**CALL Lab:**

General Indian English (GIE) and Interference of Mother Tongue (MTI) -Differences in British and American Pronunciation.

Introduction to Phonetics – Speech Sounds – Vowels and Consonants; Minimal Pairs

**ICS Lab:**

Ice-Breaking Activity and JAM Session- Situational Dialogues -Greetings-Taking Leave - Introducing Oneself and Others.

**Module 2 [9 L]**

**CALL Lab:**

The Phoneme: The Syllable.

**ICS Lab:**

Features of Good Conversation - Non-verbal Communication- Telephone Etiquette-Role Plays.

**Module 3 [9 L]**

**CALL Lab:**

Stress-Word and Sentence Stress- Stress Shift- Strong and Weak Forms.

**ICS Lab:**

Introduction to a structured talk, Presentations Skills-Formal Presentations.

**Module 4 [9 L]**

**CALL Lab:**

Intonation-Errors in Pronunciation- Neutralizing MTI

**ICS Lab:**

Introduction to Group Discussion - Mock GD

**Module 5 [8L]**

**CALL Lab:**

Listening for Specific Details-Listening Comprehension Tests.

**ICS Lab:**

Introduction to Interview Skills-Mock Interviews.

**Text Books**

1. ELCS Lab Manual: A Workbook for CALL & ICS Lab Activities; Orient Black Swan

**Reference Books**


1. Balasubramanian. T (2009), A Textbook of English Phonetics for Indian Students. Macmillan.
2. Bansal. R.K, Harrison J.B. (2008). Spoken English. Orient Black Swan.
3. Ashraf Rizvi M (2010). Effective Technical Communication. McGraw-Hill.


**E-Resources**

1. https://bbamantra.com/listening/
2. https://en.wikipedia.org/wiki/Phonetics#:~:text=Phonetics%20is%20a%20branch%20of,the%20physical%20properties%20of%20speech.
3. https://www.innovativeteachingideas.com/blog/10-great-activities-to-break-the-ice-with- your-students
4. http://kjtenglishnotes.blogspot.com/2015/10/how-i-became-public-speaker.html
5. https://www.learngrammar.net/english-grammar

**Course outcomes:**

At the end of the course, the student will be able to:

**CO1:** Differentiate the speech sounds in English and demonstrate accurate pronunciation
**CO2:** Comprehend and respond to the given texts appropriately
**CO3:** Improve their effective and empathetic listening ability
**CO4:** Communicate confidently and effectively in various contexts and different cultures.
**CO5:** Listen actively, speak fluently and write accurately.

**CO-PO/PSO Mapping**

| Course Outcomes | Program Outcomes (POs)/Program Specific Outcomes (PSOs) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
| **CO1** | - | - | - | - | - | - | - | - | 3 | 3 | - | 2 | - | - |
| **CO2** | - | - | - | - | - | - | - | - | 3 | 3 | - | 2 | - | - |
| **CO3** | - | - | - | - | - | - | - | - | 3 | 3 | - | 2 | - | - |
| **CO4** | - | - | - | - | - | - | - | - | 3 | 3 | - | 2 | - | - |
| **CO5** | - | - | - | - | - | - | - | - | 3 | 3 | - | 2 | - | - |
| **Average** | - | - | - | - | - | - | - | - | **3** | **3** | - | **2** | - | - |

**Correlation: 3–Strong; 2–Medium; 1-Weak**

| AY: 2024-25 Onwards | J. B. Institute of Engineering and Technology (UGC Autonomous) | B. Tech ECM I Year-I Sem | | | |
|---|---|---|---|---|---|
| Course Code: | CHEMISTRY LABORATORY (COMMON TO EEE, ECE, CSE, IT& ECM) | L | T | P | D |
| Credits: **1** | | **0** | **0** | **2** | **0** |

**Pre-Requisites:** NIL

**List of experiments (Any 10-12 experiments)**

**Volumetric Analysis:**

1. Preparation of standard solution of oxalic acid and standardisation of NaOH.
2. Determination of total hardness of water by complexometric method using EDTA.
3. Determination of chloride content of water by Argentometry.
4. Estimation of Ferrous ion in Mohr's salt using Permanganomerty.
5. Estimation of ferrous ion in Mohr's salt by dichrometry.

**Determination of Physico-Chemical Properties:**

6. Determination of viscosity of a given liquid by using Ostwald's viscometer.
7. Determination of surface tension of a given liquid using stalagmometer.
8. Determination of partition coefficient of acetic acid between n-butanol and water.

**Instrumental methods of Analysis:**

9. Estimation of strength of HCl by Conductometric titrations using NaOH.
10. Estimation of strength of HCl by Potentiometric titrations using NaOH.
11. Estimation of Cu+2 in a given sample by colorimetry.
12. Estimation of Mn+2 in given sample by colorimetry.

**Synthesis of Nanomaterials, Polymers and drug molecules:**

13. Synthesis of Iron Nanoparticles
14. Synthesis of Polymer-Bakelite.
15. Synthesis of drug molecule Aspirin.

**Text Books**


1. Senior practical physical chemistry, B.D. Khosla, A. Gulati and V. Garg, (R. Chand & Co., Delhi)
2. An introduction to practical chemistry, K.K. Sharma & D.S. Sharma, (Vikas publishing, N. Delhi)
3. "Text book of practical organic chemistry", Vogel's ,5th edition.
4. "Text book on Experiments and calculations in engineering chemistry", S.S. Dara


**Course outcomes:**

At the end of the course, the student will be able to:

**CO1:** Identify the basic chemical methods to analyse the substances quantitatively & qualitatively.
**CO2:** Calculate the concentration and amount of various substances using instrumental techniques.
**CO3:** Synthesize the engineering materials like nanomaterials, polymers and drug molecules.
**CO4:** Determine the physic-chemical properties like partition co-efficient, surface tension and viscosity.
**CO5:** Determine the partition coefficient of organic compound in two immiscible liquids.

**CO-PO/PSO Mapping**

| Course Outcomes | Program Outcomes (POs)/Program Specific Outcomes (PSOs) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
| **CO1** | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO2** | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO3** | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO4** | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO5** | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **Average** | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

**Correlation: 3–Strong; 2–Medium; 1-Weak**

| AY: 2024-25 Onwards | J. B. Institute of Engineering and Technology (UGC Autonomous) | B. Tech ECM I Year-I Sem | | | |
|---|---|---|---|---|---|
| Course Code: | PROGRAMMING FOR PROBLEM SOLVING LAB (COMMON TO ALL) | L | T | P | D |
| Credits: **1** | | **0** | **0** | **2** | **0** |

**Pre-Requisites:**

1. Mathematical Knowledge.
2. Analytical Skills.

**Course Objectives:**

The students should be able

1. To use accurate and appropriate pronunciation through the practice of phonetic sounds, symbols, word accent and into nation.
2. To improve their fluency in spoken English and neutralize their mother tongue influence through JAM Sessions, Role-play, etc.
3. To comprehend the speech of people of various regions through Listening practice exercises.
4. To enable students to transfer information verbally with the right usage of Body language through individual and group activities.
5. To understand nuances of English language by practicing various exercises at multi-media lab.

**List of experiments**

1. a) Write a program to find the max and min from the three numbers.

   b) Write a program to read marks from keyboard and your program should display equivalent grade according to following table (if else ladder)

   Marks Grade

   100 – 80 Distinction

   79 – 60 First Class

   59 – 40 Second Class

   < 40 Fail

2. Write a C program, which takes two integer operands and one operator from the user, performs the operation, and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)

3. Write a program that finds if a given number is a prime number

4. Write a C program to generate the first n terms of the sequence

5. Write a C program to find the minimum, maximum and average in an array of integers.

6. Write a C program to find Addition and Multiplication of Two Matrices

7. Write a C program to count the number of times a character occurs in a text file. The file name and the character are supplied as command line arguments.

8. Write a C program to determine if the given string is a palindrome or not (Spelled same in both directions with or without a meaning like madam, civic, noon, abcba, etc.)

9. a) Write a C program to implement binary search algorithm

   b) Write a C program to implement linear search algorithm.

10. a) Write a C program that implements the Bubble sort method

b) Write a C program that implements the Insertion sort method.

11. Write a C program that implements the Quick sort method.

12. Write a C program that implements the Merge sort method.

13. Recursion: factorial, Fibonacci, GCD.

**Case Studies:**

1. Implement Hotel Management system in C with the following requirements.

Requirements:

-Provide the information on reserving rooms, book an event, check the features

- Give the login for both admin and user for proper login validation

-Add/View/Edit/Delete user records

-Calculate the bill after checkout of customers

2. Implement Library management system in C with the following requirements.

Requirements:

-To add Book Information

- Display Book Information

-List all the books of the given author

-List the title of the specified Book

-List the count of books in the library

**Course outcomes:**

At the end of the course, the student will be able to:

**CO1:** Formulate the algorithms for simple problems.
**CO2:** Examine syntax errors as reported by the compilers.
**CO3:** Define and manipulate data with arrays, strings, and structures.
**CO4:** Make use of pointers with different function types.
**CO5:** Create, read, and write to and from simple text and binary files.

**CO-PO/PSO Mapping**

| Course Outcomes | Program Outcomes (POs)/Program Specific Outcomes (PSOs) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
| **CO1** | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO2** | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO3** | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO4** | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO5** | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **Average** | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

**Correlation: 3–Strong; 2–Medium; 1-Weak**

| AY: 2024-25 Onwards | J. B. Institute of Engineering and Technology (UGC Autonomous) | B. Tech ECM I Year-I Sem | | | |
|---|---|---|---|---|---|
| Course Code: | COMPUTER AIDED ENGINEERING GRAPHICS (Common For All Branches) | L | T | P | D |
| Credits: **2.5** | | **1** | **0** | **3** | **0** |

**Pre-Requisites:** Engineering Mathematics.

**Module 1: Principles of Engineering Drawing, Conic Sections, Curves, Scales [12L]**

**Unit-I: [3L]** Introduction to Engineering Graphics: Principles of Engineering Graphics and their Significance. Construction of Plane, Diagonal Scales.

**Unit-II: [6L]** Conic Sections including the Rectangular Hyperbola – General method only, Cycloid, Epicycloid and Hypocycloid.

**Unit-III: [3L]** Introduction to Computer aided drafting – views, commands and conics.

**Module 2: Orthographic Projections [12L]**

**Unit-I: [3L]** Principles of Orthographic Projections – Conventions.

**Unit-II: [3L]** Projections of Points and Lines, Projections of Plane regular geometric figures – Circle, Square, Rectangle, Triangle, Pentagon, Hexagon.

**Unit-III: [6L]** Computer aided orthographic projections – points, lines and planes.

**Module 3: Projections of Solids [12L]**

**Unit-I: [6L]** Projections of Right Regular Solids – Prisms and Pyramids of Square, Pentagon, Hexagon;

**Unit-II: [6L]** Projections of Generated Solids – Cone, Cylinder. Computer aided projections of solids.

**Module 4: Sections of Solids, Development of Surfaces of Solids [12L]**

**Unit-I: [3L]** Sectional View of Right Regular Solids – Prisms and Pyramids of Pentagon, Hexagon; Generated solids – Cylinder and Cone.

**Unit-II: [6L]** Development of Surfaces of Right Regular solids – Prism, cylinder pyramid and cone.

**Unit-III: [3L]** Computer aided sectional views, Development of surfaces.

**Module 5: Isometric Projections, Orthographic Views [12L]**

**Unit-I: [9L]** Principles of Isometric Projections, Isometric Scale, Isometric Views of Simple and Compound Solids; Conversion of Orthographic Views of simple objects to Isometric Views and Vice-versa.

**Unit-II: [3L]** Conversion of orthographic projection into isometric view using computer aided drafting.

**Text Books**


1. Bhatt N.D., Panchal V.M. & Ingle P.R., “Engineering Drawing”, Charotar Publishing 2014.
2. Engineering Drawing and graphics Using AutoCAD Third Edition, T. Jeyapoovan, Vikas: S. Chand and company Ltd.
3. K. Venugopal & V. Prabhu Raja, “Engineering Drawing + Auto CAD”, New Age International Publishers. Fifth Edition, 2011.


**Reference Books**


1. Narayana, K.L. & P Kannaiah, “Text book on Engineering Drawing”, Scitech Publish, 2008
2. Agrawal B. & Agrawal C. M., “Engineering Graphics”, TMH Publn, 2012.


**E-Resources**

1. https://nptel.ac.in/courses/112/103/112103019/
2. https://urlzs.com/fLJ3T

3. https://urlzs.com/zky46

**Course outcomes:**

At the end of the course, the student will be able to:

**CO1:** Apply computer aided drafting tools to create 2D and 3D objects

**CO2:** Sketch conics and different types of solids.

**CO3:** Read and interpret engineering drawings.

**CO4:** Conversion of orthographic projection into isometric view and vice versa manually and by using computer aided drafting.

**CO-PO/PSO Mapping**

| Course Outcomes | Program Outcomes (POs)/Program Specific Outcomes (PSOs) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
| **CO1** | 3 | 3 | 2 | 1 | 2 | - | - | - | - | - | - | 3 | 1 | 1 |
| **CO2** | 3 | 3 | 2 | 1 | 2 | - | - | - | - | - | - | 3 | 2 | 1 |
| **CO3** | 3 | 3 | 2 | 1 | 2 | - | - | - | - | - | - | 3 | 2 | 1 |
| **CO4** | 3 | 3 | 3 | 1 | 2 | - | - | - | - | - | - | 3 | 2 | 2 |
| **CO5** | 3 | 3 | 3 | 1 | 2 | - | - | - | - | - | - | 3 | 2 | 3 |
| **Average** | **3** | **3** | **2.4** | **1** | **2** | **-** | **-** | **-** | **-** | **-** | **-** | **3** | **1.8** | **1.6** |

**Correlation: 3–Strong; 2–Medium; 1-Weak**

| AY: 2024-25 Onwards | J. B. Institute of Engineering and Technology (UGC Autonomous) | B. Tech ECM I Year-I Sem | | | |
|---|---|---|---|---|---|
| Course Code: | HUMAN VALUES AND PROFESSIONAL ETHICS (Common For All Branches) | L | T | P | D |
| Credits: **0** | | **2** | **0** | **0** | **0** |

**Pre-Requisites:**

1. Positive bent of mind.
2. Zeal to know the essence of human existence and Nature.
3. Interest to know the Scientific and philosophical approach for identification of 'I'.
4. Sensitivity towards social and environmental issues.

## Course Objectives:

The students should be able

1. To enable students, appreciate the essential complementarily between 'VALUES' and 'SKILLS'to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
2. To facilitate the development of a Holistic perspective among students towards life, profession and happiness, based on a correct understanding of the Human reality and the rest of existence. Such a holistic perspective forms the basis of Value based living in a natural way.
3. To highlight plausible implications of the above Holistic understanding in terms of ethical human conduct, trustful and mutually satisfying human behaviour and mutually enriching interaction with Nature.

## Module 1

**Course Introduction** - Need, Basic Guidelines, Content and Process for Value Education: Understanding the need, basic guidelines, content and process for Value Education. Self Exploration–what is it? - its content and process; 'Natural Acceptance' and Experiential Validation- as the mechanism for self exploration. Continuous Happiness and Prosperity- A look at basic Human Aspirations. Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario. Method to fulfill the above human aspirations: understanding and living in harmony at various levels.

## Module 2

**Understanding Harmony in the Human Being - Harmony in Myself!:** Understanding human being as a co-existence of the sentient 'I' and the material 'Body'. Understanding the needs of Self ('I') and 'Body' - Sukh and Suvidha. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer). Understanding the characteristics and activities of 'I' and harmony in 'I'. Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail. Programs to ensure Sanyam and Swasthya.

## Module 3

**Understanding Harmony in the Family and Society- Harmony in Human - Human Relationship :** Understanding harmony in the Family- the basic unit of human interaction. Understanding values in human-human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti; Trust (Vishwas) and Respect (Samman) as the foundational values of relationship. Understanding the meaning of Vishwas; Difference between intention and competence. Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in relationship. Understanding the harmony in the society (society being an extension of family): Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human Goals. Visualizing a universal harmonious order in society- Undivided Society (Akhand Samaj), Universal Order (Sarvabhaum Vyawastha )- from family to world family!.

## Module 4

**Understanding Harmony in the Nature and Existence - Whole existence as Co- existence:** Understanding the harmony in the Nature. Interconnectedness and mutual fulfilment among the four orders of nature-recyclability and self- regulation in nature. Understanding Existence as Co- existence (Sah-Astitva) of mutually interacting units in all-pervasive space. Holistic perception of harmony at all levels of existence.

## Module 5

**Implications of the above Holistic Understanding of Harmony on Professional Ethics:** Natural acceptance of human values. Definitiveness of Ethical Human Conduct. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order. Competence in professional ethics:

Ability to utilize the professional competence for augmenting universal human order, Ability to identify the scope and characteristics of people-friendly andeco- friendly production systems, Ability to identify and develop appropriate technologies and management patterns for above production systems.

Case studies of typical holistic technologies, management models and production systems. Strategy for transition from the present state to Universal Human Order: At the level of individual: as socially and ecologically responsible engineers, technologists and managers At the level of society: as mutually enriching institutions and organizations

## Text Books


1. R R Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and Professional Ethics.
2. Prof. KV Subba Raju, 2013, Success Secrets for EngineeringStudents, Smart Student Publications,3rd Edition.


## Reference Books


1. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and HarperCollins, USA
2. E.F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered, Blond & Briggs, Britain.
3. A Nagraj, 1998, Jeevan Vidya ek Parichay, Divya Path Sansthan, Amarkantak.
4. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991
5. PL Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Publishers.
6. A.N. Tripathy, 2003, Human Values, New Age International Publishers.
7. Subhas Palekar, 2000, How to practice Natural Farming, Pracheen(Vaidik) Krishi Tantra Shodh, Amravati.
8. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William
9. W. Behrens III, 1972, Limits to Growth – Club of Rome's report, Universe Books.
10. E G Seebauer & Robert L. Berry, 2000, Fundamentals of Ethics for Scientists & Engineers, Oxford University Press
11. M Govindrajran, S Natrajan & V.S. Senthil Kumar, Engineering Ethichs (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd.


## Relevant CDs, Movies, Documentaries & Other Literature:

1. Value Education website, http://www.uptu.ac.in
2. Story of Stuff, http://www.storyofstuff.com
3. Al Gore, An Inconvenient Truth, Paramount Classics, USA
4. Charlie Chaplin, Modern Times, United Artists, USA
5. IIT Delhi, Modern Technology – the Untold Story

**Course outcomes:**

At the end of the course, the student will be able to:

**CO1:** The students identify the importance of human values and skills for sustained happiness.

**CO2:** The students strike a balance between profession and personal happiness/goals.

**CO3:** The students realize/explain the significance of trust, mutually satisfying human behavior and enriching interaction with nature.

**CO4:** The students develop/propose appropriate technologies and management patterns to create harmony in professional and personal life.

**CO-PO/PSO Mapping**

| Course Outcomes | Program Outcomes (POs)/Program Specific Outcomes (PSOs) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
| **CO1** | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO2** | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO3** | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO4** | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO5** | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **Average** | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

**Correlation: 3–Strong; 2–Medium; 1-Weak**

| AY: 2024-25 Onwards | J. B. Institute of Engineering and Technology (UGC Autonomous) | B. Tech ECM I Year-II Sem | | | |
|---|---|---|---|---|---|
| Course Code: | **DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS (**COMMON TO: CE, EEE, ME, ECE, CSE, IT, ECM, CSE(DS), CSE(AIML), AIML, AIDS & MIE**)** | L | T | P | D |
| Credits: **4** | | **3** | **1** | **0** | **0** |

**Pre-Requisites:** Mathematical Knowledge at pre-university level

**Course Objectives:**

The students should be able

1. Methods of solving the differential equations of first and higher order.
2. Concept, properties of Laplace transforms
3. Solving ordinary differential equations using Laplace transforms techniques.
4. The physical quantities involved in engineering field related to vector valued functions
5. The basic properties of vector valued functions and their applications to line, surface and volume integrals

**Module 1: First Order, First Degree ODE and its Applications [10L]**

Differential equations of first order and first degree - Exact differential equation, Linear and Bernoulli differential equation, applications of differential equations of first order and first degree - Newton's law of cooling, Law of natural growth and decay, orthogonal trajectories.

**Module 2: Second and Higher order ODE with Constant Coefficients: [10L]**

Second order linear differential equations with constant coefficients: Solution of Homogenous, nonhomogeneous differential equations, non-Homogeneous terms of the type e^ax, sin(ax), cos (ax), polynomials in x^k, e^ax V(x), xV(x). Method of variation of parameters; Equations reducible to linear ODE with constant Coefficients: Euler-Cauchy equation, Legendre's equation

**Module 3: Laplace Transforms [10L]**

Laplace transforms, Existence condition, Laplace transform of Elementary functions, Properties of Laplace transforms (Without Proofs), Laplace transform of special functions (Unit step function, Dirac delta function and Periodic function). Inverse Laplace transform and its properties, Convolution theorem (without proof) and its applications, solving linear differential equations with constant coefficients using Laplace transform.

**Module 4: Vector differential calculus [9L]**

Scalar and vector fields, vector differentiation, level surfaces, gradient of a scalar field, directional derivative, divergence and curl of a vector field, Scalar potential energy, Tangent plane and normal line. Vector Identities (without proofs).

**Module 5**: **Vector integral calculus**: **[9L]**

Line, surface and volume integrals. Green's theorem in a plane, Gauss-Divergence theorem and Stokes theorem (without proofs).

**Text Books**


1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010
2. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5 th Edition, 2019.

**Reference Books**


1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002
3. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S Chand and Company Limited, New Delhi
4. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.


**E-Resources**

1. https://nptel.ac.in/courses/111108098
2. https://www.math.hkust.edu.hk/~machas/differential-equations.pdf
3. https://engineeringmath.online
4. https://www.cheric.org
5. https://www.whitman.edu/mathematics/calculus_online

**Course outcomes:**

At the end of the course, the student will be able to:

**CO1:** Identify whether the given differential equation of first order is exact or not.

**CO2:** Solve higher differential equation and apply the concept of differential equation to real world problems.

**CO3:** Use the Laplace transforms techniques for solving ODE's.

**CO4:** Evaluate the line, surface and volume integrals and converting them from one to another.

**CO-PO/PSO Mapping**

| Course Outcomes | Program Outcomes (POs)/Program Specific Outcomes (PSOs) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
| **CO1** | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO2** | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO3** | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO4** | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO5** | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **Average** | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

**Correlation: 3–Strong; 2–Medium; 1-Weak**

| AY: 2024-25 Onwards | J. B. Institute of Engineering and Technology (UGC Autonomous) | B. Tech ECM I Year-II Sem | | | |
|---|---|---|---|---|---|
| Course Code: | **APPLIED PHYSICS** (COMMON TO: CE, EEE, ME, ECE, CSE, IT, ECM, CSE(AIML), CSE(DS), AIDS, AIML, CSC) | L | T | P | D |
| Credits: **4** | | **3** | **1** | **0** | **0** |

**Pre-Requisites:** 10+2 Physics

**Course Objectives:**

The students should be able

1. Study the characteristics of lasers and optical fibres.
2. Understand the basic principles of quantum mechanics and band theory of solids.
3. Understand the underlying mechanism involved in construction and working principles of various semiconductor devices.
4. Study the fundamental concepts related to the dielectric, magnetic and energy materials.
5. Identify the importance of nanoscale, quantum confinement and various fabrications techniques.

**Module 1: LASERs and Optical fibers [10L]**

**Unit I: LASERs [5L]**

Introduction, Properties of laser beam- Monochromaticity, coherence, directionality and brightness; Einstein co-efficients, Population inversion, Types of Lasers: Ruby laser, He-Ne laser, Semiconductor laser, Applications of lasers.

**Unit II: Optical Fibers [5L]**

Introduction, Principle and construction of an optical fiber, Total Internal reflection, Acceptance angle, Numerical aperture, Types of optical fibers (Single mode, multimode, step index, graded index), losses in optical fibers, Optical fiber communication system with block diagram and Applications of optical fibres.

**Module 2: Fundamentals of Quantum Mechanics and Band theory of solids [10L]**

**Unit I: Fundamentals of Quantum Mechanics [6L]:**

Introduction to quantum physics, Black body radiation, Planck's radiation law, Photoelectric effect, de-Broglie hypothesis, Davisson and Germer's experiment, Concept of wave function, Heisenberg uncertainty principle, Time independent Schrödinger wave equation, Particle in one dimensional infinite potential well.

**Unit II: Band theory of solids: [4L]**

Free electron theory (Drude & Lorentz, Sommerfeld) (Qualitative), Bloch's theorem, Kronig-Penney model (Qualitative), E-K diagram, Effective mass of electron, Origin of energy bands- classification of solids.

**Module 3: Semiconductor Physics and Devices [9L]**

**Unit I: Semiconductor Physics [5L]**

Density of states, Intrinsic semiconductor, Intrinsic carrier concentration, Extrinsic semiconductors (Qualitative), Fermi level and its temperature dependence, Hall effect-Hall coefficient, Applications of Hall effect.

**Unit II: Semiconductor Devices [4L]**

Direct and indirect bandgap semiconductor, Formation of PN junction, Working of PN junction diode in forward and reverse bias, V-I Characteristics, Zener diode, LED, Photo diode and Solar cell, their structure, working principle and characteristics.

**Module 4: Dielectric, Energy and Magnetic materials [10L]**

**Unit I: Dielectric and Energy materials [5L]**

Introduction, Types of polarizations-electronic, ionic and orientation polarizations; Internal field and Clausius-Mossotti, Piezoelectricity, Pyroelectricity and Ferroelectricity and their applications. Energy

materials-Materials and electrolytes for super capacitors-Rechargeable ion batteries- Lithium ion and sodium ion batteries, solid fuel cells.

**Unit II: Magnetic materials [5L]**

Introduction, Origin of magnetic moment, Bohr magneton, Classification of dia, para and ferro magnetic materials on the basis of magnetic moment, Hysteresis curve based on domain theory, Soft and hard magnetic materials, Properties of antiferro and ferri magnetic materials.

**Module 5: Nanoscience and Characterization techniques [9L]**

**Unit I: Nanoscience [5L]**

Introduction of nanomaterials, Surface area to Volume ratio, Quantum confinement, Top-down fabrication: Ball milling and Chemical Vapor Deposition (CVD) methods, Bottom-up fabrication: Sol-Gel and Combustion methods.

**Unit II: Characterization techniques [4L]**

X-Ray Diffraction (XRD), Scanning Electron Microscope (SEM), Transmission Electron Microscope (TEM), Scanning Tunnelling Microscope (STM), Applications of nanomaterials.

**Text Books**


1. M.N. Avadhanulu and P.G. Kshirsagar, TVS Aruna Murthy "A Text Book Engineering Physics", S. Chand, 2019.
2. P. K. Palanisamy, "Engineering Physics", Scitech Publications.
3. Essentials of Nanoscience & Nanotechnology by Narasimha Reddy Katta, Typical Creatives NANO DIGEST, 1st Edition, 2021.
4. Wahab M A, 'Solid state physics-Structure and properties of materials' Narosa publication.
5. R.L.Singhal, " Solid state physics", KNRN publication.
6. Elementary Solid State Physics , S.L. Gupta and V. Kumar, pragati prakashan, 2019.
7. A.K. Bhandhopadhya-Nano materials, New age international, 1 st edition, 2007.


**Reference Books**


1. P. Bhattacharya, "Semiconductor Optoelectronic Devices", Prentice Hall of India (1997).
2. S.O. Pillai, "Solid State Physics", New Age International Publishers
3. J. Singh, "Semiconductor Optoelectronics", Physics and Technology, McGraw-Hill Inc. (1995).
4. Introduction to Solid State Physics, Charles Kittel, Wiley Eastern, 2019.


**E-Resources**

1. http://nptel.ac.in/courses/113104012/
2. http://www.springer.com/physics/journal/340 .
3. https://www.researchgate.net/publication/259574083 Lecture Notes on Engineering Physics
4. https://www.researchgate.net/publication/292607115_Applied Physics.

**Course outcomes:**

At the end of the course, the student will be able to:

**CO1:** Describe the working of various types of lasers and explain the fundamentals of fiber optics.

**CO2:** Apply Schrodinger time independent wave equation to show energy of a particle in 1D potential box is quantized.

**CO3:** Explain the working of p-n junction diode in forward bias and reverse bias.

**CO4:** Classify the magnetic materials into hard and soft magnetic materials based on hysteresis loop area.

**CO5:** Prepare nanomaterials for applications in various fields of engineering.

**CO-PO/PSO Mapping**

| Course Outcomes | Program Outcomes (POs)/Program Specific Outcomes (PSOs) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
| **CO1** | 2 | 2 | 1 | - | - | - | - | - | - | - | - | - | 1 | - |
| **CO2** | 3 | 1 | 2 | - | - | - | - | - | - | - | - | - | 1 | - |
| **CO3** | 2 | 1 | 2 | - | - | - | - | - | - | - | - | - | 1 | - |
| **CO4** | 2 | 2 | 1 | - | - | - | - | - | - | - | - | - | 1 | - |
| **CO5** | 2 | 2 | 1 | - | - | - | - | - | - | - | - | - | 2 | - |
| **Average** | - | - | - | - | - | - | - | - | - | - | - | - | | - |

**Correlation: 3–Strong; 2–Medium; 1-Weak**

| AY: 2024-25 Onwards | J. B. Institute of Engineering and Technology (UGC Autonomous) | B. Tech ECM I Year-II Sem | | | |
|---|---|---|---|---|---|
| Course Code: | BASIC ELECTRICAL ENGINEERING (COMMON TO: CSE, IT, ECE, ECM & EEE) | L | T | P | D |
| Credits: 3 | | 3 | 0 | 0 | 0 |

**Pre-Requisites:** Mathematics and Physics

## Course Objectives:

The students should be able

1. Apply Kirchhoff's laws to analyse complex DC circuits, demonstrating comprehension and application skills in electrical engineering.
2. Analyse the behaviour of AC circuits, showcasing evaluation skills in understanding electrical phenomena, including resonance.
3. Explain the principles of transformer operation and analyse their behaviour, applying concepts of electromagnetic induction.
4. Select and operate suitable DC motors and three-phase induction motors for various industrial applications, synthesizing motor principles effectively.
5. Demonstrate proficiency in basic electrical installations and the use of fundamental measurement instruments for practical electrical applications, ensuring strict adherence to safety protocols and standards.

## Module 1: Dc Circuits and Circuit Elements [10 L]

### Unit I: D.C Circuit Concepts and Circuit Elements

Voltage – current – power and energy – active and passive elements – voltage and current sources – source conversions – open circuit – short circuit – statement of Ohm's law - Kirchhoff's Laws – loop current method – node voltage method of solving the electrical network – resistance – laws of resistance – temperature coefficient of resistance – resistors in series and parallel – uses of resistor.

### Unit II: Energy Storing Elements

Inductor – inductance – V-I relation – power – energy stored in inductor – inductors in series and parallel – uses of Inductors – capacitor – capacitance – V-I relation – power – energy stored in capacitor – capacitor in series and parallel – uses of capacitor.

## Module 2: AC Circuits [10L]

### Unit I: Single Phase AC Circuits

Alternating quantity – cycle – time period – frequency – Amplitude – RMS – average value – form and peak factors – phase and phase difference – AC through R, L, C, RL, RC and RLC series circuits – resonance in series RLC circuit.

### Unit II: Three Phase AC Circuits

Phase sequence – three phase connections – relationship between line and phase value of voltage and current in star and delta connections – power in three phase circuit.

## Module 3: Static Electric Machine [8L]

### Unit I: Fundamentals Of Single-Phase Transformer

Single phase transformer – Principle – constructional details – parts – types (core and shell type) – equivalent circuit - EMF equation.

### Unit II: Transformer Performance and Applications

Losses – efficiency – regulation – applications.

## Module 4: DC and AC Machines [8L]

**Unit I: DC Motor**

D.C Motor – principle – constructional details – DC series – DC shunt motor – torque current and speed current characteristics – applications.

**Unit II: : Three-Phase Induction Motor**

Three-phase induction motor – principle – construction – generation of rotating magnetic field – torque slip characteristics..

## Module 5: Electrical Installations And Measuring Instruments [9 L]

**Unit I: Electrical Installations:**

Components of LT switchgear: Switch fuse unit (SFU) – MCB – MCCB – earthing.

**Unit II: Measuring Instruments:**

Construction – working principle of PMMC and MI type instruments – advantages – disadvantages – applications.

## Text Books


1. D.P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 4th Edition, 2019.
2. V.K. Mehta and Rohit Mehta, "Principles of Electrical Engineering and Electronics", S. Chand & Company Ltd, 2012.
3. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
4. A.K.Sawhney, "A course in Electrical and Electronics Measurements and Instrumentation", Dhanapath Rai and Sons., 10th Edition, 2007.


## Reference Books


1. Dr. Ramana Pilla, Dr. M. Suryakalavathi, "Basic Electrical Engineering", S. Chand & Company Ltd, 2018.
2. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989..


## E-Resources

1. https://onlinecourses.swayam2.ac.in/nou21_ee02/preview
2. https://nptel.ac.in/courses/108/108/108108076/
3. https://www.electrical4u.com

## Course outcomes:

At the end of the course, the student will be able to:

**CO1:** Analyse and solve complex DC circuits using Kirchhoff's laws.

**CO2:** Calculate and analyse the behaviour of single-phase and three-phase AC circuits, including resonance phenomena.

**CO3:** Understand the principles of operation and applications of transformers in electrical systems.

**CO4:** Expertise in the principles and applications of DC motors and three-phase induction motors, enabling them to select and operate suitable machines for various industrial purposes.

**CO5:** Develop foundational skills in basic electrical installations and using fundamental measurement instruments for practical electrical applications.

**CO-PO/PSO Mapping**

| Course Outcomes | Program Outcomes (POs)/Program Specific Outcomes (PSOs) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
| **CO1** | 3 | 3 | 3 | 2 | 1 | 1 | 1 | - | - | - | - | 1 | 2 | 1 |
| **CO2** | 3 | 3 | 3 | 2 | 1 | 1 | 1 | - | - | - | - | 1 | 2 | 1 |
| **CO3** | 3 | 3 | 3 | 2 | 1 | 1 | 1 | - | - | - | - | 1 | 2 | 1 |
| **CO4** | 3 | 3 | 3 | 2 | 1 | 1 | 1 | - | - | - | - | 1 | 2 | 1 |
| **CO5** | 3 | 3 | 3 | 2 | 1 | 1 | 1 | - | - | - | - | 1 | 2 | 1 |
| **Average** | - | - | - | - | - | - | - | - | - | - | - | - | | - |

**Correlation: 3–Strong; 2–Medium; 1-Weak**

| AY: 2024-25 Onwards | J. B. Institute of Engineering and Technology (UGC Autonomous) | B. Tech ECM I Year-II Sem | | | |
|---|---|---|---|---|---|
| Course Code: | BASIC ELECTRONICS ENGINEERING (COMMON TO: ECE, EEE and ECM) | L | T | P | D |
| Credits: 3 | | 3 | 0 | 0 | 0 |

**Pre-Requisites:** Applied Physics

**Course Objectives:**

The students should be able

1.
2.
3.
4.
5.

**Module 1**

**Unit I: Diodes:**

Diode - Static and Dynamic resistances, Equivalent circuit, Diffusion and Transition Capacitances

**Unit II:** P-N junction diode- Principle of operation and characteristics of a P-N junction diode V-I Characteristics, Diode as a switch- switching times..

**Module 2**

**Unit I: Diode Applications:**

Rectifier - Half Wave Rectifier, Full Wave Rectifier, Bridge Rectifier, Rectifiers with Capacitive and Inductive Filters

**Unit II:** Clippers-Clipping at two independent levels, Clamper-Clamping Circuit Theorem, Clamping Operation, Types of Clampers.

**Module 3**

**Unit I: Bipolar Junction Transistor (BJT):** Principle of Operation, Common Emitter, Common Base and Common Collector Configurations

**Unit II:** Current components of BJT, amplification factors. V-I characteristics, Transistor as a switch, switching times

**Module 4**

**Unit I: Junction Field Effect Transistor (FET):**

Construction, Principle of Operation, Pinch-Off Voltage, Volt- Ampere Characteristic, Determination of FET Parameters from the V-I characteristics.

**Unit II:**

Comparison of BJT and FET, FET as Voltage Variable Resistor, MOSFET -Construction & Operation in Enhancement and Depletion modes, MOSFET as a capacitor.

**Module 5**

Special Purpose Devices: Zener Diode - Characteristics, Zener diode as Voltage Regulator, Principle of Operation - SCR, Tunnel diode, UJT, Varactor Diode, Photo diode, Solar cell, LED, Schottky diode

**Text Books**

1. Jacob Millman - Electronic Devices and Circuits, McGraw Hill Education

2. Robert L. Boylestead, Louis Nashelsky- Electronic Devices and Circuits theory, 11th Edition, 2009, Pearson.

**Reference Books**

1. Horowitz -Electronic Devices and Circuits, David A. Bell – 5thEdition, Oxford.
2. Chinmoy Saha, Arindam Halder, Debaati Ganguly - Basic Electronics-Principles and Applications, Cambridge, 2018.

**Course outcomes:**

At the end of the course, the student will be able to:

**CO1:**
**CO2:**.
**CO3:**
**CO4:**
**CO5:**

**CO-PO/PSO Mapping**

| Course Outcomes | Program Outcomes (POs)/Program Specific Outcomes (PSOs) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
| **CO1** | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO2** | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO3** | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO4** | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO5** | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **Average** | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

**Correlation: 3–Strong; 2–Medium; 1-Weak**

| AY: 2024-25 Onwards | J. B. Institute of Engineering and Technology (UGC Autonomous) | B. Tech ECM I Year-II Sem | | | |
|---|---|---|---|---|---|
| Course Code: | PHYSICS LABORATORY (COMMON TO: All Branches) | L | T | P | D |
| Credits: 1 | | 0 | 0 | 2 | 0 |

**Pre-Requisites:** 10+2 Physics basic concepts

**List of Experiments:**

**1: Energy gap of P-N junction diode**

To determine the energy gap of a semiconductor diode.

**2. Solar Cell:**

To study the V-I Characteristics of solar cell.

**3. Light emitting diode and Laser Diode:**

Plot V-I characteristics of light emitting diode and Laser diode.

**4. Optical fiber:**

Determination of Numerical Aperture of an optical fibre.

**5. Hall effect:**

To determine Hall co-efficient of a given semiconductor.

**6. Photoelectric effect**

To determine work function of a given material.

**7. Dielectric Constant**

To determine the Dielectric constant of the given material.

**8. LCR Circuit**

To determine the Quality factor of LCR Circuit ( Series & Parallel).

**9. R-C Circuit**

To determine the time constant of R-C circuit (Growth and Decay).

**10.Melde's Experiment**

To determine the frequency of a vibrating bar or turning fork using Melde's arrangement.

**11. Torsional Pendulum**

To determine the rigidity modulus of the material of the given wire using torsional pendulum.

**12.Sonometer**

To determine the frequency of AC Supply sonometer.

**Note: Any 10 experiments are to be performed.**

**Text Books**


1. Dr. Narendra, L. Mathakari,"Experiments in Applied Physics" ( Physics Lab Manual 4thedition) ,
2. "Engineering Physics Lab Resources" by Department of Physics JBIET.


**Course outcomes:**

At the end of the course, the student will be able to:

**CO1:** Learn the experimental concepts on in LED, Electric and Electronic materials.

**CO2:** Get the knowledge of fundamentals of Semiconductor physics.

**CO3:** Design, characterization and study of properties of material help the students to prepare new

materials for various engineering applications.

**CO4:** Be exposed to the phenomena of waves, oscillations and optics.

**CO5:** Lasers and fiber optics enable the students to apply to various systems like communications, solar cell, photo cells and so on.

**CO-PO/PSO Mapping**

| Course Outcomes | Program Outcomes (POs)/Program Specific Outcomes (PSOs) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
| **CO1** | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO2** | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO3** | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO4** | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO5** | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **Average** | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

**Correlation: 3–Strong; 2–Medium; 1-Weak**

| AY: 2024-25 Onwards | J. B. Institute of Engineering and Technology (UGC Autonomous) | B. Tech ECM I Year-II Sem | | | |
|---|---|---|---|---|---|
| Course Code: | BASIC ELECTRICAL ENGINEERING LAB (COMMON TO: CSE, IT, ECE, ECM & EEE) | L | T | P | D |
| Credits: **1** | | **0** | **0** | **2** | **0** |

**Pre-Requisites:** Mathematics and Physics

## Course Objectives:

The students should be able

1. Proficiently apply fundamental electrical principles, including Ohm's Law and circuit analysis techniques, to determine the values of unknown resistances.
2. Demonstrate mastery in validating circuit behaviours through the application of Kirchhoff's Voltage Law and Kirchhoff's Current Law.
3. Showcase understanding of time-dependent behaviour in electrical components by investigating the transient responses of series RL and RC circuits to DC excitation.
4. Explore resonance phenomena in series RLC circuits, identifying the frequency at which impedance is minimized and current is maximized, thus exhibiting proficiency in frequency-domain analysis.
5. Equip students to evaluate the performance characteristics of DC shunt motors and single-phase transformers, enabling them to assess their suitability for specific applications in electrical systems.

## List of Experiments:

1. Verification of Ohms Law.
2. Determination of unknown resistance.
3. Verification of KVL and KCL.
4. Transient response of series RL and RC circuits using DC excitation.
5. Transient response of RLC series circuit using DC excitation.
6. Resonance in series RLC circuit.
7. Calculations and verification of impedance and current of RL, RC and RLC series circuits.
8. Measurement of voltage, current and real power in primary and secondary circuits of a single phase transformer.
9. Performance Characteristics of a DC Shunt Motor.
10. Load test on single phase transformer (Calculate Efficiency and Regulation).

## Course outcomes:

At the end of the course, the student will be able to:

**CO1:** Apply Ohm's Law and circuit analysis techniques to determine the value of unknown resistances, showcasing proficiency in fundamental electrical principles.

**CO2:** Validate principles of circuit behaviour using Kirchhoff's Voltage Law and Kirchhoff's Current Law.

**CO3:** Investigate the transient responses of series RL and RC circuits to DC excitation, demonstrating an understanding of time-dependent behaviour in electrical components.

**CO4:** Explore resonance phenomena in series RLC circuits, identifying the frequency at which impedance is minimized and current is maximized, showcasing proficiency in frequency-domain analysis.

**CO5:** Evaluate the performance characteristics of DC shunt motors and single-phase transformers, to assess their suitability for specific applications in electrical systems.

**CO-PO/PSO Mapping**

| Course Outcomes | Program Outcomes (POs)/Program Specific Outcomes (PSOs) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
| **CO1** | 3 | 3 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | - | - | 1 | 2 | 1 |
| **CO2** | 3 | 3 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | - | - | 1 | 2 | 1 |
| **CO3** | 3 | 3 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | - | - | 1 | 2 | 1 |
| **CO4** | 3 | 3 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | - | - | 1 | 2 | 1 |
| **CO5** | 3 | 3 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | - | - | 1 | 2 | 1 |
| **Average** | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

**Correlation: 3–Strong; 2–Medium; 1-Weak**

| AY: 2024-25 Onwards | J. B. Institute of Engineering and Technology (UGC Autonomous) | B. Tech ECM I Year-II Sem | | | |
|---|---|---|---|---|---|
| Course Code: | BASIC ELECTRONICS ENGINEERING LAB (COMMON TO: ECE, EEE and ECM) | L | T | P | D |
| Credits: **1** | | **0** | **0** | **2** | **0** |

**Pre-Requisites:** Applied Physics

## List of Experiments:

1. PN Junction diode characteristics A) Forward bias B) Reverse bias.
2. Study of Rectifier charecteristics with & without filters
3. Types of Clippers at different reference voltages
4. Types of Clampers at different reference voltages
5. Input and output characteristics of BJT in CB Configuration
6. Input and output characteristics of BJT in CE Configuration
7. Input and output characteristics of MOS FET in CS Configuration
8. Input and output characteristics of MOS FET in CD Configuration
9. Switching characteristics of a transistor
10. Zener diode characteristics and Zener as voltage Regulator
11. SCR Characteristics.
12. UJT Characteristics and identify negative region
13. Photo diode characteristics
14. Solar cell characteristics
15. LED Characteristics

    *Design a circuit to switch on and off LED using diode/BJT/FET as a switch.

**Major Equipment required for Laboratories:**

1. Regulated Power Suppliers, 0-30V
2. 20 MHz, Dual Channel Cathode Ray Oscilloscopes.
3. Functions Generators-Sine and Square wave signals
4. Multimeters, voltmeters and Ammeters
5. Electronic Components and devices

## Course outcomes:

At the end of the course, the student will be able to:

**CO1:**
**CO2:**
**CO3:**
**CO4:**
**CO5:**

**CO-PO/PSO Mapping**

| Course Outcomes | Program Outcomes (POs)/Program Specific Outcomes (PSOs) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
| **CO1** | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO2** | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO3** | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO4** | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **CO5** | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **Average** | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

**Correlation: 3–Strong; 2–Medium; 1-Weak**

| AY: 2024-25 Onwards | J. B. Institute of Engineering and Technology (UGC Autonomous) | B. Tech ECM I Year-II Sem | | | |
|---|---|---|---|---|---|
| Course Code: | ENGINEERING WORKSHOP AND DIGITAL FABRICATION PRACTICES (COMMON TO All) | L | T | P | D |
| Credits: **2.5** | | **1** | **0** | **4** | **0** |

**Pre-Requisites:** Basic knowledge about tools and different trades

## List of Experiments:

1. To make a Half Lap joint from the given Wooden pieces.
2. To make a Dovetail joint from the given Wooden pieces.
3. To make a Rectangular Scoop using the given Sheet metal.
4. To make a Hooper using the given Sheet metal.
5. To perform Parallel and Series wiring connection.
6. To perform Stair case wiring connection.
7. To make a Square rod from a given round rod.
8. To make a S- hook from a given round rod.
9. To prepare a sand mould for the given single piece pattern.
10. To prepare a sand mould for the given Split-piece pattern.
11. To make a Straight fitting from the given metal pieces.
12. To make a V- shape fitting from the given metal pieces

**Demonstration**

13. 3D Printing of modeled component by varying Layer thickness.
14. 3D Printing of modeled component by varying Orientation.
15. 3D Printing of modeled component by varying Infill.

## Text Books


1. K. C. John, “Mechanical Workshop Practice”, PHI Publishers, 2nd Edition,2010.
2. Ben Redwood, “The 3D Printing Handbook”, 3D HUBS, 2018.


## Course outcomes:

At the end of the course, the student will be able to:

**CO1:** Know the importance of general safety precautions on different shop floors.

**CO2:** Identify the basic tools and equipment used in fitting, carpentry, sheet metal, machine shop, welding and smithy.

**CO3:** Familiarize with the production of simple models in carpentry, sheet metal, machine, welding and smithy trades.

**CO4:** Gain the knowledge on different 3D Printing techniques.

**CO5:** Perform the printing of the different components using FDM 3D printer.

**CO-PO/PSO Mapping**

| Course Outcomes | Program Outcomes (POs)/Program Specific Outcomes (PSOs) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
| **CO1** | - | - | - | - | - | - | - | - | 2 | 2 | 2 | 3 | 3 | 3 |
| **CO2** | - | - | - | - | - | - | - | - | 2 | 2 | 2 | 3 | 3 | 1 |
| **CO3** | - | - | - | - | - | - | - | - | 2 | 2 | 2 | 3 | 3 | 3 |
| **CO4** | - | - | - | - | - | - | - | - | 2 | 2 | 2 | 3 | 3 | 3 |
| **CO5** | - | - | - | - | - | - | - | - | 2 | 2 | 2 | 3 | 3 | 2 |
| **Average** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **2** | **2** | **2** | **3** | **3** | **2.4** |

**Correlation: 3–Strong; 2–Medium; 1-Weak**

| AY: 2024-25 Onwards | J. B. Institute of Engineering and Technology (UGC Autonomous) | B. Tech ECM I Year-II Sem | | | |
|---|---|---|---|---|---|
| Course Code: | LINGUASKILL FOR PROFESSIONALS (COMMON TO: CSE, IT, ECM, ECE, EEE) | L | T | P | D |
| Credits: 0 | | 2 | 0 | 0 | 0 |

**Pre-Requisites:** Nil

**Course Objectives:**

The students should be able

1. Acquire an extensive range of vocabulary related to diverse topics.
2. Enhance pronunciation skills, focusing on specific sounds and intonation patterns
3. Improve the use of various grammar concepts
4. Strengthen listening, speaking, reading, and writing skills across different proficiency levels
5. Develop practical language skills for everyday communication scenarios.

**Module 1** **[6L]**

**Unit I:**

**Grammar:** Subject-Object, Present Tense

**Vocabulary:** Words about friendship, communication, work and technology

**Pronunciation:** Word stress, sentence stress

**Unit II:**

**Everyday English**: Opinions and suggestions

- **Listening:** Listening Activity 1, Listening Activity 2
- **Reading:** Reading Activity 1, Reading Activity 2
- **Speaking:** Speaking Activity 1, Speaking Activity 2

**Writing:** Guide, Email giving news

**Module 2** **[6L]**

**Unit I:**

**Grammar:** Modals, Phrases of ability, Articles, used to and usually

**Vocabulary:** Words about relationship and ability

**Pronunciation:** Linking sounds, Intonation in question tags

**Unit II:**

**Everyday English:** Telling a story; Offering and asking for help

- **Listening:** Listening Activity 1, Listening Activity 2
- **Reading:** Reading Activity 1, Reading Activity 2
- **Speaking:** Speaking Activity 1, Speaking Activity 2

**Writing:** About someone's life, online advertisement

**Module 3** **[6L]**

**Unit I:**

**Grammar:** Future forms, zero and first conditionals, comparatives and superlatives

**Vocabulary:** Words about the natural world, environmental issues and food

**Pronunciation:** Sound and spelling 'a', /ʃ/, /tʃ/

**Unit II:**

**Everyday English:** Giving reasons, results and examples; Asking and giving recommendations

- **Listening:** Listening Activity 1, Listening Activity 2
- **Reading:** Reading Activity 1, Reading Activity 2
- **Speaking:** Speaking Activity 1, Speaking Activity 2

**Writing:** Discussion essay, Review of a restaurant or café.

**Module 4** **[6L]**

**Unit I:**

**Grammar:** Quantifiers, Reported speech

**Vocabulary:** Words about buildings and sharing information

**Pronunciation:** Sounds /t//d//k//g//h//w/

**Unit II:**

**Everyday English:** Offers, request, permission; generalising and being vague

- **Listening:** Listening Activity 1, Listening Activity 2
- **Reading:** Reading Activity 1, Reading Activity 2
- **Speaking**: Speaking Activity 1, Speaking Activity 2

**Writing:** A note with useful information, an email summary of a news story.

**Module 5**: **[6L]**

**Unit I:**

**Grammar:** Passive, Relative clause, Second and third conditionals

**Vocabulary:** Words about music and sport; expressions with do, make and take

**Pronunciation:** -ed ending words, mostly confused words

**Unit II:**

**Everyday English:** Recommending, Discussing problems and reassuring

- **Listening:** Listening Activity 1, Listening Activity 2
- **Reading:** Reading Activity 1, Reading Activity 2
- **Speaking:** Speaking Activity 1, Speaking Activity 2

**Writing:** Article, Email with advice

**Text Books**

1. Doff, Adrian, et al. Empower Second Edition Student's Book with Digital Pack: B1+ Intermediate. Cambridge University Press, 2022.

**Reference Books**

1. Cullen, Pauline, et al. The Official Cambridge Guide to IELTS for Academic and General Training: Student's Book with Answers. with DVD-ROM. Cambridge Univ. Press, 2014.

**E-Resources**

1. Cambridge English
2. English with Cambridge - YouTube
3. BBC Learning English - Learn English with BBC Learning English - Homepage
4. https://englishonline.britishcouncil.org/

**Course outcomes:**

At the end of the course, the student will be able to:

**CO1:** Demonstrate a diverse vocabulary repertoire, facilitating better expression and comprehension.

**CO2:** Exhibit inteligible pronunciation skills, ensuring clearer oral communication.

**CO3:** Utilise various grammar concepts accurately and coherently.

**CO4:** Strengthened language skills across listening, speaking, reading, and writing.

**CO5:** Apply practical language skills effectively in everyday communication scenarios.

**CO-PO/PSO Mapping**

| Course Outcomes | Program Outcomes (POs)/Program Specific Outcomes (PSOs) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
| **CO1** | - | - | - | - | - | - | - | - | 2 | 2 | - | 3 | - | - |
| **CO2** | - | - | - | - | - | - | - | - | 2 | 2 | - | 3 | - | - |
| **CO3** | - | - | - | - | - | - | - | - | 2 | 2 | - | 3 | - | - |
| **CO4** | - | - | - | - | - | - | - | - | 2 | 2 | - | 3 | - | - |
| **CO5** | - | - | - | - | - | - | - | - | 2 | 2 | - | 3 | - | - |
| **Average** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **2** | **2** | **-** | **3** | **-** | **-** |

**Correlation: 3–Strong; 2–Medium; 1-Weak**