SAMARTH EDUCATIONAL TRUST
SAWKAR INSTITUTES
SATARA
Since 1989

AGCE


# GROUP-A

# SYLLABUS FIRST YEAR

## EXAMINATION SECTION

Syllabus and Course Structure of First Year B.Tech Engineering Programme at Arvind Gavali College of Engineering, Satara – Designed to nurture foundational knowledge, practical skills, and holistic development for future engineers

**ARVIND GAVALI COLLEGE OF ENGINEERING, SATARA.**

+91-9957100100
http.//www..agce.edu.in
Panmalewadi, Varye, Satara

SAMARTH EDUCATIONAL TRUST
ARVIND GAVALI COLLEGE OF ENGINEERING
ENGINEERING (B.Tech & M.Tech) BCA MCA B.VOC
NAAC & NBA Accredited AN AUTONOMOUS INSTITUTE ISO 9001:2015
Approved by AICTE, New Delhi, Recognised by Govt. Of Maha.,DTE Mumbai & Affiliated to
Dr.Babasaheb Ambedkar Technological University (BATU), Lonere.

Address : At.Panmalewadi, Post.-Varye, Tal.& Dist.-Satara.-415 015 (Maharashtra)
Phone : 02162 - 261122 , 200100
e-mail : agcenggsatara@gmail.com
Website :-www.agce.edu.in
Institute Code : Engg. DTE EN-6545
BCA 6545, MCA 6545, B.Voc 6545

Ref No.: Date :

**As per NEP Guidelines, Proposed Scheme of Credit Distribution**
**First Year B. Tech-2025-26(Common to all Branches)**
**SEMESTER I (Group A)**

| Sr. No. | Category | Course Code | Course Name | Teaching Scheme | | | | | Evaluation Scheme | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | Hrs./ Week | Cr | Components | Max | Min for Passing | |
| 1 | BSC | 25BSE1101 | Engineering Mathematics I | 3 | 1 | 0 | 4 | 4 | CA1 | 10 | | 40 |
| | | | | | | | | | MSE | 30 | | |
| | | | | | | | | | CA2 | 10 | | |
| | | | | | | | | | ESE | 50 | 20 | |
| 2 | BSC | 25BSE1002 | Engineering Chemistry | 3 | 0 | 0 | 3 | 3 | CA1 | 10 | | 40 |
| | | | | | | | | | MSE | 30 | | |
| | | | | | | | | | CA2 | 10 | | |
| | | | | | | | | | ESE | 50 | 20 | |
| 3 | ESC | 25BSE1102 | Basic Electrical & Electronics Engineering | 3 | 0 | 0 | 3 | 3 | CA1 | 10 | | 40 |
| | | | | | | | | | MSE | 30 | | |
| | | | | | | | | | CA2 | 10 | | |
| | | | | | | | | | ESE | 50 | 20 | |
| 4 | ESC | 25BSE1103 | C Programming for Problem Solving | 2 | 0 | 0 | 2 | 2 | CA1 | 10 | | 40 |
| | | | | | | | | | MSE | 30 | | |
| | | | | | | | | | CA2 | 10 | | |
| | | | | | | | | | ESE | 50 | 20 | |
| 5 | AEC | 25BSE1104 | Communication Skills | 2 | 0 | 0 | 2 | 2 | CA1 | 10 | | 40 |
| | | | | | | | | | MSE | 30 | | |
| | | | | | | | | | CA2 | 10 | | |
| | | | | | | | | | ESE | 50 | 20 | |
| 6 | BSC | 25BSE1001L/ 25BSE1002L | Engineering Physics Laboratory/ Modern Chemistry Laboratory | 0 | 0 | 2 | 2 | 1 | CA1 | 25 | | 20 |
| | | | | | | | | | CA2 | 25 | | |
| | | | | | | | | | OE | -- | -- | |
| 7 | ESC | 25BSE1102L | Basic Electrical & Electronics Engineering Laboratory | 0 | 0 | 2 | 2 | 1 | CA1 | 25 | | 40 |
| | | | | | | | | | CA2 | 25 | | |
| | | | | | | | | | OE | 50 | 20 | |
| 8 | ESC | 25BSE1103L | C Programming for Problem Solving Laboratory | 0 | 0 | 2 | 2 | 1 | CA1 | 25 | | 40 |
| | | | | | | | | | CA2 | 25 | | |
| | | | | | | | | | OE | 50 | 20 | |
| 9 | AEC | 25BSE1104L | Communication Skills Laboratory | 0 | 0 | 2 | 2 | 1 | CA1 | 25 | | 20 |
| | | | | | | | | | CA2 | 25 | | |
| | | | | | | | | | OE | -- | -- | |
| 10 | VSEC | 25BSE1105L | Engineering Practice Laboratory | 0 | 0 | 2 | 2 | 1 | CA1 | 25 | | 20 |
| | | | | | | | | | CA2 | 25 | | |
| | | | | | | | | | OE | -- | -- | |
| 11 | CC | 25BSE1106L | Yoga | 0 | 0 | 2 | 2 | 1 | CA1 | 25 | | 20 |
| | | | | | | | | | CA2 | 25 | | |
| | | | | | | | | | OE | -- | -- | |
| | | | **Total** | **13** | **1** | **12** | **26** | **20** | | **900** | | |
| **Total Contact Hours –26 Total Credits – 20** | | | | | | | | | | | | |

**As per NEP Guidelines, Proposed Scheme of Credit Distribution**
**First Year B. Tech-2025-26(Common for all Branches)**

**SEMESTER II (Group A)**

| Sr. No. | Category | Course Code | Course Name | Teaching Scheme | | | | | Evaluation Scheme | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | Hrs./ Week | Cr | Components | Max | Min for Passing | |
| 1 | BSC | 25BSE1201 | Engineering Mathematics II | 3 | 1 | 0 | 4 | 4 | CA1 | 10 | | 40 |
| | | | | | | | | | MSE | 30 | | |
| | | | | | | | | | CA2 | 10 | | |
| | | | | | | | | | ESE | 50 | 20 | |
| 2 | BSC | 25BSE1001 | Engineering Physics | 3 | 0 | 0 | 3 | 3 | CA1 | 10 | | 40 |
| | | | | | | | | | MSE | 30 | | |
| | | | | | | | | | CA2 | 10 | | |
| | | | | | | | | | ESE | 50 | 20 | |
| 3 | ESC | 25BSE1202 | Engineering Mechanics | 2 | 0 | 0 | 2 | 2 | CA1 | 10 | | 40 |
| | | | | | | | | | MSE | 30 | | |
| | | | | | | | | | CA2 | 10 | | |
| | | | | | | | | | ESE | 50 | 20 | |
| 4 | ESC | 25BSE1203 | Python Programming | 2 | 0 | 0 | 2 | 2 | CA1 | 25 | | 20 |
| | | | | | | | | | MSE | -- | | |
| | | | | | | | | | CA2 | 25 | | |
| | | | | | | | | | ESE | -- | -- | |
| 5 | VSEC | 25BSE1204 | Computer Aided Engineering Drawing | 2 | 0 | 0 | 2 | 2 | CA1 | 10 | | 40 |
| | | | | | | | | | MSE | 30 | | |
| | | | | | | | | | CA2 | 10 | | |
| | | | | | | | | | ESE | 50 | 20 | |
| 6 | PCC | 25PCC1201 | Introduction to Industry 4.0 | 2 | 0 | 0 | 2 | 2 | CA1 | 10 | | 40 |
| | | | | | | | | | MSE | 30 | | |
| | | | | | | | | | CA2 | 10 | | |
| | | | | | | | | | ESE | 50 | 20 | |
| 7 | IKS | 25BSE1205 | Energy, Ecology & Environment | 2 | 0 | 0 | 2 | 2 | CA1 | 25 | | 20 |
| | | | | | | | | | MSE | -- | | |
| | | | | | | | | | CA2 | 25 | | |
| | | | | | | | | | ESE | -- | -- | |
| 8 | BSC | 25BSE1001L/ 25BSE1002L | Engineering Physics Laboratory/ Modern Chemistry Laboratory | 0 | 0 | 2 | 2 | 1 | CA1 | 25 | | 20 |
| | | | | | | | | | CA2 | 25 | | |
| | | | | | | | | | OE | -- | -- | |
| 9 | ESC | 25BSE1203L | Python Programming Laboratory | 0 | 0 | 2 | 2 | 1 | CA1 | 25 | | 40 |
| | | | | | | | | | CA2 | 25 | | |
| | | | | | | | | | OE | 50 | 20 | |
| 10 | VSEC | 25BSE1204L | Computer Aided Engineering Drawing Laboratory | 0 | 0 | 2 | 2 | 1 | CA1 | 25 | | 20 |
| | | | | | | | | | CA2 | 25 | | |
| | | | | | | | | | OE | -- | -- | |
| 11 | VSEC | 25BSE1205L | Design Thinking | 0 | 0 | 2 | 2 | 1 | CA1 | 25 | | 20 |
| | | | | | | | | | CA2 | 25 | | |
| | | | | | | | | | OE | -- | -- | |
| 12 | CC | 25BSE1206L | Community Services | 0 | 0 | 2 | 2 | 1 | CA1 | 25 | | 20 |
| | | | | | | | | | CA2 | 25 | | |
| | | | | | | | | | OE | -- | -- | |
| | | | **Total** | **16** | **1** | **10** | **27** | **22** | | **900** | | |
| **Total Contact Hours –27 Total Credits - 22** | | | | | | | | | | | | |

| Title of the Course: Engineering Mathematics-I<br>Course Code: 25BSE1101 | L | T | P | Credit |
|---|---|---|---|---|
| | 3 | 1 | - | 4 |

**Course Prerequisite:** Basics of matrices, complex algebra, Indefinite and definite integrals, standard integration formulas.

**Course Description:**
In this course the students will learn linear algebra techniques, eigenvalues and eigenvectors with applications, complex numbers and hyperbolic functions, and the use of multiple integrals to solve real-world problems involving areas, volumes, and surface areas.

**Course Objectives:**
By the end of this course, the students will be able to:
1. To provide the knowledge of linear algebra for solving linear system equations
2. To calculate eigenvalues, eigenvectors and apply it to diagonalize a matrix.
3. To study the applications of De Moivre's theorem and elementary properties of hyperbolic functions.
4. To understand and estimate errors and approximations using Taylor's expansion.
5. To evaluate multiple integrals and their applications to area and volume.

**Course Outcomes:**

| CO | After the completion of the course the student should be able to |
|---|---|
| CO1 | Understand the nature of solutions and solve the system of linear homogeneous and non- homogeneous equations. |
| CO2 | Apply Cayley-Hamilton theorem to find inverse and higher powers of a matrix. |
| CO3 | Analyze the properties of complex numbers and their functions and find powers and roots of complex numbers by using De- Mover's theorem.. |
| CO4 | Evaluate the behavior of sequences and series using convergence tests and apply power series and Taylor/Maclaurin expansions for approximation and error analysis. |
| CO5 | Apply multiple integrals to evaluate areas and volumes of given regions. |

**CO-PO Mapping:**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | P011 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | | 2 | 1 | | | | | | 1 |
| CO2 | 3 | 2 | | 2 | | | | | | | 1 |
| CO3 | 3 | 2 | | 2 | | | | | | | 1 |
| CO4 | 3 | 2 | | 3 | | | | | | | 1 |
| CO5 | 3 | 2 | | 2 | | | | | | | 1 |

**Assessment Scheme:**
Two components of Continuous Assessment (CA-1, CA-2), Mid Semester Examination (MSE) and End Semester Examination (ESE) having 20%, 30% and 50% weightage respectively.

| Assessment Component | Marks |
|---|---|
| CA1 | 10 |
| MSE | 30 |
| CA2 | 10 |
| ESE | 50 |

**CA1** and **CA2** are based on Surprise test/ Assignment/ Quiz/Seminar/Group discussions presentation, etc.
**MSE** is based on 50% of course content.
**ESE** is based on 100% course content with 60-70% weightage for course content covered after MSE.

**Course Contents**

| Unit No. | Unit Title and Contents | Hours |
|---|---|---|
| 1 | **Matrices and Linear Systems of Equations**<br>Rank of a matrix (Echelon and Row-reduced Echelon Forms), Linear dependence and independence of vectors, Consistency of linear systems (homogeneous and non-homogeneous), Solution of systems of linear equations using matrix methods, Applications in circuit theory, mechanics, and engineering systems. | **7** |
| 2 | **Eigenvalues and Eigenvectors**<br>Eigenvalues and Eigenvectors: Definition, properties, and computation, Cayley-Hamilton Theorem (statement only), Application of Cayley-Hamilton to find inverse and powers of matrices, Diagonalization of matrices (conceptual overview), Applications in dynamic systems and stability analysis. | **9** |
| 3 | **Complex Numbers and Hyperbolic Functions**<br>Complex numbers in Cartesian and polar form, De Moivre's Theorem and its applications, Roots of complex numbers, Circular and hyperbolic functions: Definitions and inter-relations, Inverse hyperbolic functions, Functions of a complex variable (definition only), Separation of real and imaginary parts, Applications: AC circuits, wave phenomena. | **8** |
| 4 | **Sequences and Series**<br>Sequences and convergence, Infinite series, tests of convergence (comparison test, ratio test), Power series: Radius and interval of convergence, Taylor and Maclaurin series (with examples), Errors and approximations using Taylor’s expansion (first-order). | **7** |

| | | |
|---|---|---|
| 5 | **Multiple Integral**<br>Double integration in cartesian and polar co-ordinate, Evaluation of double integrals by changing the order of integration and changong to polar form, triple integral, Application of multiple integrals to find area as double integral, volume as triple integral and surface area. | **9** |

**Text Books**

| Sr. No. | Title | Author | Publisher |
|---|---|---|---|
| 1 | Engineering Mathematics | G.V. Kumbhojakar | C. Jamnadas and Co. |
| 2 | Higher Engineering Mathematics | Dr. B. S. Grewal | Khanna Publishers, Delhi |
| 3 | Engineering Mathematics (Vol-1) | H.K. Dass & Er. Rajnish Verma | S. Chand Publishing |
| 4 | A Text Book of Applied Mathematics Vol. I | P. N. Wartikar & J. N. Wartikar | Pune Vidyarthi Griha Prakashan, Pune |

**Reference Books**

| Sr. No. | Title | Author | Publisher |
|---|---|---|---|
| 1 | Advanced Engineering Mathematics | Erwin Kreyszig | John Willey & Sons |
| 2 | Advanced Engineering Mathematics | H. K. Dass | S. Chand & Company Pvt. Ltd, New Delhi |
| 3 | Higher Engineering Mathematics | B. S. Grewal | Laxmi Publications (P) Ltd., New Delhi |
| 4 | A Textbook of Engineering Mathematics | N.P. Bali and Manish Goyal | Laxmi Publications |
| 5 | Engineering Mathematics | B.V. Ramana | Tata McGraw-Hill Education |

| Title of the Course: Engineering Physics<br>Course Code: 25BSE1001 | L | T | P | Credit |
|---|---|---|---|---|
| | 3 | -- | - | 3 |

**Course Prerequisite:**

To ensure that the students can fully benefit from this course, they should have:

1. Basic knowledge of Intermediate level Physics and Mathematics
2. Familiarity with light behavior and optical phenomena.
3. To have fundamental knowledge of modern physics.

**Course Description:**

This course explores physics principles through an engineering lens, starting from wave optics and progressing through modern materials, quantum theory, and semiconductor devices. Each unit is carefully connected to develop scientific thinking and problem-solving for engineering applications.

**Course Objectives:**

By the end of this course, the students will be able to:

1. Introduce fundamental wave optics and its industrial applications.
2. Develop a basic understanding of laser and optical fiber technologies.
3. Provide foundational knowledge of quantum mechanics for nanoscale systems.
4. Understand crystal structure and X-ray applications in material science.
5. Classify solids on the basis of Band theory and to calculate carrier concentrations.

**Course Outcomes:**

| CO | After the completion of the course the student should be able to |
|---|---|
| CO1 | Understand the concepts of interference, diffraction and polarization in engineering measurements. |
| CO2 | Explain the working principles of laser and optical fiber technologies and their applications. |
| CO3 | Apply quantum mechanical concepts to solve basic physical models. |
| CO4 | Analyze crystal structures using X-ray diffraction principles. |
| CO5 | Assess band theory and semiconductor behavior for engineering applications in sensors and devices |

**CO-PO Mapping:**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | P011 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | | | 1 | | | | | | 1 |
| CO2 | 3 | 2 | 2 | | 2 | | | | | | 1 |
| CO3 | 3 | 3 | 1 | 1 | 2 | | | | | | 1 |
| CO4 | 3 | 2 | | 1 | 2 | | | | | | 1 |
| CO5 | 3 | 2 | 2 | 1 | 3 | 1 | 1 | | | | 1 |

**Assessment Scheme:**
Two components of Continuous Assessment (CA-1, CA-2), Mid Semester Examination (MSE) and End Semester Examination (ESE) having 20%, 30% and 50% weightage respectively.

| Assessment Component | Marks |
|---|---|
| CA1 | 10 |
| MSE | 30 |
| CA2 | 10 |
| ESE | 50 |

**CA1** and **CA2** are based on Assignment/ Surprise test/Quiz/Seminar/Group discussions/presentation, etc.

**MSE** is based on 50% of course content.

**ESE** is based on 100% course content with 60-70% weightage for course content covered after MSE.

**Course Contents**

| Unit No. | Unit Title and Contents | Hours |
|---|---|---|
| 1 | **Engineering Optics**<br>Introduction, Interference: conditions, thin film interference, wedge-shaped film, Newton's rings, Diffraction: single slit and diffraction grating, resolving power, Polarization: Polarization by reflection and refraction, double refraction, types of polarization, Optical Activity and Specific rotation, Applications: anti-reflection coatings, polarizers. | **08** |
| 2 | **Lasers and Optical Fiber**<br>Interaction of light with matter: Spontaneous and stimulated emission, Population inversion, Pumping (conceptual), Construction and working of: Ruby laser, Nd-YAG Laser, Semiconductor Laser (basic structure and operation), Engineering applications of Lasers, Fiber Optics: Total internal reflection, Numerical aperture, Types (step-index and graded-index), Applications in sensors and communication. | **08** |
| 3 | **Quantum Mechanics**<br>Limitations of classical mechanics; need for quantum theory, wave particle duality, de-Broglie hypothesis, Heisenberg's Uncertainty Principle(qualitative), Wave function: Physical significance, Probability interpretation Schrödinger Equation: Time-dependent form; Time-independent form (1D infinite potential well), Applications: Quantum tunneling (qualitative), Energy levels in quantum wells. | **08** |
| 4 | **Crystallography and X-Ray Diffraction**<br>Crystal structure basics: Unit cell, Lattice, Bravais lattices (SC, BCC, | **08** |

| | | |
|---|---|---|
| | FCC), Crystal systems, packing factor (qualitative), Miller indices, Crystallographic planes and directions, Interplanar spacing, X-ray production (characteristic and bremsstrahlung), Bragg's Law and Applications: Basics of material structure analysis. | |
| 5 | **Band Theory and Semiconductor Devices**<br>Energy bands in solids: Formation of bands and classification (metal, insulator, semiconductor), Fermi level (concept), Carrier concentration (intrinsic vs. extrinsic semiconductors), Electrical Conductivity in semiconductors, Hall Effect: Principle, Significance, Measurement of carrier type and concentration, Applications: Diodes, Photodetectors, Sensors (brief, illustrative). | **08** |

**Text Books**

| Sr. No. | Title | Author | Publisher |
|---|---|---|---|
| 1 | A textbook of Engineering Physics | M.N. Avadhanulu and P. G. Kshirsagar | S. Chand & Company Ltd., Delhi |
| 2 | Engineering Physics | Shailendra Sharma, Jyostna Sharma | Pearson Publications. |
| 3 | Engineering Physics | R.K. Gaur & S.L. Gupta | Dhanpat Rai Publications |

**Reference Books**

| Sr. No. | Title | Author | Publisher |
|---|---|---|---|
| 1 | Optics | Ajoy Ghatak | Tata McGraw-Hill Education |
| 2 | Engineering Physics | H K Malik\| A K Singh | McGraw Hill |
| 3 | Introduction to Quantum Mechanics | David J. Griffiths | Pearson Education |
| 4 | Introduction to Solid State Physics | Charles Kittel | Wiley |
| 5 | Applied Physics | P.K. Palanisamy | Scitech Publications (India) Pvt. Ltd. |

| Title of the Course: Modern Chemistry<br>Course Code: 25BSE1002 | L | T | P | Credit |
|---|---|---|---|---|
| | 3 | - | - | 3 |

**Course Prerequisite:**

The students should have knowledge about basic chemistry related to the periodic table, properties of elements, electrochemistry, properties of electromagnetic radiations, energy storage and energy conversion devices, physical and chemical properties of nanomaterials and advanced materials, etc.

**Course Description:**

This course intends to impart fundamental knowledge of advanced materials and applied knowledge of instrumental methods, energy conversion and storage devices, prevention techniques of corrosion. The students will be expected to communicate knowledge to society and industry.

**Course Objectives:**

By the end of this course, the students will be able to:

1. To introduce phenomenon involved in corrosion and corrosion control methods.
2. To provide and demonstrate chemistry concepts relevant to the technological field.
3. To understand the basic principles of electrochemistry and chemistry of different energy conversion devices such as batteries, fuel cells.
4. To train the students to effectively use knowledge of instrumental techniques & advanced materials and nanomaterials.
5. Design nanomaterials, and propose innovative engineering applications.

**Course Outcomes:**

| CO | After the completion of the course the students should be able to |
|---|---|
| **CO1** | Understand the concepts of corrosion and its prevention methods to select appropriate materials and techniques for enhancing the durability of engineering components. |
| **CO2** | Apply the concepts of chemistry to lay the ground work for subsequent studies in various engineering fields to examine fuel and suggest alternative fuels. |
| **CO3** | Analyze the principles of electrochemistry, fuel cell and battery technology to analyze and select suitable electrochemical systems for energy storage and conversion in industrial and engineering applications. |
| **CO4** | Evaluate the principles, working, advantages, limitations, and industrial applications of instrumental techniques to determine their effectiveness in qualitative and quantitative chemical analysis. |
| **CO5** | Create nanomaterials using appropriate top-down or bottom-up synthesis methods, review their structure through characterization techniques and propose innovative engineering applications. |

**CO-PO Mapping:**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | P011 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 1 | | | | | | | | |
| **CO2** | 3 | 2 | 1 | | 2 | | | | | | |
| **CO3** | 3 | 2 | | | | | | | | | |
| **CO4** | 3 | 2 | | | | | | | | | |
| **CO5** | 3 | 2 | | | | | 1 | | | | |

**Assessment Scheme:**
Two components of Continuous Assessment (CA-1, CA-2), Mid Semester Examination (MSE) and End Semester Examination (ESE) having 20%, 30% and 50% weightage respectively.

| Assessment Component | Marks |
|---|---|
| CA1 | 10 |
| MSE | 30 |
| CA2 | 10 |
| ESE | 50 |

**CA1** and **CA2** are based on Assignment/ Declared test/ Quiz/Seminar/Group discussions presentation, etc.
**MSE** is based on 50% of course content.
**ESE** is based on 100% course content with 60-70% weightage for course content covered after MSE.

**Course Contents**

| Unit No. | Unit Title and Contents | Hours |
|---|---|---|
| 1 | **Corrosion and Its Prevention**<br>Introduction, dry corrosion (corrosion due to oxygen and other gases), wet corrosion: electrochemical theory of corrosion (hydrogen evolution and oxygen absorption), differential metal corrosion, differential aeration corrosion: pitting corrosion and water line corrosion, stress corrosion, factors affecting rate of corrosion; Corrosion control: cathodic protection-Sacrificial anode and Impressed current method, Anodic protection- electroplating. | **08** |

| | | |
|---|---|---|
| 2 | **Chemical Fuel**<br>Introduction, classification, characteristics of good fuel, calorific value-definition, units, gross calorific value, net calorific value, Calculation of calorific value by Dulong's formula, Bomb calorimeter and Boy's calorimeter-basic instrumentation, working, Numericals. Petroleum- Introduction, refining, important petroleum products, Non - petroleum fuels. | **08** |
| 3 | **Electrochemistry, Fuel Cell & Battery Technology**<br>Introduction, cell potentials, electrolyte concentration cells, Nernst equation, reference electrodes, ion selective electrodes, glass electrode: pH measurement using glass electrode, applications of pH- metry.<br>Fuel Cell - Principle, components, classification of fuel cell, $H_2$-$O_2$ Fuel Cell.<br>Battery technology- Introduction, components of battery, Battery characteristics, Li-Ion battery: Principle, working and applications. | **08** |
| 4 | **Instrumental techniques**<br>Introduction to various analytical techniques such as qualitative and quantitative analysis, Ultraviolet-Visible Spectroscopy, spectrophotometer: instrumentation and working, numericals Lambert's and Beer - Lambert's Law, NMR Spectroscopy, Chromatography, numerical. advantages and disadvantages of instrumental methods. | **08** |
| 5 | **Nanomaterials and Characterization Techniques**<br>Introduction to Nanomaterials, Synthesis of Nanomaterials (Bottom up- self-assembly and Top down approaches using methods like Ball milling, Sol-gel Process, Chemical Vapour deposition (CVD), Characterization of Nanomaterials using Scanning Electron Microscopy (SEM), Graphene, Carbon Nanotubes, Applications of nanomaterial in engineering fields. | **08** |

**Text Books**

| Sr.No. | Title | Author | Publisher |
|---|---|---|---|
| 1 | A Textbook of Engineering Chemistry | S. S. Dara and S. S. Umare | S.Chand and Company Ltd.,New Delhi |
| 2 | A Textbook of Engineering Chemistry | Shashi Chawla | Dhanpat Rai & Co.(Pvt.) Ltd, Delhi |
| 3 | Engineering Chemistry | Godbole, Pendse, Joshi | Nirali publication, Pune |

| **Reference Books** | | | |
|---|---|---|---|
| **Sr. No.** | **Title** | **Author** | **Publisher** |
| 1 | Instrumental Methods of Chemical Analysis | Chatwal and Anand | Himalaya Publishing House, New Delhi |
| 2 | Engineering Chemistry | O. G. Palanna | Blackie Academic and Professional |
| 3 | Nanotechnology-Importance and Applications. | M. H. Fulekar | Wiley |

| Title of the Course: **Basic Electrical and Electronics Engineering**<br>**Course Code: 25BSE1102** | **L** | **T** | **P** | **Credit** |
|---|---|---|---|---|
| | **3** | **-** | **-** | **3** |

**Course Prerequisite:** Fundamental concepts of electrical engineering and semiconductor devices.

**Course Description:**

This course introduces the fundamental concepts of Electrical and Electronics Engineering to the students from all the branches of Engineering. It provides a strong foundation in basic electrical circuits, electrical machines, and electronic devices. The course begins with electrical circuit analysis, Ohm's law, Kirchhoff's laws, and introduces AC and DC systems. It further explores single-phase systems, transformers, and rotating machines like DC motors. The electronics part covers semiconductor devices such as diodes, transistors and electronic devices.

After completion of the course, the students will be able to understand the basic principles, analysis, and applications of key electrical and electronic systems used in engineering and everyday life.

**Course Objectives:**

By the end of this course, the students will be able to:

1. To impart knowledge about the fundamental concepts of electrical circuit laws and analysis methods.
2. To familiarize the students with the working principal of DC circuits and to analyze its working
3. To study performance characteristics and working of DC Motor & Transformer.
4. To familiarize the students with basic electronic components like diodes and circuits.
5. To understand various types of transistor and logic gates.

**Course Outcomes:**

| **CO** | **After the completion of the course the student should be able to** |
|---|---|
| **CO1** | Apply basic laws and theorems for electrical circuit analysis. |
| **CO2** | Interpret the behaviour of DC electrical circuits including series, parallel, and mixed configurations. |
| **CO3** | Explain the working principle of transformer and DC Motor. |
| **CO4** | Analyze the operation of semiconductor devices like diodes and transistors. |
| **CO5** | Demonstrate working of transistors and test digital logic circuit. |

**CO-PO Mapping:**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | P011 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | 1 | 1 | 1 | | | | 1 | |
| **CO2** | 3 | 2 | 1 | 1 | | | | | | 1 | |
| **CO3** | 3 | 2 | 2 | | | | | | | | |
| **CO4** | 3 | 3 | 2 | 2 | 2 | | | | | | |
| **CO5** | 2 | 2 | 2 | 1 | 1 | | | | 1 | | |

**Assessment Scheme:**

Two components of Continuous Assessment (CA-1, CA-2), Mid Semester Examination (MSE) and End Semester Examination (ESE) having 20%, 30% and 50% weightage respectively.

| Assessment Component | Marks |
|---|---|
| CA1 | 10 |
| MSE | 30 |
| CA2 | 10 |
| ESE | 50 |

**CA1** and **CA2** are based on Assignment/ Surprise Test/ Quiz/Seminar/Group Discussions Presentation, etc.

**MSE** is based on 50% of course content.

**ESE** is based on 100% course content with 60-70% weightage for course content covered after MSE

**Course Contents**

| Unit No. | Unit Title and Contents | Hours |
|---|---|---|
| 1 | **DC Circuit**<br>DC Electric Circuit: Kirchhoff's laws, Concept of constant voltage and current source, Analysis of series and parallel DC circuit with resistance and capacitance, Voltage rating, Power rating of resistive devices, DC circuit with R-C & R-L (Charging and discharging of capacitor, Time constant for RC & R-L circuit.), Numerical treatment on DC electric circuit | **08** |
| 2 | **AC Fundamentals**<br>Generation of Sinusoidal Voltage, Representation of Sinusoidal Waveforms, RMS value, Average value, Form factor, Peak factor, Phasor representation, Impedance of AC circuit, Powers- Active, Reactive & Apparent, Power Factor and its Significance, Analysis of single phase AC circuits consisting of R,L,C, R-L,R-C,R-L-C combinations (Series and Parallel) Resonance. Basic concept of Three phase circuits. | **08** |

| | | |
|---|---|---|
| 3 | **Single Phase Transformer and DC Motor**<br>Principle, Construction, Classifications, EMF equation, voltage ratio, current ratio, working at No Load & with Load, Losses in Transformer, Efficiency and Voltage Regulation, Applications. DC Motor: Basic principle of any electric motor, Construction and Working of DC motor, Types of DC motors and their Speed-Torque characteristics with applications. | **08** |
| 4 | **Diodes and Circuits:**<br>Diodes and Rectifiers: Review of PN junction diode, Review of Zener Diodes, Light-Emitting Diodes, Photo Diodes, Load-Line Analysis of diode, Types of Rectifiers (Half Wave & Full Wave), Equation for IDC, VDC, VRMS, I RMS, Efficiency and Ripple Factor for each configuration. Block diagram of RPS. | **08** |
| 5 | **Semiconductor Devices and Applications:**<br>**Transistors:** Introduction**,** Construction of BJT, type of biasing- fixed bias and self-bias circuit, BJT characteristics for CE, CB, CC configuration, α , β , Relationship between alpha (α) & beta (β), concept of gain and bandwidth, BJT as an Amplifier, BJT as switch.<br>**Introduction to Digital Electronics**: Number System, Logic Gates, Universal Gates, Boolean Postulates, De- Morgan's Theorem. | **08** |

**Text Books**

| Sr. No. | Title | Author | Publisher |
|---|---|---|---|
| 1 | Basic Electrical and Electronics Engineering | D.P. Kothari and I.J. Nagrath | McGraw Hill 4th Education, 2019 |
| 2 | Principles of Electrical Engineering and Electronics | V.K. Mehta and Rohit Mehta | S. Chand Publications., 2019 |
| 3 | Electrical Technology Vol-II | B.L. Theraja | S. Chand, 24th edition, 2024 |

**Reference Books**

| Sr. No. | Title | Author | Publisher |
|---|---|---|---|
| 1 | Fundamentals of Electrical Engineering and Electronics | J.B.Gupta | S.K. Kataria & Sons, 10th edition,2019 |
| 2 | Electronic Devices and Circuits 4th edition | David A.Bell | PHI, 2nd edition, 2015 |
| 3 | Basic Electrical and Electronics Engineering | R Muthusubramanian, S.S Salivahanan | TMH, 2nd edition 2024 |

| | | | |
|---|---|---|---|
| 4 | Basic Electrical and Electronics Engineering | S.K. Bhattacharya | Pearson Education, 10th edition, 2010 |
| 5 | Basic Electrical and Electronics Engineering | Ritu Sahdev | Khanna Publishing House., 2021 |
| 6 | Fundamentals of Electrical Engineering | Rajendra Prasad | PHI 3RD Edition |
| 7 | Fundamentals of Electrical Engineering | Charles A. Gross and Thaddeus A. Roppel | CRC press. |

| Title of the Course:<br>C Programming for Problem Solving<br>Course Code: 25BSE1103 | L | T | P | Credit |
|---|---|---|---|---|
| | 2 | - | - | 2 |

**Course Prerequisite:** Basic Understanding of Computers

**Course Description:**

This course provides a comprehensive introduction to the C programming language, focusing on foundational programming concepts and structured programming techniques. The students will learn how to write efficient, readable, and error-free C programs, with an emphasis on developing problem-solving skills through algorithm design and implementation.

The course covers core topics such as variables, data types, operators, control structures, functions, arrays, pointers, strings, structures, file handling, and dynamic memory management. Through hands-on lab sessions and assignments, the students will gain practical experience and be prepared to work on system-level software, embedded systems, and application development.

By the end of the course, the students will have a strong understanding of C programming fundamentals, enabling them to develop robust programs and transition to more advanced languages like C++ and Java.

**Course Objectives:**

By the end of this course, the students will be able to:

1. Understand the Fundamentals of C: Grasp the basic structure, syntax, and semantics of the C programming language.
2. Apply Programming Logic and Control Structures: Implement conditional statements, loops, and branching techniques to solve computational problems to prepare you to use the techniques, skills, and modern engineering tools necessary for engineering practice.
3. Use Functions for Modular Programming: Design and use user-defined and library functions to build modular, reusable, and organized code.
4. Work with Arrays and Strings: Handle one-dimensional and multi-dimensional arrays, and manipulate strings using both the built-in and user-defined methods.
5. Understand and Use Pointers Effectively: Apply pointers for direct memory access, dynamic memory allocation, and as function arguments.

**Course Outcomes:**

| CO | After the completion of the course the student should be able to |
|---|---|
| CO1 | Explain features of "C" programming language. |
| CO2 | Select "C" programming constructs for program writing. |
| CO3 | Develop programming solution for given problem. |
| CO4 | Implement programs using arrays, strings, and user-defined data types such as structures and unions. |

**CO-PO Mapping:**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | P011 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | 1 | | | 1 | 1 | | | | |
| **CO2** | 3 | 3 | 1 | 1 | | 1 | 1 | | | | |
| **CO3** | 1 | 3 | | 1 | | | | | | | |
| **CO4** | 3 | | | | 2 | | | | | | |

**Assessment Scheme:**

Two components of Continuous Assessment (CA1 & CA2), one Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weightage respectively.

| Assessment Component | Marks |
|---|---|
| CA1 | 10 |
| MSE | 30 |
| CA2 | 10 |
| ESE | 50 |

**Assessment Details:**

**CA1** and **CA2** are based on Surprise test/ Assignment/ Quiz/Seminar/Group discussions presentation, etc.

**MSE** is based on 50% of course content.

**ESE** is based on 100% course content with 60-70% weightage for course content covered after MSE.

**Course Contents**

| Unit No. | Unit Title and Contents | Hours |
|---|---|---|
| 1 | **Introduction to C**<br>Importance of programming, Algorithms, Flowchart, Pseudocode, Structure of C Program, Compilation and Execution, Data Types (user defined, pre-defined), Variables, Constants, Reading and printing variable values, Preprocessor Directive. | **07** |

| | | |
|---|---|---|
| 2 | **Operators and Control Flow**<br>Operators in C:<br>Arithmetic Operators, Relational Operators, Logical Operators, Unary Operators, Bitwise Operators, Ternary Operator, size of operator.<br>Control Flow:<br>Statements & Blocks, Decision Controls, If-else statements, Nested if-else, Switch Case, Loops (for loop, while loop, do-while loop), Loop interruption (break, continue, exit functions). | **07** |
| 3 | **Functions and Arrays**<br>Functions:<br>Fundamentals of function, Function declaration and prototype, Function definition, Function call, Return type and return statement.<br>Arrays:<br>Single Dimensional Array, Multi-Dimensional Array, Character Array, Strings, Built-in String functions (strcat, strcmp, strcpy, strlen). | **07** |
| 4 | **Pointers, Structures and File Handling**<br>Pointers:<br>Pointer variables, Pointer to functions, Pointer to array Structure:<br>Basics of structures File.<br>handling:<br>Defining and opening the file, Closing the file, Operations on file. | **07** |

**Text Books**

| Sr. No. | Title | Author | Publisher |
|---|---|---|---|
| 1 | The Complete Reference, 4th Edition | Herbert Schildt | McGraw Hill Education |
| 2 | The C Programming Language | E. Balagurusamy | McGraw Hill Education |
| 3 | C Programmer's Companion | R.S. Jone | Universities Press Pvt. Ltd. |
| 4 | Programming In C | Pradip Dey | Oxford University Press |

| Reference Books | | | |
|---|---|---|---|
| **Sr. No.** | **Title** | **Author** | **Publisher** |
| 1 | Let Us C | Yashavant Kanetkar | 17th Edition (2023) BPB Publications |
| 2 | Programming in ANSI C | E. Balagurusamy | 8th Edition (2019), McGraw Hill Education |
| 3 | Practical "C" Programming | Steve Oualline | Third Edition, Oreilly, 2013 |
| 4 | Introduction to C programming | Reema Thareja | Oxford University press (2nd edition),2015 |
| 5 | The C Puzzle book | Alan R. Feuer | Pearson,1999 |

| Certification Courses | | | | | |
|---|---|---|---|---|---|
| **Sr. No.** | **Course/ Certification** | **Provider/Platform** | **Level** | **Mode** | **Certification Authority** |
| 1 | Problem Solving Through Programming in C | https://onlinecourses.nptel.ac.in/noc23_cs53/preview | UG | Online | NPTEL |
| 2 | Introduction to Programming in C | https://onlinecourses.nptel.ac.in/noc25_cs119/preview | Beginner | Online | NPTEL |

| Title of the Course: Communication Skills<br>Course Code: 25BSE1104 | L | T | P | Credit |
|---|---|---|---|---|
| | 2 | - | - | 2 |

**Course Prerequisite:** English subject at HSC

**Course Description:**

The course intends to make learners understand and develop various communication skills required in day-to-day life as well as in professional contexts. As domain knowledge and skills have become equally important in today's technology-driven world, the current course and the one being offered in the Third Year will provide the learners a great opportunity to strengthen their English communication and soft skills. Keeping in mind the current competence of the learners, the course aims to provide them with revision and ample practice in the skills essential for their professional life. It includes four modules that cover basic concepts and theory of communication, business communication, verbal aptitude (English grammar), language learning skills, letter writing, and comprehension. In addition to Listening, Speaking, Reading, and Writing (LSRW) the course sees Thinking as an essential language learning skill.

**Course Objectives:**

By the end of this course, the students will be able to:

1. To understand the fundamentals of communication theory and its relevance in a professional context.
2. To apply the listening and reading comprehension skills.
3. To summarize the techniques to improve Spoken English and to provide the students with a platform for practicing these skills.
4. To prepare the students to write correct and effective business letters, official letters, and covering letters with resume, and to participate in Group Discussion (GD) and face the interviews.

**Course Outcomes:**

| CO | After the completion of the course, the students should be able to |
|---|---|
| CO1 | Demonstrate the communication process, methods of communication, and flow of Communication in a business context. |
| CO2 | Apply acquired LSRW skills in real-life situations and in a professional context. |
| CO3 | Compose effective business and cover letters using standard language, style, and structure. |
| CO4 | Apply the techniques for effective participation in GD and tips to face interviews successfully. |

**CO-PO Mapping:**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | P011 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | | | | | | | | 3 | | 1 |
| CO2 | | | | | | | 2 | 2 | 3 | | 1 |
| CO3 | | | | | | | 2 | | 3 | | 1 |
| CO4 | | | | | | | 2 | 2 | 3 | | 1 |

**Assessment Scheme:**
Two components of Continuous Assessment (CA1 & CA2), one Mid Semester Examination (MSE) and one End Semester Examination (ESE), have 20%, 30% and 50% weightage, respectively.

| Assessment Component | Marks |
|---|---|
| CA1 | 10 |
| MSE | 30 |
| CA2 | 10 |
| ESE | 50 |

**CA1** and **CA2** are based on the Assignment/ Surprise test/ Quiz/Seminar/Group discussions/ presentation, etc.
**MSE** is based on 50% of course content.
**ESE** is based on 100% course content with 60-70% weightage for course content covered after MSE.

**Course Contents**

| Unit No. | Unit Title and Contents | Hours |
|---|---|---|
| 1 | **Communication Theory**<br>Communication basics: Importance, process, levels, forms, methods: verbal and non-verbal, Barriers and solutions, Flow/channels of business communication (Internal, External, Vertical, Horizontal, Diagonal, Grapevine), Problems and Solutions. | **08** |
| 2 | **Enhancing Language Learning Skills (LSRW)**<br>**Effective listening**: Process and advantages of listening, poor listening habits, types of listening, strategies for effective listening, listening barriers<br>**Effective speaking**: Importance of telephonic conversation, various oral business contexts/situations, group communication, Preparing effective public communications<br>**Effective reading**: Importance, types, overcoming common obstacles, tips and strategies<br>**Effective Writing**: Mastering English Essentials and Fundamentals, paragraph and essay writing techniques, diary/blog writing Art of précis writing, Techniques to comprehend and summarize a given technical, scientific, or industry-oriented text<br>Thinking is intricately with the LSRW skills. | **08** |
| 3 | **Formal Business Correspondence**<br>Principles, structure (elements),Layout (complete block, modified block, semi-block), Types (enquiry and replies, claim and adjustment). | **06** |
| 4 | **Employability Skills**<br>Covering letter and resume, Group Discussion, Interviews (Online / Offline) Introduction to soft skills (Etiquettes, Team Work, Empathy, Problem Solving etc.) | **06** |

| Text Books | | | |
|---|---|---|---|
| **Sr.No.** | **Title** | **Author** | **Publisher** |
| 1 | Developing Communication Skills | Krishna Mohan<br>Meera Banerji | Macmillan Publishers India Ltd. |
| 2 | Communication Skills for Engineers and Scientists | Sangeeta Sharma<br>Binod Mishra | PHI Learning Private Limited. |

| Reference Books | | | |
|---|---|---|---|
| **Sr.No.** | **Title** | **Author** | **Publisher** |
| 1 | Professional Communication Skills | Er. A.K.Jain,<br>Dr.Pravin S.R.Bhatia,<br>Dr. A.M.Shaikh | S.Chand |
| 2 | Personality Development and Soft skills | Barun K.Mitra | Oxford University Press |
| 3 | Communication Skills for Engineers | Sunita Mishra<br>C.Muralikrishna | Pearson Education |
| 4 | Effective Technical Communication | M.Ashraf Rizvi | McGraw Hill Education Pvt.Ltd. |

| Title of the Course: Engineering Physics Laboratory<br>Course Code: 25BSE1001L | L | T | P | Credit |
|---|---|---|---|---|
| | - | - | 2 | 1 |

**Course Prerequisite:**

1. To calculate the least count of measuring instruments.
2. Ability to use standard measuring instruments and analyze data with fundamental mathematical tools.

**Course Description**:

This course offers hands-on experiments aligned with Engineering Physics theory. It reinforces concepts of wave optics, lasers, optical fibers, crystal structure, and semiconductor physics through experimental verification and measurements.

**Course Objectives:**

By the end of this course, the students will be able to:

1. To explore wave optics phenomena through laboratory demonstrations.
2. To understand characteristics and engineering applications of lasers and optical fibers.
3. To analyze crystal structure and semiconducting properties using models and instruments.
4. To enhance experimental design, data analysis, and interpretation.

**Course Outcomes:**

| CO | After the completion of the course the student should be able to |
|---|---|
| CO1 | Demonstrate different phenomenon of light and their applications. |
| CO2 | Demonstrate working of the optical fiber and determine its acceptance angle. |
| CO3 | Analyze crystal structure and electrical properties of semiconducting material and semiconducting device. |
| CO4 | Design, develop and demonstrate experimental set up and models for tools applicable in engineering. |
| CO5 | Interpret experimental observations to understand physical phenomena from solid-state physics. |

**CO-PO Mapping:**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | | | 3 | | | 2 | 1 | | 1 |
| **CO2** | 3 | 2 | | | 3 | | | 2 | 1 | | 1 |
| **CO3** | 3 | 2 | | | 3 | | | 2 | 1 | | 1 |
| **CO4** | 3 | 2 | 1 | | 3 | | | 2 | 1 | | 1 |
| **CO5** | 3 | 2 | | | 3 | | | 2 | 1 | | 1 |

**Assessment Scheme:**

Two components of in semester evaluation (CA1 and CA2) having 50% weightage each.

| Assessment Component | Marks |
|---|---|
| CA1 | 25 |
| CA2 | 25 |
| OE | - |

CA1 and CA2 are based on practical performance etc.

**Course Contents**

| Practical No. | List of Experiments | Hours |
|---|---|---|
| 1 | To determine the wavelength of prominent lines of mercury by plane diffraction grating. | **2** |
| 2 | To determine radius of curvature of Plano-convex lens and to determine wavelength of sodium light by newton's ring | **2** |
| 3 | To determine the wavelength of He-Ne Laser light using a diffraction grating. | **2** |
| 4 | To calculate the Numerical Aperture and acceptance angle of an optical fibre. | **2** |
| 5 | To determine Planck's constant and to verify inverse square law of radiation using photoelectric effect | **2** |
| 6 | To analyze the crystal structure from X-ray diffraction pattern using Bragg's Law. | **2** |
| 7 | Study of planes with the help of models related Miller Indices | **2** |

| | | |
|---|---|---|
| 8 | To determine the Hall coefficient and carrier concentration of a semiconductor. | **2** |
| 9 | To study forward and reverse bias I–V characteristics of a p–n junction diode. | **2** |
| 10 | To measure electrical conductivity of a semiconducting sample using the four-probe method. | **2** |
| 11 | To calculate the specific rotation of sugar solution using a polarimeter. | **2** |
| 12 | To determine Divergence of LASER beam and study directionality of LASER | **2** |

***Any 10 practicals /experiments to be conducted.**

| **Textbooks** | | | |
|---|---|---|---|
| **Sr. No.** | **Title** | **Author/s** | **Publisher** |
| 1 | An Advanced Course In practical physics | D. Chattopadhyay | New Central Book Agency(P) Ltd |
| 2 | Engineering Physics Laboratory Manual | Dr. A.S. Vasudeva | S. Chand |

| **Reference Books** | | | |
|---|---|---|---|
| **Sr. No.** | **Title** | **Author/s** | **Publisher** |
| 1 | Experiments in Engineering Physics | M.N. Avadhanulu, A.A. Dani, P.M. Pokley. | S. Chand & Company Ltd., Delhi |
| 2 | Engineering Physics Practical | S.P. Singh | Laxmi Publications |

| Title of the Course: Modern Chemistry Laboratory<br>Course Code: 25BSE1002L | L | T | P | Credit |
|---|---|---|---|---|
| | - | - | 2 | 1 |

**Course Prerequisite:**

The students should have basic knowledge about acid bases reactions apparatus and preparation of chemicals. The students should have basic knowledge about fundamental principles used in various analytical techniques.

**Course Description:**

The course intends to train the students to enhance experimental skills and apply fundamental chemical principles to solve chemistry related problems in engineering. The course provides experience to the students about qualitative and quantitative analysis of different samples using instrumental and non-instrumental techniques.

**Course Objectives:**

By the end of this course, the students will be able to:

1. To study the mechanism and estimation of corrosion rate of metals as well as corrosion preventative techniques.
2. To understand the various quality parameters of water using volumetric quantitative analysis.
3. To develop the ability to analyze electrochemical reactions.
4. To analyze the various analytical samples by using conductometer, potentiometer and spectrophotometer.

**Course Outcomes:**

| CO | After the completion of the course the student should be able to |
|---|---|
| CO1 | Recall the basic principles of corrosion processes and pH measurement techniques. |
| CO2 | Demonstrate an understanding of titrations and analytical procedures to determine chemical properties. |
| CO3 | Analyze electrochemical reactions and spectrophotometric data to evaluate material properties and solution behavior. |
| CO4 | Illustrate the operation of different instrumental and non-instrumental techniques for the analysis of various engineering materials. |
| CO5 | Design and synthesize nanoparticles using conventional and green chemistry methods. |

**CO-PO Mapping:**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | | | | | | | | | | 1 |
| **CO2** | 3 | | | | | | | | | | 1 |
| **CO3** | 3 | | | | | | | | | | 1 |
| **CO4** | 3 | | | | | | | | | | 1 |
| **CO5** | 3 | | | | | | | | | | 1 |

**Assessment Scheme:**

Two components of in Semester Evaluation (CA1 and CA2), having 50% weightage respectively.

| Assessment Component | Marks |
|---|---|
| CA1 | 25 |
| CA2 | 25 |
| OE | -- |

CA1 and CA2 are based on practical performance.

**Course Contents:**

| Practical No. | List of Experiments | Hours |
|---|---|---|
| 1 | Preparation of corrosive Medium & Determination of rate of corrosion of Aluminum metal. | **02** |
| 2 | Determination of pH of different type of water using pH meter. | **02** |
| 3 | Determination of Acid dissociation constant (pKa) of acetic acid by pH metric titration with NaOH solution. | **02** |
| 4 | Determination of total hardness of water sample by EDTA method (Complexometric Titration). | **02** |
| 5 | To determine calorific value of a fuel. | **02** |
| 6 | Estimation of strong acid and weak acid from given mixture by conductometric Titration. | **02** |
| 7 | Determination of cell potential of Galvanic cell (Zn /Cu cell) | **02** |
| 8 | Determine maximum wavelength of absorption-of a given inorganic coloured sample by colorimeter | **02** |
| 9 | Identification of basic radicals from given binary mixture of inorganic salts by paper chromatography. | **02** |

| | | |
|---|---|---|
| 10 | Synthesis of Iron Oxide Nanoparticles by co-precipitation method (Fe3O4) | **02** |
| 11 | Preparation of ZnO Nanoparticles -Based Sunscreen | **02** |
| 12 | Green Synthesis of Silver Nanoparticles Using Tulasi Extract | **02** |

***Any 10 practicals /experiments to be conducted.**

| **Reference Books** | | | | | |
|---|---|---|---|---|---|
| **Sr.No.** | **Title** | **Edition** | **Author/s** | **Publisher** | **Year** |
| 1 | Laboratory Manual of Engineering Chemistry | 3rd | S..K..Bhasin, Sudha Rani | Dhanpat Publishing Company | 2012 |
| 2 | Textbook of Engineering Chemistry with Lab Manual of Chemistry and Environmental Studies | 9th | Shashi Chawla | Dhanpat Publishing Company | 2013 |
| 3 | Engineering Chemistry Laboratory Manual | 3rd | Manoj Kumar Solanki | Educreation Publishing | 2019 |

| **Text Books** | | | | | |
|---|---|---|---|---|---|
| **Sr.No.** | **Title** | **Edition** | **Author/s** | **Publisher** | **Year** |
| 1 | Vogels Qualitative Inorganic Analysis | 7th | Michael Urban and Joel Murach | Murach's Publication, 2016. | 2012 |
| 2 | Instrumental Methods of Chemical Analysis | 5th | Dr.R.Nageswara Rao | Dreamtech Press, 1st Edition, 2016. | 2019 |

| Title of the Course: Basic Electrical & Electronics Engineering Laboratory<br>Course Code: 25BSE1102L | L | T | P | Credit |
|---|---|---|---|---|
| | - | - | 2 | 1 |

**Course Prerequisite:** Basic theoretical concepts of electrical circuits and semiconductor devices.

**Course Description:**
This laboratory course is designed to complement the theoretical concepts covered in the Basic Electrical and Electronics Engineering course. It introduces students to hands-on experimentation with fundamental electrical and electronic components, circuits, and instruments. The students will gain practical experience in circuit wiring, testing of semiconductor devices, and selection of appropriate logic gate for given applications.

**Course Objectives:**
1. To reinforce the theoretical knowledge of electrical and electronics engineering through experiments.
2. To familiarize students with electrical circuit components, measuring instruments, and wiring methods.
3. To develop skills in constructing and analyzing basic circuits and systems.
4. To understand the characteristics and applications of electrical machines and semiconductor devices.
5. To introduce the use of Logic Gates, Boolean algebra in engineering applications.

**Course Outcomes:**

| CO | After the completion of the course the student should be able to |
|---|---|
| CO1 | Demonstrate the use of safety electrical equipment. |
| CO2 | Identify the use DC motors and single-phase transformers in daily life. |
| CO3 | Verify Kirchhoff's law and determine voltage and current ratios of single-phase transformers through experiment. |
| CO4 | Analyze the performance of rectifiers, filters circuits |
| CO5 | Understand the logic gates with their truth tables and verify Demorgan's theorem |

**CO-PO Mapping:**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | 1 | 1 | 1 | 3 | | | 1 | 1 | |
| CO2 | 2 | 1 | 2 | | | 2 | | | | | |
| CO3 | 3 | 3 | 2 | 2 | | | | | | 1 | |
| CO4 | 3 | 3 | 2 | 2 | 2 | | | | | | |
| CO5 | 2 | 2 | 2 | 1 | 2 | | | | 1 | | |

**Assessment Scheme:**

Two components of in Semester Evaluation (CA1 and CA2), having 50% weightage of course contents and OE is having 50 % weightage of total course contents which is based on practical performance, presenty and oral discussion.

| Assessment Component | Marks |
|---|---|
| CA1 | 25 |
| CA2 | 25 |
| OE | 50 |

**Course Content**

| Practical No. | List of Experiment | Hours |
|---|---|---|
| 1 | Determine frequency, time period, peak value, rms value, peak factor of a Sinusoidal ac waveform on CRO/DSO | **2** |
| 2 | Identify switches , fuse, switch fuse and fuse switch, MCB, MCCB | **2** |
| 3 | Study and verify Kirchhoff's current and voltage law. | **2** |
| 4 | Determine current and voltage ratio of single phase transformers. | **2** |
| 5 | Load test on DC shunt/ compound motor. | **2** |
| 6 | Speed Control of the DC Shunt Motor using Three point starter. | **2** |
| 7 | Study of Half Wave Rectifier (HWR) with & without filter. | **2** |
| 8 | Study of Full Wave Rectifier (FWR) with & without filter | **2** |
| 9 | Study of output characteristics of transistors. | **2** |
| 10 | Verify Truth Table of Logic Gates (AND, OR, NOT, NAND & NOR Gates). | **2** |
| 11 | Design Basic Gates Using NOR/ NAND gates. | **2** |
| 12 | Verify Demorgan's theorem. | **2** |

| Textbooks/Software | | | |
|---|---|---|---|
| **Sr. No.** | **Title** | **Author** | **Publisher** |
| 1 | Basic Electronics | B.L. Theraja | S. Chand |
| 2 | Principles of Electrical and Electronics Engineering | V.K. Mehta & Rohit Mehta | S. Chand |
| 3 | Electronic Devices and Circuits | Millman and Halkias | McGraw Hill Education. |

| Reference Books | | | |
|---|---|---|---|
| **Sr.No.** | **Title** | **Author** | **Publisher** |
| 1 | Basic Electrical and Electronics Engineering | D.P. Kothari and I.J. Nagrath | McGraw Hill Education |
| 2 | A Course in Electrical and Electronic Measurements and Instrumentation | J.B.Gupta | S.K. Kataria & Sons. |
| 3 | Electronic Devices and Circuits | Millman and Halkias | McGraw Hill Education. |
| 4 | Electronics Lab Manual (Volume I and II) | K. A. Navas | Rajath Publishers. |
| 5 | Basic Electrical and Electronics Engineering | S.K. Bhattacharya | Pearson Edition |
| 6 | Basic Electrical and Electronics Engineering | Ritu Sahdev | Khanna Publisher |

| Title of the Course:<br>C Programming for Problem Solving Laboratory<br>Course Code: 25BSE1103L | L | T | P | Credit |
|---|---|---|---|---|
| | -- | -- | 2 | 1 |

**Course Prerequisite:** Basic understanding of computers and logic building.

**Course Description:**

This laboratory course provides hands-on experience in solving engineering and real-life problems using the C programming language. It is designed to complement the theoretical foundations of C programming by engaging the students in implementing structured, modular, and efficient code. The students will learn to apply programming constructs such as variables, data types, control structures, functions, arrays, strings, pointers, and dynamic memory management through practical problem- solving. The course also focuses on debugging, compiling, and testing C programs using modern development tools and IDEs. Emphasis is placed on developing logical thinking, structured programming habits, and effective algorithmic approaches to real-world computational problems.

**Course Objectives:**

By the end of this course, the students will be able to:

1. To familiarize students with the syntax and semantics of C programming language.
2. To develop the ability to write programs using fundamental programming constructs.
3. To implement modular programming and memory management using pointers.
4. To enhance logical reasoning and problem-solving abilities.
5. To prepare students to use C programming in engineering applications and further Programming courses.

**Course Outcomes:**

| CO | After the completion of the course the student should be able to |
|---|---|
| CO1 | Explain 'C' Language Constructs |
| CO2 | Select Constructs of 'C' to develop programming solution |
| CO3 | Use Memory Management techniques for dynamic memory management |
| CO4 | Develop “C” program to solve problem |
| CO5 | Create a C program to implement modular programming and memory management using pointers. |

**CO-PO Mapping:**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | P011 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | | 1 | 1 | | | | 1 | | | |
| **CO2** | 3 | 1 | 2 | 2 | 1 | | | 1 | | | |
| **CO3** | 3 | 1 | 2 | 2 | 2 | | | 1 | | | |
| **CO4** | 3 | 2 | 3 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 2 |
| **CO5** | 1 | 2 | 2 | 1 | 1 | | | | 2 | 2 | 2 |

**Assessment Scheme:**
Two components of in Semester Evaluation (CA1 and CA2), having 50% weightage respectively.

| Assessment Component | Marks |
|---|---|
| CA1 | 25 |
| CA2 | 25 |
| OE | 50 |

**CA1** OE based on 50% of course content, attendance, lab overall performance.

**CA2** OE based on 100% of course content, attendance, lab overall performance.

Intent of this laboratory is to build the logic development and problem-solving skills of students and build proficiency and competency in C language. For this purpose, a sample list of assignments is grouped into Group A, Group B and Group C with increasing levels of difficulty and understanding.

**Group A assignments** are based on real life problems using language constructs such as constant, variable, data type, operator, array, string, expressions, decision, iteration etc.

**Group B assignments** are based on the applications of language constructs and combination of language constructs, control structures, String, Arrays, Pointers, Structures, Functions.

**Group C assignments** are a little more challenging. Assignments will be open ended which can either be a mini project or simulation of real-life problems/scenarios/applications. It can also include

Debugging and Feature enhancement / Alternative solution/ testing / Code-refactoring of given problem statements or analyze the given code and comment on the output.

Instructors can conduct a total of 10 assignments, six from Group A, three from Group B, one from Group C. Other assignments can be considered as extra assignments.

Suggestive List of Assignments

**Assignment 0:** Get acquainted with Windows/Linux Platform, C environment, structure of

basic C program, compilation, debugging and execution of C program.

Group A - Language constructs

For Group A problem statements, students should draw flowchart/ algorithm/ pseudo code and convert it into a C program. Problems are based on constructs such as concepts of constant, variable, data type, operator and expressions, arrays, strings, iteration, decision making and others.

| Practical No. | Practical Title and Contents | Hours |
|---|---|---|
| 1 | To Study Basic Linux commands used for programming:<br>i. Hands on Basic Linux Commands.<br>ii. Command Line based compilation and execution of program. | **2** |
| 2 | Convert measurement units such as feet to inches, inches to centimeters, Kilograms to grams, Dollar to Rupees, temperature conversion Degree to Fahrenheit, days into years, weeks and days. | **2** |
| 3 | Number conversion (decimal to binary, binary to decimal, binary to octal, octal to binary). | **2** |
| 4 | i) Find the maximum/minimum of given numbers.<br>ii) Obtain the first 25 numbers of a Fibonacci sequence/prime numbers with and without recursion etc. | **2** |
| 5 | Search the data from an array of numbers/ characters/ string. | **2** |
| 6 | Calculate the total number of characters in the string and the total number of vowels in the string with the number of occurrences in the string. | **2** |
| 7 | Swap two data elements using pass by value, pass by reference and without using a third variable. | **2** |
| 8 | Operations on matrices. | **2** |

**Applications of Language Constructs**

Group B problem statements address the applications of language constructs such as Loops for iteration, Arrays, Strings, Structures, and Functions for modularity wherever required. They should implement the application using a function (call by reference/ call by value) wherever appropriate. Problems are based on real life applications/ scenarios.

| Practical No. | Practical Title and Contents | Hours |
|---|---|---|
| 1 | Perform employee operations such as accept, display, search by name, and search by number, update a record. Explore the possibility of modularity for implementation. | **2** |

| | | |
|---|---|---|
| 2 | For a class an examination is conducted and the results for the students of all the 5 subjects are recorded. Write a C program to display the record of students. On the basis of the record compute:<br>i. The average score of class<br>Highest score and lowest score of class. | **2** |
| 3 | Create a structure to specify data of customers in a bank. The data to be stored is: Account number, Name, Balance in account. Assume a maximum of 200 customers in the bank. Write a C program to display details of customers. | **2** |
| 4 | Write a C program that simulates an ATM machine. The user should be able to choose an operation such as balance inquiry, deposit, withdrawal, or exit using a switch-case structure. Within each operation, use if-else statements to check conditions such as sufficient balance for withdrawal or valid deposit amount. | **2** |

Group C

Group C problem statements address big real-life problem solving. Students are expected to apply the learnt concepts to solve these problems. Students should choose any one of the following: -

| Practical No. | Practical Title and Contents | Hours |
|---|---|---|
| 1 | **Micro Project –**<br>Students should implement a micro project which simulates real life problems/scenarios/applications. They are expected to make use of the appropriate constructs of C language. | **2** |
| 2 | **Game -**<br>Students should develop a game which simulates real life problems/scenarios/applications. They are expected to make use of the appropriate constructs of C language. | **2** |

**Textbooks**

| Sr. No. | Title | Edition | Author/s | Publisher |
|---|---|---|---|---|
| 1 | The Complete Reference | Fourth | Herbert Schildt | McGraw-Hill Education, |
| 2 | The C Programming Language | Eighth | E. Balagurusamy | McGraw Hill Education |
| 3 | C Programmer's Companion | First Edition | R.S. Jones | Universities Press Pvt. Ltd. |

| Reference Books | | | | |
|---|---|---|---|---|
| **Sr. No.** | **Title** | **Edition** | **Author/s** | **Publisher** |
| 1 | C"Programmg Language | Second Edition | Brian Kernighan, Dennis Ritchie | PHI Learning |
| 2 | Practical "C" Programmig | Third | Steve Oualline | McGraw Hill Education |
| 3 | Programming in ANSI C | Eight Edition | E.Balagurusamy | McGraw Hill Education, |

| Title of the Course: Communication Skills Laboratory<br>Course Code: 25BSE1104L | L | T | P | Credit |
|---|---|---|---|---|
| | - | - | 2 | 1 |

**Course Prerequisite:** English subject at HSC, Communication Skills Theory

**Course Description**:
This is a practice-oriented course, laying importance on application of various skills being learnt in the Communication Skills theory course such as grammar, techniques and strategies for improving English sub-skills and vocabulary, etc. In addition, this course focuses on English speaking, reading, writing skills, effective presentation and building confidence.

**Course Objectives:**
By the end of this course, the students will be able to:
1. To exhibit confident and effective communication skills in presentations, group discussions, and role-plays.
2. To design clear, concise, and persuasive messages in written and oral formats, applying principles of effective communication.
3. To analyze the students' own communication strengths and weaknesses, identifying areas for improvement.
4. To deliver engaging presentations, incorporating visual aids and effective delivery techniques.
5. To assess the effectiveness of communication strategies, providing constructive feedback and suggestions for improvement.

**Course Outcomes:**

| CO | After completion of the course, the students should be able to |
|---|---|
| CO1 | Demonstrate confidence in public speaking, group discussions, and other communication settings. |
| CO2 | Create engaging and informative content for presentations, reports, and other written assignments. |
| CO3 | Use nonverbal communication effectively, including body language, tone of voice, and facial expressions. |
| CO4 | Practice active listening skills, including paraphrasing, summarizing, and asking clarifying questions. |
| CO5 | Adapt their communication style to different audiences, purposes, and contexts, demonstrating flexibility and effectiveness. |

**CO-PO Mapping:**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | | | | | | | 2 | 3 | | 1 |
| CO2 | | | | | | | | 2 | 3 | | 2 |
| CO3 | | | | | | | 2 | | 3 | | 2 |
| CO4 | | | | | | | 2 | 2 | 3 | | 2 |
| CO5 | | | | | | | 2 | | 3 | | 1 |

**Assessment Scheme:**
Two components of Continuous Assessment (CA1 and CA2), having 50% weightage respectively.

| Assessment Component | Marks |
|---|---|
| CA1 | 25 |
| CA2 | 25 |
| OE | -- |

CA1 and CA2 are based on the performance of the practicals

**Course Contents**

| Practical No. | Practical Title and Contents | Hours |
|---|---|---|
| 1 | **Icebreaking: Introducing yourself and others**<br>Adjectives, phrases and clauses to describe yourself and others Introducing yourself and others demonstration. | **2** |
| 2 | **Introduction to English Building Blocks -1**<br>Grammar fundamentals: parts of speech, tenses, prepositions, articles, modals, Vocabulary building: synonyms, antonyms, prefixes/suffixes, idioms, phrases. | **2** |
| 3 | **Verbal Aptitude1(Discussion on applications of grammar)**<br>Using proper tenses, correct use of articles, conjunctions and prepositions. | **2** |
| 4 | **Verbal Aptitude 2(Watching videos and solving grammar exercises)**<br>Using proper tenses, correct use of articles, conjunctions and prepositions. | **2** |
| 5 | **Listening practice**<br>Listening comprehension, Strategies for effective listening with audio/ video samples. | **2** |
| 6 | **Speaking practice-1**<br>Video samples of effective and ineffective public speeches, Extempore(JAM), prepared speeches. | **2** |
| 7 | **Speaking practice-2**<br>Prepared speeches. | **2** |
| 8 | **Group Discussion-1**<br>Group discussion tips, Dos and Don'ts, video samples<br>Mock GD-1analysis and comments on individual performances. | **2** |
| 9 | **Group Discussion-2**<br>Final GD participation. | **2** |

| | | |
|---|---|---|
| 10 | **Interview1**<br>Discussing interview FAQs in detail, video samples. | **2** |
| 11 | **Interview2**<br>Mock interviews (prepared and formal). | **2** |
| 12 | **Incident Narration or Storytelling**<br>Practicing narration methods and techniques for effective narration. | **2** |

***Any 10 practicals to be conducted.**

| **Reference Books** | | | | | |
|---|---|---|---|---|---|
| **Sr.No.** | **Title** | **Edition** | **Author/s** | **Publisher** | **Year** |
| 1 | Better English Pronunciation | Second | J.D. O'Connor | OUP | 1980 |
| 2 | A Practical Course in Spoken English | First | J.K. Gangaj | PHI Learning Pvt. Ltd | 2014 |
| 3 | English Language Laboratories | Second | Nira Konar | PHI Learning | 2014 |

| **Software** |
|---|
| Orell Talk Digital Language Lab Software – Professional Version with 1+50 users' subscription. |

| Title of the Course: Engineering Practice Lab<br>Course Code: 25BSE1105L | L | T | P | Credit |
|---|---|---|---|---|
| | - | -- | 2 | 1 |

**Course Prerequisite:** Basic engineering drawing, equipment's and safety rules.

**Course Description:** The Engineering Practice Lab course is designed to provide first-year engineering students with hands-on experience and fundamental knowledge of various manufacturing practices, tools, and machining processes. The course introduces students to basic fabrication methods, enabling them to understand the practical aspects of engineering, materials, and processes used in industry.

Students will engage in practical sessions involving fitting, carpentry, welding, sheet metal work, plumbing, plastic injection, metal forming, and machining. Emphasis is placed on safety protocols, tool handling, measurement techniques, and the working principles of workshop machines and tools. This course lays the foundation for core mechanical and manufacturing subjects in later semesters.

**Course Objectives:**

By the end of this course, the students will be able to:

1. To familiarize students with basic manufacturing techniques and tools.
2. To develop manual skills and technical understanding of fabrication processes.
3. To encourage safe workshop practices and working discipline.
4. To prepare students for real-world engineering tasks requiring practical knowledge.

**Course Outcomes:**

| CO | After the completion of the course the student should be able to |
|---|---|
| CO1 | Understand the work culture, how to use tools and safety in the workshop. |
| CO2 | Practice on manufacturing of components using workshop trades including fitting, carpentry, sheet metal working, metal forming, and welding. |
| CO3 | Demonstrate practical skills in household wiring, electronic circuit assembly, soldering, and testing of electrical and electronic components through hands-on experiments. |
| CO4 | Acquire skills in basic engineering practices and enhance their skill set using hands on experience and their teamwork. |

**CO-PO Mapping:**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 2 | 2 | 1 | | 1 | | | 2 | | | 3 |
| **CO2** | 2 | | 2 | | 2 | | | 2 | | | 3 |
| **CO3** | 3 | 3 | 3 | | 2 | | | 2 | | | 3 |
| **CO4** | 2 | 2 | 1 | | 2 | | | 1 | | | 3 |

**Assessment Scheme:**
Two components of in Semester Evaluation (CA1 and CA2), having 50% weightage respectively.

| Assessment Component | Marks |
|---|---|
| CA1 | 25 |
| CA2 | 25 |
| OE | -- |

CA1 and CA2 are based on the Practical performance.

**Course Contents**

| Practical No. | List of Experiments | Hours |
|---|---|---|
| 1 | Safety precaution while working in workshop (Fire, Electric, Accidental prevention) and introduction of workshop tools. | **02** |
| 2 | Wood sizing (pattern making) exercises in planning, marking, sawing, chiseling and grooving to make half lap joint and cross lap joint. | **04** |
| 3 | A job fitting includes cutting, filing to saw cut, filing sides and faces, drilling and tapping on M. S. plates. Measure accuracy of dimension. | **08** |
| 4 | Demonstration of different piping connection, Threading dies, and pipe fitting. | **02** |
| 5 | Introduction to metal forming process and common tools required are anvil, hammers, forging dies, furnace etc. | **02** |
| 6 | Making a small parts using GI sheet involving development, marking, cutting, bending, brazing and soldering operations- i) Tray ii) Pan iii) Box and similar articles. | **04** |
| 7 | Demonstration of Arc welding process to make a square butt joint. | **02** |
| 8 | Demonstration of household wiring connection, wiring of experiments assembly and disassembly. | **02** |

| | | |
|---|---|---|
| 9 | Demonstration of soldering and testing of electronics components. Demonstration of Use of electronic circuits. | **02** |

| **Text Book** | | | |
|---|---|---|---|
| **Sr.No.** | **Title** | **Author** | **Publisher** |
| 1 | Work Shop Technology – Vol. 1 | S.K. Hajra Choudhury, A.K. Hajra Choudhury, Nirjhar Roy | Media Promoters and Publishers Pvt Ltd. |
| 2 | Mechanical Workshop Practice | K. C. John | Prentice Hall Publication, New Delhi, 2010. |
| 3 | Elements of Workshop Technology – Vol. 1 | S.K. Hajra Choudhury & A.K. Hajra Choudhury | Media Promoters |
| 4 | Engineering Workshop Practice | H.S. Bawa | McGraw Hill Education |

| **Reference Books** | | | |
|---|---|---|---|
| **Sr.No.** | **Title** | **Author** | **Publisher** |
| 1 | Workshop Technology (Vol. 1 & 2) | R.S. Khurmi & J.K. Gupta | S. Chand Publishing |
| 2 | Manufacturing Technology: Foundry, Forming and Welding | P.N. Rao | McGraw Hill Education |
| 3 | Workshop Practice | B.S. Raghuwanshi | Dhanpat Rai & Co. |
| 4 | Production Technology | H.M.T. (Hindustan Machine Tools) | Tata McGraw Hill |

| Certification Courses | | | | |
|---|---|---|---|---|
| **Course/Certification** | **Provider/Platform** | **Level** | **Mode** | **Certification Authority** |
| NPTEL “Manufacturing Processes I & II” | IITs/IISc (via NPTEL) | UG | Online | NPTEL |
| SWAYAM "Introduction to Engineering Workshop" | IITs/IISc (via SWAYAM) | UG | Online | SWAYAM |
| Skill India / NSDC Courses (Pradhan Mantri Kaushal Vikas Yojana) | NSDC / Skill India | Base | Online + offline hands-on (at training centers) | Government-recognized |
| Coursera / edX – Fundamentals of Manufacturing Processes | Coursera / edX | Base | Online | University at Buffalo / MIT |
| TCS iON Career Edge – Young Professional | TCS iON | Base | Online | TCS iON |

| Title of the Course: Yoga<br>Course Code: 25BSE1106L | L | T | P | Credit |
|---|---|---|---|---|
| | - | - | 2 | 1 |

**Course Prerequisite:** No prior knowledge required; only willingness to participate and awareness of personal health conditions.

**Course Description**:
This course helps the students achieve physical fitness, mental clarity, and emotional balance through asanas, pranayama, and meditation. It promotes stress management, concentration, and a healthy lifestyle, supporting overall well-being.

**Course Objectives:**
By the end of this course, the students will be able to:
1. To introduce students to the foundational concepts and philosophy of Yoga.
2. To familiarize students with various yogic practices such as asanas, pranayama, and meditation.
3. To develop physical flexibility, strength, and mental clarity through regular yoga practice.
4. To understand the connection between breath, body, and mind in achieving holistic well-being.
5. To reinforce the importance of discipline, mindfulness, and a balanced lifestyle.

**Course Outcomes:**

| CO | After the completion of the course the student should be able to |
|---|---|
| CO1 | Understand the science and philosophy behind yogic practices and their relevance to holistic health. |
| CO2 | Demonstrate proficiency in performing basic asanas, breathing techniques (pranayama), and meditation. |
| CO3 | Use yogic techniques to enhance focus, emotional balance, and stress management in daily life. |
| CO4 | Analyze the physical and psychological impacts of regular yoga practice on the human body and mind. |
| CO5 | Demonstrate the ability to integrate yogic discipline and mindfulness into personal and professional |

**CO-PO Mapping:**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | | | | | | 1 | 2 | - | | 2 |
| CO2 | | | | | | | 1 | 2 | - | | 2 |
| CO3 | | | | | | | 2 | 2 | - | | 2 |
| CO4 | | | | | | | 2 | 2 | 1 | | 2 |
| CO5 | | | | | | | 2 | 2 | 1 | | 2 |

**Assessment Scheme:**

Two components of in Semester Evaluation (CA1 and CA2), having 50% weightage respectively.

| Assessment Component | Marks |
|---|---|
| CA1 | 25 |
| CA2 | 25 |
| OE | -- |

CA1 and CA2 are based on the practical performance.

**Course Contents**

| Practical No. | List of Experiments | Hours |
|---|---|---|
| 1 | Conduct Physical Activities. | **2** |
| 2 | Conditioning Exercise | **2** |
| 3 | Warming and cooling down exercises. | **2** |
| 4 | Conduct different style of yoga. (Hatha, Vinyasa, Ashtang) | **2** |
| 5 | Conduct yoga for alignment and balance, Shitalikarna, Vyayama, Suryanamaskar. | **2** |
| 6 | Basic yoga postures (Asanas). | **2** |
| 7 | Practice of Suryanamaskar & Pranayama, Anulom Vilom. | **2** |
| 8 | Practice basic yoga postures & Pranayama, Kapalabhati. | **2** |
| 9 | Practice Asanas & Pranayama Bhramari | **2** |
| 10 | Breath control for physical and mental health. | **2** |
| 11 | Types of Dhyan. | **2** |
| 12 | Perform sitting in Dhyan Mudra and meditating. | **2** |

***Any 10 practical's experiments to be conducted.**

| Textbook | | | | |
|---|---|---|---|---|
| **Sr.No.** | **Title** | **Edition** | **Author/s** | **Publisher** |
| 1 | Asanas | 2nd | Swami Kuvalyananda Pineer in scientific Yoga | Kaivalyadhama samiti Lonavla. |
| 2 | Hathayoga Pradipika Swatmarama | 3rd | Swami Digambaraji | Kaivalyadhama, Lonavala |
| 3 | The Science of Yoga | 2nd | Taimini | Theosophical Publishing House, Adyar, Madras |

| Reference Books | | | | |
|---|---|---|---|---|
| **Sr.No.** | **Title** | **Edition** | **Author/s** | **Publisher** |
| 1 | Light on yoga | 2nd | B.K.S Iyangar | Schocken Books |
| 2 | Yoga Darshan | 2nd | Swami Niranjanananda | Swami Niranjanananda |
| 3 | Modern Trends and Physical Education | 4th | A. Singh | Kalyani Publishers |