I Semester B.E.
Calculus and Linear Algebra
(Common to all branches)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>18MAT11</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>Course type</td>
<td>BS</td>
<td>CIE Marks</td>
<td>50 marks</td>
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<tr>
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<td>3-1-0</td>
<td>SEE Marks</td>
<td>50 marks</td>
</tr>
<tr>
<td>Total Hours:</td>
<td>40</td>
<td>SEE Duration</td>
<td>3 Hours for 100 marks</td>
</tr>
</tbody>
</table>

Course learning objectives
1. Learn the concept of series expansion using Taylor’s and Maclaurin’s series and get acquainted with the polar curves.
2. Understand the concept of Differentiation of functions involving two or more variables.
3. Understand and interpret the system of equations and various solutions.
4. Learn Differential Equations of first order and apply them.
5. Study the concept of Vector Differentiation and its applications.

Pre-requisites:
1. Basic Differentiation and Integration
2. Trigonometry
3. Matrix and Determinant operations
4. Vector algebra

Unit - I 8 Hours
Differential Calculus:
Taylor’s and Maclaurin’s Theorems for function of one variable (Statement only)-Problems. Angle between Polar curves.

Unit - II 8 Hours
Partial Differentiation:

Unit – III 8 Hours
Applications of Partial Differentiations:

Unit - IV 8 Hours
Linear Algebra:
Rank of a matrix by elementary transformation, Solution of system of linear equations-Gauss Jordan method and Gauss-Seidal method. Eigen value and Eigen vectors – Rayleigh’s Power method. Linear transformation, Diagonalization of a square matrix, Quadratic forms, Reduction to Canonical forms by Orthogonal Transformation.
Unit - V 8 Hours

Vector Calculus:
Scalar and Vector point function, Gradient, Divergence, Curl, Solenoidal and Irrotational vector fields and their applications. Vector identities - Div(\(\Phi\A\)), curl(\(\Phi\A\)), curl(\(\text{grad}\Phi\)), Div(curl\(\A\))

Books

Text Books:

Reference Books:

Course Outcome (COs)

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

1. **Write** the series expansion of some functions and **find** the angle between curves. L1, L3
2. **Demonstrate** the concept and use of Partial Differentiation in various problems. L3
3. **Apply** Partial Differentiation concepts to find the extreme values, Jacobians, Tangent planes, Normal Line. L3
4. **Interpret** the various solutions of system of equations and **Solve** them. L2
5. **Explain** the concept of Vector Differentiation. L2

Program Outcome of this course (POs)

1. An ability to apply knowledge of Mathematics, science and Engineering. PO1
2. An ability to identify, formulate and solve engineering problems. PO5

<table>
<thead>
<tr>
<th>Course delivery methods</th>
<th>Assessment methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Black board</td>
<td>1. Internal Assessment</td>
</tr>
<tr>
<td>2. Power point presentation</td>
<td>2. Quiz</td>
</tr>
<tr>
<td>3.</td>
<td>3. Assignments</td>
</tr>
<tr>
<td>4.</td>
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</table>
Scheme of Continuous Internal Evaluation (CIE):

<table>
<thead>
<tr>
<th>Components</th>
<th>Average of best two IA tests out of three</th>
<th>Average of two assignments / activity</th>
<th>Quiz</th>
<th>Class participation</th>
<th>Total Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Marks: 50</td>
<td>25</td>
<td>10</td>
<td>5</td>
<td>10</td>
<td>50</td>
</tr>
</tbody>
</table>

- Writing two IA test is compulsory.
- Minimum marks required to qualify for SEE : Minimum IA test marks (Average) 10 out of 25 AND total CIE marks 20

Scheme of Semester End Examination (SEE):
1. It will be conducted for 100 marks of 3 hours duration. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2. Minimum marks required in SEE to pass:
3. Question paper contains 08 questions each carrying 20 marks. Students have to answer FIVE full questions. SEE question paper will have two compulsory questions (any 2 units) and choice will be given in the remaining three units.

I/II Semester B.E.
Applied Physics
(Common to all branches)

<table>
<thead>
<tr>
<th>Course Code</th>
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<tr>
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</tr>
<tr>
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<td>4 – 0 – 0</td>
<td>SEE Marks</td>
<td>50</td>
</tr>
<tr>
<td>Total Hours:</td>
<td>48</td>
<td>SEE Duration</td>
<td>3 Hours for 100 marks</td>
</tr>
</tbody>
</table>

Course learning objectives
1. To understand wave-particle duality and dynamics of microscopic particles.
2. To study electrical properties of materials, many electron systems and semiconductors from a quantum mechanical point of view.
3. To study interference due to division of amplitude, Fraunhoffer diffraction of N slits and ultrasonic waves.
4. To study Maxwell’s equations and to comprehend working principle and structure of a laser. To grasp working principle, types and applications of optical fibers.
5. To study properties of superconductors and applications.

Unit – I

Quantum Mechanics 11 Hours

Introduction, de Broglie hypothesis, Davisson-Germer experiment, Relation between phase velocity and group velocity, Relation between velocity of a particle and group velocity of associated matter waves, Heisenberg’s uncertainty principle and its elementary proof, Max Born interpretation of wave function, normalization condition and well-behaved wave functions, Schrodinger wave equation in 1– dimension, Particle in infinite potential well, Elementary
operators in quantum mechanics,

**Unit II**

Solid state physics  
10 Hours

Band theory of solids- The Kronig penney model (qualitative), Bloch theorem, Electrical conductivity, Energy band structure of a solid, Band formation in Lithium, Silicon and Diamond, Fermi-Dirac distribution, Intrinsic conductivity, Fermi level in intrinsic semiconductor, Fermi level in n type and p type semiconductor (qualitative), Hall effect and applications

**Unit – III**

Physics of waves  
9 Hours

Wave equation, Principle of superposition, Stationary waves  
Optics – interference and diffraction  
Techniques for obtaining interference, Review of geometric path, optical path, path difference, phase difference, Interference due to thin film, Wedge shaped film, Newton’s rings and its applications, Michelson interferometer and its applications  
Types of diffraction, Diffraction due to N slits, Resolving power of a grating  
Sound – Introduction to Ultrasonic waves, generation of ultrasonic waves by Piezoelectric effect  
Self learning topic: Non destructive testing (NDT) of materials.

**Unit – IV**

Electromagnetism and Photonics  
10 Hours

Maxwell’s equations:  
Fundamentals of vector calculus, Divergence and curl of electric field and magnetic field (static), Maxwell’s equations in vaccum, Velocity of electromagnetic waves using Maxwell equations.

Laser and Optical fiber  
Introduction, Interaction between radiation and matter, Einstein coefficients and their relations, conditions for working of a laser, Components of a laser, Nd-YAG and CO₂ laser, Total internal reflection in fiber, Angle of acceptance, fractional index change, Numerical aperture, Types of optical fiber, Losses in optical fiber.

Self learning topics:  
LIDAR and industrial applications of laser  
Optical fibers in communication and as sensors

**Unit – V**

Superconductivity  
08 Hours

Introduction, Superconductivity, Properties of superconductors: Meissner effect, critical magnetic field, critical current density, London penetration depth, Type I and II superconductors, BCS theory (qualitative), Josephson effect: DC Josephson effect and AC Josephson effect- SQUID.

Self learning topics:  
Application of superconductors - Maglev and MRI
Text Books:


Reference Books:


Course Outcomes (COs)

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

1. **Apply** Schrodinger’s time independent equation for a particle in infinite potential well.
2. **Explain and apply** ideas in quantum mechanics and statistical physics to semiconductors.
3. **Analyze** wave phenomenon of interference, diffraction and ultrasonic waves.
4. **Explain** the working principle, structure and applications of laser and optical fibers.
5. **Explain** superconductivity on the basis of BCS theory.

Program Outcomes of this course (POs)

1. An ability to apply knowledge of mathematics, science, and engineering.  
   **PO No.** PO1
2. Recognition of the need for, and an ability to engage in life-long learning.  
   **PO No.** PO12

Course delivery methods

1. Classroom lecture
2. PPTs and Videos
3. Activities

Assessment methods

1. Assignments
2. IA Tests
3. Quiz
4. Semester End Examination (SEE)
Scheme of Continuous Internal Evaluation (CIE):

<table>
<thead>
<tr>
<th>Components</th>
<th>Average of best two IA tests out of three</th>
<th>Average of assignments (Two) / activity</th>
<th>Quiz</th>
<th>Class participation</th>
<th>Total Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Marks: 50</td>
<td>25</td>
<td>10</td>
<td>5</td>
<td>10</td>
<td>50</td>
</tr>
</tbody>
</table>

- Writing two IA tests is compulsory.
- Minimum marks required to qualify for SEE : 20

Self Study topics shall be evaluated during CIE (Assignments and IA tests) and 10% weightage shall be given in SEE question paper.

Scheme of Semester End Examination (SEE):
1. It will be conducted for 100 marks of 3 hours duration. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2. Minimum marks required in SEE to pass: 40 (out of 100 marks)
3. Question paper contains 08 questions each carrying 20 marks. Students have to answer FIVE full questions. SEE question paper will have two compulsory questions (any 2 units) and choice will be given in the remaining three units.

I/II Semester B.E.
Basic Electrical and Electronics Engineering
(Common to all branches)

<table>
<thead>
<tr>
<th>Course Code</th>
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<tr>
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<th>SEE Marks</th>
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</thead>
<tbody>
<tr>
<td>4 –0 – 0</td>
<td>50</td>
<td>50</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total Hours:</th>
<th>SEE Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>3 Hours for 100 marks</td>
</tr>
</tbody>
</table>

Course learning objectives
1. Understand and Explain the basic concepts of electric power system and its components viz generation, transmission, and distribution of power and protection aspects
2. Explain the process of generation of Single phase and three phase power, parameters of single and three phase AC systems and analyze AC circuits.
3. Understand and Explain types, construction, principle of operation and performance of Electric machines viz. 3 phase AC generators, transformers and induction motors and their applications.
4. Understand and Explain the operation of Electronic solid state devices namely Diodes, Transistors and OPAMPs and Apply in practice.
5. Understand and Explain binary logic, logic gates and demonstrate their applications in digital circuits.
Unit – I

Typical Electrical System 02 Hours

A typical power system single line diagram, typical domestic wiring layout, protection of electrical systems using fuse & MCB, necessity of earthing.

Single-phase A.C. Circuits 08 Hours

Sinusoidal voltage, instantaneous value, average value, root mean square value, form factor and peak factor of sinusoidal varying voltage and current, phasor representation of alternating quantities. Analysis of RL, RC and RLC series circuit & RLC series resonant circuit and problems.

Self-learning topics: Calculation of energy bill for domestic applications.

Unit II

Three phase Synchronous Generators 05 Hours

Principle of operation, types and constructional features, synchronous speed and frequency, expression for EMF generated examples.

Three Phase Circuits 05 Hours

Advantages of three phase system, definition of phase sequence, relationship between line and phase values of balanced star and delta connections, power in balanced three-phase circuits, measurements of active and reactive power and power factor by using two-wattmeter method, illustrative examples.

Unit – III

Transformer 05 Hours

Principle of operation and construction of single-phase transformer (core and shell type), EMF equation, transformation ratio, losses, efficiency, voltage regulation and its significance, illustrative problems on EMF equation and efficiency only, applications of transformer (open circuit and short circuit tests, equivalent circuit and phasor diagrams are excluded).

Three Phase Induction Motor 05 Hours

Concept of rotating magnetic field (no proof), principle of operation, types and constructional features, slip and its significance, applications of squirrel cage and slip ring motors, necessity of a starter, illustrative examples on slip calculations.

Unit – IV

Semiconductor diode applications 05 Hours

Half wave and Full wave diode rectifiers with and without filter, ripple factor, efficiency and voltage regulation, regulators 7805 & 7905.

Transistor applications 05 Hours

(Only concepts through circuit diagrams without analysis) Transistor as a switch, RC coupled CE amplifier, power amplifiers class A, class B and class C type, RC phase shift oscillator.
Unit – V

Operational Amplifiers

Concept of operational amplifier and integrated circuits, ideal OPAMP Characteristics, inverting, non-inverting OPAMP and voltage follower, zero crossing detector (ZCD), addition, subtraction using OPAMP.

Digital Electronic circuits

Boolean algebra and binary number system, logic gates, truth table, half adder and full adder, applications of digital electronics.

Text Books:


Reference Books:


Course Outcomes (COs)

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

1. Explain the basic concepts of power distribution system and analyze simple AC circuits used in electrical and electronic devices. Bloom’s Level L2
2. Explain the process three phase AC power generation and analyze AC circuits L2, L4
3. Explain the principle of operation of transformers and induction motors and demonstrate their applications. L2
4. Explain and demonstrate the operation of Electronic solid state devices namely Diodes, Transistors and OPAMPs and apply in practice. L2, L4
5. Explain binary logic, logic gates and demonstrate their applications in digital circuits. L2

Program Outcomes of this course (POs)

1. Engineering Knowledge: Apply knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems. PO1
2. Problem Analysis: Identify, formulate, research literature and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences. PO 2
3. Project Management and Finance: Demonstrate knowledge and understanding of engineering and management principles and apply these to one’s own PO 11
work, as a member and leader in a team, to manage projects and in multidisciplinary environments

**Course delivery methods**

1. Black Board
2. PPTs and Videos

**Assessment methods**

1. Assignments
2. Internal Assessment Tests (IA) Tests
3. Quiz/Seminar/Project
4. Semester End Examination (SEE)

**Scheme of Continuous Internal Evaluation (CIE):**

<table>
<thead>
<tr>
<th>Components</th>
<th>Average of best two IA tests out of three</th>
<th>Average of assignments (Two) / activity</th>
<th>Quiz</th>
<th>Class participation</th>
<th>Total Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Marks: 50</td>
<td>25</td>
<td>10</td>
<td>5</td>
<td>10</td>
<td>50</td>
</tr>
</tbody>
</table>

- Writing two IA tests is compulsory.
- Minimum marks required to qualify for SEE : 20

**Self study topics shall be evaluated during CIE (Assignments and IA tests) and 10% weightage shall be given in SEE question paper.**

**Scheme of Semester End Examination (SEE):**

1. It will be conducted for 100 marks of 3 hours duration. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2. Minimum marks required in SEE to pass: 40 (out of 100 marks)
3. Question paper contains 08 questions each carrying 20 marks. Students have to answer FIVE full questions. SEE question paper will have two compulsory questions (any 2 units) and choice will be given in the remaining three units.

**I/II Semester B.E.**

**Engineering Graphics**

(Common to all branches)

<table>
<thead>
<tr>
<th>Course Code</th>
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<th>Credits</th>
<th>3.5</th>
</tr>
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<tbody>
<tr>
<td>Course type</td>
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<td>CIE Marks</td>
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<tr>
<td>Hours/week: L-T-P</td>
<td>2-0-3</td>
<td>SEE Marks</td>
<td>50</td>
</tr>
<tr>
<td>Total Hours:</td>
<td>Theory 30 Hrs + Sheet work 30 Hrs = Total 60 Hrs</td>
<td>SEE Duration</td>
<td>04 hours for 100 marks</td>
</tr>
</tbody>
</table>

**Course learning objectives**

1. To develop in students, graphic skills using drafter and drawing sheets for communication of concepts, ideas and design of engineering products.
2. To expose the students to existing national standards related to technical drawings.
3. To understand the concepts of projections of an object and various ways of projection for visualization of various engineering parts and components.
4. To introduce to students the use of effective drawing tools such as AutoCAD software.
5. To expose to students the skills of engineering drawing and its application to industry standards and best practices applied in engineering.

Detailed Syllabus

Unit – I Introduction, Orthographic projection of Points and Lines. 08 Hrs Theory + 06 Hrs [Sheet work]

Projection of point in all four quadrants.

Projections of straight lines (Line located in first quadrant only). Concepts of True and apparent lengths, true and apparent inclinations.

Introduction to the AutoCAD software [To be covered in last class/lab]: Demonstration on computer using AutoCAD Software using various commands and their usage for engineering drawings. Computer screen, layout of the software, standard toolbar/menus and description of most commonly used toolbars, navigational tools. Dimensioning, line convention and one complete problem on projection of solids.

Unit – II Orthographic projection of plane surfaces 05 Hrs Theory + 06 Hrs [Sheet work]
Introduction and definition of different plane surfaces. Projections of –square, rectangle, pentagon, hexagon and circle in different positions by change of position method.

Unit – III Projection of solids (First angle projection) 06 Hrs Theory + 06 Hrs [Sheet work]
Introduction, definitions of pyramids and prisms – Projection of right regular pyramids, prisms, cylinder and cone in different positions (resting on HP and with axis inclined to either one or both of the principal planes, by rotating object method). Demonstration of one complete problem on solid using AutoCAD software in last lab.

Unit – IV Development of Lateral Surfaces of Solids 06 Hrs Theory + 03 Hrs [Sheet work]
Introduction to development, concepts of cutting planes, development of cut section of prisms, pyramid, cone and cylinder, development of frustum of square and pentagonal pyramid.

Unit – V Isometric Projections 05 Hrs Theory + 03 Hrs [Sheet work]
Principles of isometric projection – Isometric scale – Isometric projections of simple solids like Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions , Simple problems on Pictorial to orthographic conversions.
Books

Course Outcome (COs)
At the end of the course, the student will be able to
1. Comprehend the theory of projection, Interpret and Illustrate engineering drawings as per existing standards/conventions. [L2]
2. Compute 2D and simple 3D drawings of different objects. [L3]
3. Apply independent thinking and problem solving capabilities. [L3]
4. Improve technical communication skill in the form of communicative drawings. [L2]
5. Develop visualization skills so that these skills can be applied for developing new products [L3]

Program Outcome of this course (POs)
1. An ability to apply knowledge of mathematics, science, and engineering. [PO1]
2. An ability to identify, formulate and solve engineering problems. [PO5]
3. A recognition of the need for, and an ability to engage in life-long learning. [PO9]
4. An ability to use the techniques, skills and modern engineering tools necessary for engineering practice. [PO11]

Course delivery methods
1. Black Board Teaching
2. Drawing on sheets with drafter
3. Working Models
4. Videos and Power Point presentation.

Assessment methods
1. Internal Assessment
2. Sheet work problems using drafter
3. Practice problems

Scheme of Continuous Internal Evaluation (CIE):
- Sheet work on five titles each evaluated for 15 marks [Average of total no. of sheets].
- Two tests each of 50 marks shall be conducted using drafter in drawing hall reduced to 25.

<table>
<thead>
<tr>
<th>Components</th>
<th>Average of two IA tests</th>
<th>Sheet work using drafter</th>
<th>Class Performance</th>
<th>Total Marks</th>
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</thead>
<tbody>
<tr>
<td>Maximum Marks: 50</td>
<td>25</td>
<td>15</td>
<td>10</td>
<td>50</td>
</tr>
</tbody>
</table>
Scheme of Semester End Examination (SEE):

1. SEE exam will be conducted on a single day for all students for 100 marks of 4 hours duration in drawing hall on drawing board using drafter. It will be reduced to 50 marks for the calculation of SGPA and CGPA.

2. **Minimum marks to be obtained in SEE to pass:** 40

3. Question paper contains 08 questions each carrying 20 marks. Students have to answer **FIVE full questions.** SEE question paper will have two compulsory questions (any 2 units) and choice will be given in the remaining three units.

4. The answer paper is A2 Sheet (Half Imperial Sheet). Students should draw at 1:1 scale only using drafter.

I/II Semester B.E.
Applied Physics Lab
(Common to all branches)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>18PHL15/25</th>
<th>Credits</th>
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<tr>
<td>Hours/week: L-T-P</td>
<td>0-0-3</td>
<td>SEE Marks</td>
<td>25 marks</td>
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<tr>
<td>Total Hours:</td>
<td>30</td>
<td>SEE Duration</td>
<td>3 Hours for 50 marks</td>
</tr>
</tbody>
</table>

**Course learning objectives**

1. To gain in depth knowledge by correlating theory with the experiments.
2. To learn the usage of electrical and optical systems for various measurements.
3. Apply the analytical techniques and graphical analysis to the experimental data.
4. To develop intellectual communication skills and discuss the basic principles of scientific concepts in a group.

**List of experiments**

1. Study of I-V characteristics of a photodiode
2. Estimation of Fermi energy and a study of variation of resistance with temperature for a metal
3. Hall effect
4. Michelson interferometer
5. Newton’s rings
6. Laser diffraction by a grating
7. Velocity of ultrasonic waves by using Ultrasonic interferometer
9. Rigidity modulus by Torsion pendulum
10. Resonance of LCR circuit.

**Note:** A student has to perform 8 experiments out of the 10 listed above

**Open Ended Experiments / Minor Projects**

1. To study bending losses of an optical Fiber
2. Resistivity measurement by four probe method
3. To determine the type of charge carriers and carrier concentration in different semiconducting materials
4. A comparative study of velocity and compressibility of ultrasonics in different liquid samples
5. Design a circuit to study the I-V characteristics of a diode
6. To determine the wavelength of different coloured light using white light source by Newton’s ring method
7. Study the characteristics of LED and Laser diode

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### Books

1. C.L. Arora, Practical physics, S. Chand Publication
2. B.L. Worsnop and H. T. Flint, Advanced Practical Physics, Asia Publishing House

### Course Outcomes (COs)

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

1. **Apply** the various procedures and techniques for the experiments.  
   Bloom’s Level: L3
2. **Use** the different measuring devices and meters to record the data with precision  
   Bloom’s Level: L2
3. **Apply** the mathematical concepts/equations to obtain quantitative results  
   Bloom’s Level: L3
4. **Develop** basic communication skills through working in groups in performing the laboratory experiments and by interpreting the results  
   Bloom’s Level: L3

### Program Outcomes of this course (POs)

1. An ability to apply knowledge of mathematics, science, and engineering  
   PO No.: PO 1
2. Modern tool usage: Create, select and apply appropriate techniques, resources and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.  
   PO No.: PO5

### Assessment methods

1. Journal writing
2. Viva-voce

### Scheme of Continuous Internal Evaluation (CIE):

<table>
<thead>
<tr>
<th>Components</th>
<th>Attendance / Conduct of the lab</th>
<th>Journal</th>
<th>Minor Project / Open Ended Experiment</th>
<th>Total Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Marks: 25</td>
<td>10</td>
<td>10</td>
<td>5</td>
<td>25</td>
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</tbody>
</table>

- Submission and certification of lab journal is compulsory to qualify for SEE.
- **Minimum marks required to qualify for SEE : 13**

### Scheme of Semester End Examination (SEE):

1. It will be conducted for 50 marks of 3 hours duration. **It will be reduced to 25 marks for the calculation of SGPA and CGPA.**
2. **Minimum marks required in SEE to pass:** 10 out of 25 marks

<table>
<thead>
<tr>
<th>Components</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Write up</td>
<td>10</td>
</tr>
<tr>
<td>Conduct of experiment</td>
<td>20</td>
</tr>
<tr>
<td>Viva-voce *</td>
<td>20</td>
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</table>

**50 marks**

*Viva-voce shall be conducted for individual student and not in a group.*
I/II Semester B.E
Basic Electrical and Electronics Lab
(Common to all branches)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>18EEL16/26</th>
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<tr>
<td>Total Hours:</td>
<td>20</td>
<td>SEE Duration</td>
<td>3 Hours for 50 marks</td>
</tr>
</tbody>
</table>

Course learning objectives

1. To introduce practical concepts and techniques in Electrical systems to students across all disciplines.
2. To create awareness among students about domestic wiring, the functioning of various electrical apparatus and the safety measures
3. To provide knowledge of practical operation of AC generator, Transformer, and Induction motor
4. Understand operation and design of simple electronic circuits.
5. Appreciate the practical significance of the systems developed in the course

List of Experiments

1. Measurement of current, voltage, power and power factor in single phase systems (Fluorescent lamp circuit)
2. Operation and loading of single phase transformer
3. Performance analysis of Single phase Energy meter
5. One way and two way control of lamp
6. Inverting and non-inverting amplifier using OPAMP
7. Full wave rectifier with regulator
8. Truth table verification of logic gates

Text Books:


Course Outcomes (COs)

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

1. **Demonstrate** referring of specifications of Electrical equipment and appliances. Bloom’s Level L2
2. **Explain and Demonstrate** the operation of Electrical appliances and machines and assess their performance and applications.  
3. **Demonstrate** measurement Electrical quantities current, voltage, power, energy, power factor in Electrical systems  
4. **Analyze and Design** simple electronic circuits.  

**Program Outcomes of this course (POs)**

1. Engineering Knowledge: Apply knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.  
2. Identify, formulate, research literature and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.  
3 Graduates will demonstrate the ability to identify, formulate and solve electrical and electronics engineering problems and also will be aware of contemporary issues.  
3 Graduates will develop confidence for self-education and ability for continuous learning.  

**Course delivery methods**

1. Explanation in the labs  
2. Conduct of the experiment  

**Assessment methods**

1. Journals  
2. Viva-voce  
3. Semester End Examination (SEE)

**Scheme of Continuous Internal Evaluation (CIE):**

<table>
<thead>
<tr>
<th>Components</th>
<th>Conduction of lab</th>
<th>Journal writing</th>
<th>Open ended expt.</th>
<th>Total Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Marks: 25</td>
<td>25</td>
<td>10</td>
<td>5</td>
<td>25</td>
</tr>
</tbody>
</table>

**Scheme of Semester End Examination (SEE):**

1. It will be conducted for 50 marks of 3 hours duration. It will be reduced to 25 marks for the calculation of SGPA and CGPA.  
2. Minimum marks required in SEE to pass: 20 (out of 50 marks)
I/II Semester B.E.
Communicative English
(Common to all branches)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>16ENG17/27</th>
<th>Credits</th>
<th>1.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course type</td>
<td>HS</td>
<td>CIE Marks</td>
<td>25 marks</td>
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<td>Hours/week: L-T-P</td>
<td>1:0:1</td>
<td>SEE Marks</td>
<td>NA</td>
</tr>
<tr>
<td>Total Hours:</td>
<td>30</td>
<td>SEE Duration</td>
<td>NA</td>
</tr>
</tbody>
</table>

Course learning objectives

1. To assist the students in developing necessary language skills in the areas like vocabulary, grammar, presentation and interactive communication.
2. To enable them to express their ideas coherently.
3. To help to comprehend and write effectively.
4. To aid them in understanding the importance of verbal and non-verbal communication.

Pre-requisites:

- Basic knowledge of English Language.
- Conversant with Basic English Grammar.
- Ability to frame sentence in English.

Unit – I: Grammar and Vocabulary 5 Hours

1. Frame grammatically acceptable sentences using Articles, Prepositions, Tenses, Modals and Subject-Verb agreement.
2. Enhance day to day general vocabulary and business vocabulary using every day words, appropriate collective nouns, idioms, phrases and phrasal verbs.

Self learning topics: Improve vocabulary by reading.

Unit – II: Reading Skills 5 Hours

1. Comprehend and interpret the texts such as notices, advertisements, memos, emails, charts etc. using reading techniques like skimming and scanning.
2. Using the knowledge of Phonetics to identify the right pronunciation from a dictionary.
3. Reading to enrich work place / business vocabulary.

Self learning topics: Solve reading assignments from Cambridge Business BENCHMARK Pre-intermediate to Intermediate.

7 Hours

Unit – III: Listening Skills

1. Interpret recorded audio-video scripts in order to pick specific information in a short extract.
2. Listening exercises to understand factual information like dates, prices, telephone numbers etc.
3. Listening for gist (general meaning) to understand the speaker’s opinions and pick out the specific information.

Unit – IV: Speaking Skills

1. Interact effectively as an individual and also as a member in a team using correct grammar using wide range of vocabulary and avoiding common errors in English.
2. Design and formulate presentations using Microsoft PowerPoint and Non-Verbal communication cues (Kinesics, Proxemics, Chronemics and Paralinguistics).
3. Speak in a logical way and speak for the right amount of time with proper pronunciation on general topics and business topics.

Self learning topics: Self evaluation by recording their speech.

Unit – V: Writing Skills

2. Writing skills using appropriate registers (formal and informal), correct grammar, correct spelling, vocabulary, linking words and phrases.

Self learning topics: Practice e-mail, memos, and report writing.

Books

4. Prof. G.S. Mudambadithya, “Functional English”, Sapan- Bangalore,

Course Outcome (COs)

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

1. Define various grammatical concepts such as Articles, Prepositions, Subject-Verb Agreement, and Tenses. L1
2. Explain their ideas in their own words in English. L2
3. Interpret the given information or data in the form of reading or listening materials. L3
4. Distinguish among the various grammatical concepts like sentence patterns, sub-verb agreement, tenses etc. L4
5. Evaluate the grammatically acceptable sentences, and Defend their view-points. L5
6. Design and Formulate oral and written presentations. L6

Program Outcome of this course (POs)

1. The course will help students to enhance their communicative skills and Business English. PO8
2. The course also helps the students to enhance their ability to work in a group. PO7, PO9
3. The course will encourage students to interact confidently and effectively. PO11
4. The course will promote self learning. PO10
<table>
<thead>
<tr>
<th>Course delivery methods</th>
<th>Assessment methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Lecture</td>
<td>1. Individual speech</td>
</tr>
<tr>
<td>2. Learnsoft Software</td>
<td>2. PPT (Group activity)</td>
</tr>
<tr>
<td>3. PPT</td>
<td>3. Writing assignment</td>
</tr>
<tr>
<td>4. Vocabulary activities/games/videos</td>
<td>4. Online Quiz</td>
</tr>
</tbody>
</table>

**Scheme of Continuous Internal Evaluation (CIE):**

<table>
<thead>
<tr>
<th>Components</th>
<th>Individual activity - Speech</th>
<th>Group Activity – Power Point Presentation</th>
<th>Writing Skills – email/memo/letters</th>
<th>Class Performance (Attendance)</th>
<th>Online Test</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Marks (25)</td>
<td>5</td>
<td>15</td>
<td>10</td>
<td>5</td>
<td>15</td>
<td>50</td>
</tr>
</tbody>
</table>

Continuous Internal Evaluation (CIE) is of 50 marks. It will be reduced to 25 marks for the calculation of SGPA and CGPA.
I Semester B.E.
Calculus and Linear Algebra
(Common to all branches)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>18MAT11</td>
<td>4</td>
</tr>
</tbody>
</table>

Course learning objectives
1. Learn the concept of series expansion using Taylor’s and Maclaurin’s series and get acquainted with the polar curves.
2. Understand the concept of Differentiation of functions involving two or more variables.
3. Understand and interpret the system of equations and various solutions.
4. Learn Differential Equations of first order and apply them.
5. Study the concept of Vector Differentiation and its applications.

Pre-requisites:
1. Basic Differentiation and Integration
2. Trigonometry
3. Matrix and Determinant operations
4. Vector algebra

Unit - I 8 Hours
Differential Calculus:
Taylor’s and Maclaurin’s Theorems for function of one variable (Statement only)-Problems. Angle between Polar curves.

Unit - II 8 Hours
Partial Differentiation:

Unit – III 8 Hours
Applications of Partial Differentiations:

Unit - IV 8 Hours
Linear Algebra:
Rank of a matrix by elementary transformation, Solution of system of linear equations-Gauss Jordan method and Gauss-Seidal method. Eigen value and Eigen vectors – Rayleigh’s Power method. Linear transformation, Diagonalization of a square matrix, Quadratic forms, Reduction to Canonical forms by Orthogonal Transformation

Unit - V 8 Hours
Vector Calculus:
Scalar and Vector point function, Gradient, Divergence, Curl, Solenoidal and Irrotational vector fields and their applications. Vector identities-Div(ΦA), curl(ΦA), curl(GradΦ), Div(curlA)
Books

Text Books:

Reference Books:

Course Outcome (COs)

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

1. Write the series expansion of some functions and find the angle between curves. Bloom’s Level L1, L3
2. Demonstrate the concept and use of Partial Differentiation in various problems. L3
3. Apply Partial Differentiation concepts to find the extreme values, Jacobians, Tangent planes, Normal Line. L3
4. Interpret the various solutions of system of equations and Solve them. L2
5. Explain the concept of Vector Differentiation. L2

Program Outcome of this course (POs) PO No.
1. An ability to apply knowledge of Mathematics, science and Engineering. PO1
2. An ability to identify, formulate and solve engineering problems. PO5

<table>
<thead>
<tr>
<th>Course delivery methods</th>
<th>Assessment methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Black board</td>
<td>1. Internal Assessment</td>
</tr>
<tr>
<td>2. Power point presentation</td>
<td>2. Quiz</td>
</tr>
<tr>
<td>3.</td>
<td>3. Assignments</td>
</tr>
</tbody>
</table>

Scheme of Continuous Internal Evaluation (CIE):

<table>
<thead>
<tr>
<th>Components</th>
<th>Average of best two IA tests out of three</th>
<th>Average of two assignments / activity</th>
<th>Quiz</th>
<th>Class participation</th>
<th>Total Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Marks: 50</td>
<td>25</td>
<td>10</td>
<td>5</td>
<td>10</td>
<td>50</td>
</tr>
</tbody>
</table>

➤ Writing two IA test is compulsory.
➤ Minimum marks required to qualify for SEE : Minimum IA test marks (Average) 10 out of 25 AND total CIE marks 20
I/II Semester B.E.
Applied Chemistry
(Common to all branches)

Subject Code: 18CHE12/22
Credits: 4
Course Type: BS
CIE Marks: 50
Hours/week: L – T – P 4 – 0 – 0
SEE Marks: 50
Total Hours: 45
SEE Duration: 3 Hours

Course Learning Objectives (CLOs):

1. To develop an understanding of the operating principles and the reaction mechanisms of energy storage and energy conversion devices.
2. To develop fundamental knowledge of corrosion of materials and its prevention. To provide the student with a broad range of information related to electroplating and electroless plating processes.
3. To develop an understanding of chemical fuels and to provide a basic knowledge of instrumental methods of analysis.
4. To develop an understanding of various polymers and composite materials, which have engineering applications.
5. To provide the knowledge of analysis and treatment of water and waste water. To impart basic knowledge of nanomaterials and their applications.

Unit I
Electrochemistry, Energy Conversion and Storage Devices  9 hours

Electrochemistry: Introduction, Types of electrodes: metal-metal ion, metal-metal salt ion, gas, amalgam, redox & ion selective. Reference electrodes: Introduction; construction, working and applications of calomel and Ag / AgCl electrodes. Construction and working of glass electrode, determination of pH using glass electrode.

Battery Technology: Introduction, Characteristics - cell potential, current, capacity, electricity storage density, energy efficiency, cycle life and shelf life. Construction, working and applications of Zinc-Air, Nickel- metal hydride, Li-ion and Li-ion polymer batteries. Fuel Cells: Introduction, difference
between conventional cell and fuel cell, limitations & advantages. Classification of fuel cells based on electrolyte; construction & working of polymer electrolyte membrane fuel cell, Numerical problems on Nernst equation.

**Photovoltaic cells:** Importance, construction and working of photovoltaic cells. Modules, Panels, Arrays and production of solar grade silicon by Union carbide process.

**Self Learning Topics:** Derivation of Nernst Equation for single electrode potential.

**Unit II**

**Corrosion and Metal Finishing** 9 hours

**Corrosion:** Introduction, Electrochemical theory of corrosion. Rate of corrosion, Factors affecting the rate of corrosion: ratio of anodic to cathodic areas, polarization of anodic & cathodic regions, nature of metal, nature of corrosion product, nature of medium – pH, conductivity and temperature. Types of corrosion- Differential metal, Differential aeration (Pitting and water line) and Stress (Caustic embrittlement in boilers). Corrosion control: Design and selection of materials, inorganic coatings-Anodizing of Al, Metal coatings-Galvanization. Cathodic protection by Sacrificial Anodic method. Numericals on rate of corrosion by weight loss method.

**Metal Finishing:** Introduction. Technological importance, Electroplating: Introduction, Factors influencing the nature of electro deposit-current density, concentration of metal salt, metal ion & electrolyte; pH, temperature & throwing power of plating bath, additives-complexing agents, brighteners, levelers, structure modifiers & wetting agents. Numerical problems on Throwing power of plating bath. Electroplating of chromium, Electroless plating: Introduction, distinction between electroplating and electroless plating, electroless plating of copper & manufacture of double sided Printed Circuit Board (PCB) with copper.

**Self Learning Topics:** Phosphating, Tinning and Cathodic protection by Impressed current method.

**Unit III**

**Fuels and Instrumental Methods of Analysis** 9 hours


**Instrumental Methods of Analysis:** Introduction, Instrumentation and applications of UV-Visible, Infra Red spectroscopy and Thermo Gravimetric Analysis (TGA).

**Unit IV**

**Polymers** 9 hours


**Composite materials:** Types of matrix materials and reinforcements with examples, Glass reinforced plastic (GRP), synthesis, properties and applications of Kevlar and Carbon fiber.

Self Learning Topics: Synthesis, properties and applications of PMMA (plexiglass), Polyurethane and Nomex.

**Unit V**

**Water Technology and Nanotechnology** 9 hours


**Nanotechnology:** Introduction, size dependent properties: chemical, mechanical, electrical & electronic and optical properties. Synthesis of nano-scale materials: Sol-gel and Chemical vapor deposition methods.

Text Books:

Reference Books:

Course Outcomes (COs):
At the end of the course, the Students will be able to:
1. Identify the materials best suited for construction of Battery and fuel cells. [L3]
2. Apply the knowledge of electrochemistry for corrosion and metal finishing phenomena in achieving a practical solution. [L3]
3. Able to identify instrumental techniques for analysis and analyze the quality parameters of chemical fuels. [L3, L4]
4. Demonstrate the knowledge of polymers and nanomaterials for futuristic engineering applications. [L2]
5. Identify and apply suitable water and waste water treatment techniques. [L3]

Program Outcomes (POs) of the course:
1. Engineering knowledge: An ability to apply knowledge of mathematics, science and engineering. [PO1]
2. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with
appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations. [PO3]

3. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations. [PO5]

4. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. [PO12]

**Scheme of Continuous Internal Evaluation (CIE):**

<table>
<thead>
<tr>
<th>Components</th>
<th>Average of best two tests out of three</th>
<th>Average of two assignments</th>
<th>Quiz/Seminar/Project</th>
<th>Class participation</th>
<th>Total Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Marks</td>
<td>25</td>
<td>10</td>
<td>5</td>
<td>10</td>
<td>50</td>
</tr>
</tbody>
</table>

**Scheme of Semester End Examination (SEE):**

1. SEE will be conducted for 100 marks of 3 hours duration. It will be reduced to 50 marks for the calculation of SGPA and CGPA.

2. Question paper contains 08 questions each carrying 20 marks. Students have to answer FIVE full questions. SEE question paper will have two compulsory questions (any 2 Modules) and choice will be given in the remaining three Modules.

### I/II Semester B.E.
Engineering Mechanics
(Common to all branches)

<table>
<thead>
<tr>
<th>Course Code:</th>
<th>18CIV13/23</th>
<th>Credits:</th>
<th>03</th>
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</thead>
<tbody>
<tr>
<td>Course Type:</td>
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<td>CIE Marks:</td>
<td>50</td>
</tr>
<tr>
<td>Hours/week: L – T – P</td>
<td>3 – 0 – 0</td>
<td>SEE Marks:</td>
<td>50</td>
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<tr>
<td>Total Hours:</td>
<td>40</td>
<td>SEE Duration:</td>
<td>3 Hours for 100 marks</td>
</tr>
</tbody>
</table>

**Course Learning Objectives (CLOs):**

CLO1: To understand the basics of Engineering Mechanics.

CLO2: To comprehend the action of forces, moments and other loads on the rigid bodies and compute the reactive forces.

CLO3: To understand the concepts of Centroid and moment of inertia of Engineering
sections.

CLO4: To know the basics of Engineering dynamics.

**Pre-requisites: Physics and Mathematics Detailed Syllabus:**

**UNIT – I**

**Introduction to Engineering Mechanics** 06 Hours

Introduction to Engineering Mechanics, Basic Idealizations, Force, Types of forces and force systems; Principle of Superposition and Principle of Transmissibility of forces; Resolution of forces.

Moment of a Force, Couple, Characteristics of a couple, Equivalent Force-Couple concept; Related numerical problems.

**UNIT – II**

**Coplanar Concurrent Force Systems**

08 Hours

Composition of Coplanar-Concurrent force systems, Numerical problems.

Equilibrium of Coplanar-Concurrent force systems, Conditions of static equilibrium, Free-body diagram, Related numerical problems.

**Self Learning Topics:** Fundamentals of Friction.

**UNIT - III**

**Coplanar Non-Concurrent Force Systems** 08 Hours

Composition of Coplanar Non-concurrent force systems, Varignon’s Principle of moments, Types of loads (Point loads, UDL, UVL and External moments), Support reactions for statically determinate beams, Related numerical problems.

**UNIT - IV**

**Centroid and Moment of Inertia of Engineering sections** 10 Hours

Definition of Centroid; Locating the Centroid of a triangle, semi-circle and quarter-circle by first principles, Numerical problems on locating the Centroid.

Definition of Moment of Inertia, Polar Moment of Inertia, Radius of Gyration, Perpendicular axis theorem and Parallel axis theorem; Determining the Moment of Inertia of triangular, rectangular and circular areas about the Centroidal axes by first principles, Numerical problems.

**UNIT -V**

**Engineering Dynamics** 08 Hours

Text Books

Reference Books

Course Outcome (COs)
At the end of the course, the student will be able to

1. **Outline** the basic principles of Engineering Mechanics and **apply** the principles to analyze concurrent and non-concurrent force systems.
   - Bloom’s Level: L2, L3
2. **Make use of** the state of static equilibrium and **apply** the conditions of static equilibrium to analyze concurrent and non-concurrent force systems.
   - Bloom’s Level: L2, L3
3. **Compute** the reactive forces and the effects that develop as a result of the external loads for various types of statically determinate beams.
   - Bloom’s Level: L4
4. **Locate the** centroid and **Compute** Moment of Inertia of regular and built up sections.
   - Bloom’s Level: L2, L4
5. **Apply** the basic principles of Work, Power and Energy to solve the effects of forces on rigid bodies in motion.
   - Bloom’s Level: L3

Program Outcome of this course (POs)
1. Graduates shall be able to understand and apply the basic mathematical and scientific concepts that underlie the field of Civil Engineering.
   - PO No.: PO1
2. Graduates shall possess the ability to identify the societal needs, formulate appropriate solutions and meaningfully contribute to major civil engineering design projects.
   - PO No.: PO3
3. Graduates shall be capable of working productively in team with meaningful contribution as a member and with leadership attributes.
   - PO No.: PO4
4. Graduates shall be proficient in the core principles of Civil Engineering such as Environmental Engineering, Geotechnical Engineering, Structural Engineering and Water Resources Engineering, and shall be able to apply these principles in engineering practice.
   - PO No.: PO10

Course delivery methods
1. Lecture and board
2. PPT
3. Video
4. E-material such as NPTEL, Edusat etc.

Assessment methods
1. Internal assessment tests
2. Assignments and Open book tests
3. Quiz
4. SEE
Scheme of Continuous Internal Evaluation (CIE):

<table>
<thead>
<tr>
<th>Components</th>
<th>Average of best two IA tests out of three</th>
<th>Average of assignments (Two) / activity</th>
<th>Quiz</th>
<th>Class participation</th>
<th>Total Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Marks: 50</td>
<td>2 / 5</td>
<td>1 / 0</td>
<td>05</td>
<td>1 / 0</td>
<td>5 / 0</td>
</tr>
</tbody>
</table>

- Writing two IA test is compulsory.
- Minimum marks required to qualify for SEE: 20

Self-Study topics shall be evaluated during CIE (Assignments and IA tests) and 10% weightage shall be given in SEE question paper.

Scheme of Semester End Examination (SEE):
1. It will be conducted for 100 marks of 3 hours duration. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2. Minimum marks required in SEE to pass: 40 out of 100
3. Question paper contains 08 questions each carrying 20 marks. Students have to answer FIVE full questions. SEE question paper will have two compulsory questions (any 2 units) and choice will be given in the remaining three units.

I/II Semester B.E.
Problem Solving with C
(Common to all branches)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>18CCP14/24</th>
<th>Credits</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course type</td>
<td>ES</td>
<td>CIE Marks</td>
<td>50 marks</td>
</tr>
<tr>
<td>Hours/week: L-T-P</td>
<td>4 – 0 – 0</td>
<td>SEE Marks</td>
<td>50 marks</td>
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<tr>
<td>Total Hours:</td>
<td>45</td>
<td>SEE Duration</td>
<td>3 Hours for 100 marks</td>
</tr>
</tbody>
</table>

Course learning objectives
1. To understand the basic of problem solving techniques
2. To provide an insight of programming constructs in C
3. To understand the need of structured programming
4. To illustrate the operations on arrays and strings
5. To give details of modular programming

Unit – I 9 Hours

Problem solving using flowchart and algorithm: Algorithms and Flowcharts with examples
Basics of C language: Introduction, Character Set, Basic Structure of C programs, C Tokens: Keywords and Identifiers, Variables, Constants, Data-types, Declaration of Variables, Assigning Values to Variables, Defining Symbolic Constants, Declaring Variable as Constant.
Unit – II 9 Hours

Decision Making and Branching
Introduction, Decision Making with IF Statement, Simple if, if..else, Nested if….else statements (excluding Dangling else problem), else..if ladder, Switch statement, The ?: Operator, The goto statement.

Decision Making and Looping
Introduction, while statement, do statement, for statement, jumps in loops.

9 Hours

Unit – III

Arrays: Introduction, One-Dimensional Arrays, Declaration of 1-D Array, Initialization of 1-D Arrays, Searching (Linear and Binary Search) and Sorting (Bubble Sort), Two-Dimensional Arrays, Initialization of 2-D Arrays, Memory Layout.

9 Hours

Unit – IV

Character Arrays and Strings: Introduction, Declaring and Initializing String Variables, Reading from terminal and Writing strings to screen, Arithmetic Operations on Characters, Putting strings together, Comparison of two strings, String Handling Functions, Table of strings.

9 Hours

Unit – V

User-defined Functions: Introduction, Need for User-Defined functions, A Multi-function Program, Elements of User-Defined Functions, Definition of Functions, Return Values and their types, Function Calls, Function Declaration, Category of Functions, No Arguments No Return Values, Arguments but No Return Values, Arguments with Return Values, No Arguments but returns a value.

Text Books:

Reference Books::

Course Outcomes (COs)
At the end of the course, the student will be able to

1. Explain the major C programming concepts
2. Design/Develop a computer program to solve real world problems of different requirements.
3. Select most suitable data structures for writing well structured program.
4. Analyze problem statement and choose suitable constructs to write efficient program
5. Use modular programming concept to design and develop solutions to complex problems

Bloom’s Level

PO No.
Program Outcome of this courses (POs)

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

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<tbody>
<tr>
<td>1. Lecture &amp; Board</td>
<td>1. Internal assessment</td>
</tr>
<tr>
<td>2. Power-point Presentation</td>
<td>2. Assignment</td>
</tr>
<tr>
<td>3. Video lectures</td>
<td>3. Quiz</td>
</tr>
<tr>
<td>4. Class Room Exercises</td>
<td></td>
</tr>
</tbody>
</table>

**Scheme of Continuous Internal Evaluation (CIE):**

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<td>25</td>
<td>10</td>
<td>5</td>
<td>10</td>
<td>50</td>
</tr>
</tbody>
</table>

- Writing two IA test is compulsory.
- Minimum marks required to qualify for SEE : 20

**Scheme of Semester End Examination (SEE):**

1. It will be conducted for 100 marks of 3 hours duration. It will be reduced to 50 marks for the calculation of SGPA and CGPA.

2. Minimum marks required in SEE to pass: 40 (out of 100)

3. Question paper contains 08 questions each carrying 20 marks. Students have to answer FIVE full questions. SEE question paper will have two compulsory questions (any 2 units) and choice will be given in the remaining three units.
I/II Semester B.E.
Applied Chemistry Laboratory
(Common to all branches)

<table>
<thead>
<tr>
<th>Subject Code:</th>
<th>18CHL15/25</th>
<th>Credits:</th>
<th>1.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course Type:</td>
<td>BS</td>
<td>CIE Marks:</td>
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<tr>
<td>Hours/week: L – T – P</td>
<td>0-0-3</td>
<td>SEE Marks:</td>
<td>25</td>
</tr>
<tr>
<td>Total Hours:</td>
<td>30</td>
<td>SEE Duration:</td>
<td>3 Hours</td>
</tr>
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</table>

Course Learning Objectives (CLOs):
1. To understand the principle behind instrumental methods of analysis.
2. To understand the principle behind the determination of molecular weight of a polymer, adsorption isotherms and ion exchange.
3. To analyze water quality parameters like hardness, chloride, alkalinity etc.
4. To analyze quality parameters of alloys.

List of Experiments

Instrumental Experiments
1. Potentiometric estimation of FAS using standard K2Cr2O7 solution.
2. Colorimetric estimation of Copper.
5. Flame photometric estimation of Sodium and potassium.

Volumetric Experiments
1. Determination of hardness of water before and after Ion exchange process.
2. Determination of chloride content and total alkalinity of water.
3. Determination of percentage of Copper in Brass using standard Na2S2O3 solution.
5. Study of adsorption of oxalic acid on activated charcoal to prove the validity of Freundlich adsorption isotherms.

Open ended Project
1. Students have to select and demonstrate an open ended project related to chemistry.

Text Books:

Reference Books:
**Course Outcomes (COs)**
At the end of the course the students will be able to:
1. Explain and demonstrate the working principles of different instrumental techniques. [L2]
2. Explain and demonstrate the different volumetric methods of analysis. [L2]
3. Measure molecular weight of a polymer, conductivity of solutions, redox potentials, water quality parameters etc. [L3]
4. Analyze the alloys and demonstrate the adsorption isotherms. [L4]

**Program Outcomes (POs) of the course:**
1. An ability to apply knowledge of mathematics, science and engineering. [PO1]
   
2. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations. [PO5]
   
3. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. [PO12]

**Scheme of Continuous Internal Evaluation (CIE):**

<table>
<thead>
<tr>
<th>CIE</th>
<th>Conduct of Lab</th>
<th>10</th>
<th>25 Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Journal writing</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Open Ended Project</td>
<td>05</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

➢ Submission and certification of lab journal is compulsory to qualify for SEE.
➢ Minimum marks required to qualify for SEE : 13

**Scheme of Semester End Examination (SEE):**

<table>
<thead>
<tr>
<th>SEE</th>
<th>Initial write up</th>
<th>2*5 = 10</th>
<th>50 Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conduct of Experiments</td>
<td>2*10 = 20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Viva-voce</td>
<td>20</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Practical Examination (SEE) of 3 hours duration will be conducted for 50 marks. It will be reduced to 25 marks for the calculation of SGPA and CGPA.

- Submission and certification of Lab journal is compulsory to qualify for SEE
- Minimum marks required in SEE to pass: 20 out of 50 marks (10 out of 25 Marks)
- Viva-voce shall be conducted for individual student and not in a group
I/II Semester B.E.
C Programming Laboratory
(Common to all branches)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>18CPL16/26</th>
<th>Credits</th>
<th>1.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course type</td>
<td>ES</td>
<td>CIE Marks</td>
<td>25 marks</td>
</tr>
<tr>
<td>Hours/week: L-T-P</td>
<td>0 – 0 – 3</td>
<td>SEE Marks</td>
<td>25 marks</td>
</tr>
<tr>
<td>Total Hours:</td>
<td>36</td>
<td>SEE Duration</td>
<td>3 Hours</td>
</tr>
</tbody>
</table>

**Course learning objectives**

1. Understand working of computer hardware and Identify networking components.
2. Analyze real world problem and provide solution in the form of flowchart/algorithm.
3. Write a well documented C program for a given problem and implement the same.
4. Demonstrate good programming practices followed in the industry
5. Interpret/trace and debug the given C program.

**Pre-requisites : NIL**

**Computer Hardware**

1. Introduction to basic computer hardware
   - Name and identify various PC hardware components: USB Mouse, PS/2 Mouse, Keyboard, LCD/LED Monitor, VGA, HDMI, CAT5, CAT6, server, routers, fiber cable, Hard disk, RAM, CMOS battery, SMPS, cache, ROM, BIOS
2. To install different operating systems with dual boot
   - Install any two operating systems on a PC making it dual boot, including latest version of Ubuntu Linux, Windows
3. Introduction to computer networks and it’s components
   - Network Hub (4/8 ports), CAT6 cables network tool kit (Network crimper, Cable Tester, Wire stripper)
   - Connect 2-4 computers together using a network hub to create a LAN

**Demonstration Programs (Use of Turtle Simulator)**

1. Demonstrate a program to draw a square using turtle simulator.
2. Demonstrate a program to draw a line by switching control of turtle to right or left directions.
3. Demonstrate a program to draw a polygon using repeat command in turtle simulator.
4. Demonstrate a program to create a spiral using repeat command in turtle simulator.

**List of experiments (PART – A )**

1. Write a C program to read the details of the students like Name, Roll number, Division, Mobile number and Marks obtained in three subjects and display student details along with average marks.
2. Write a C program to find GCD and LCM of two numbers using Euclid’s Algorithm.
3. Write a C program to do the following:
   a. Count total number of digits for a given integer number.
   b. Reverse the given integer number and display the same on output screen.
4. Write a C program to read N numbers in an integer array and search for an element using linear search. Display the same with appropriate messages on the terminal.
5. Write a C program to reverse a given string without using library function and without using additional character array.
6. Write a function `area(int, int)` to find the area of triangle for a given base and height.

**List of experiments (PART – B )**

1. Design and develop an algorithm to evaluate the following polynomial series for \( n \) terms:
   \[
   \sin x = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \ldots
   \]
2. Develop an algorithm, implement and execute a C program that reads \( N \) integer numbers and arrange them in ascending order using Bubble Sort.
3. Design and develop a C function `isprime(num)` that accepts an integer argument and returns 1 if the argument is prime, a 0 otherwise. Write a C program that invokes this function to check whether a given number is prime or not.
4. Write a program to accept a string and a character from the user and perform the following:
   a. Return the number of occurrences of the accepted character.
   b. Strip the accepted character and print the string.

**Open Ended Experiments.**

1. The Income Tax slabs for individuals is described as follows:

<table>
<thead>
<tr>
<th>Income Slabs</th>
<th>Tax Rates</th>
</tr>
</thead>
<tbody>
<tr>
<td>i. Where the taxable income does not exceed Rs. 2,50,000/-</td>
<td>NIL</td>
</tr>
<tr>
<td>ii. Where the taxable income exceeds Rs. 2,50,000/- but does not exceed Rs. 5,00,000/-</td>
<td>10% of amount by which the taxable income exceeds Rs. 2,50,000/-</td>
</tr>
<tr>
<td>iii. Where the taxable income exceeds Rs. 5,00,000/- but does not exceed Rs. 10,00,000/-</td>
<td>Rs. 25,000/- + 20% of the amount by which the taxable income exceeds Rs. 5,00,000/-</td>
</tr>
<tr>
<td>iv. Where the taxable income exceeds Rs. 10,00,000/-</td>
<td>Rs. 125,000/- + 30% of the amount by which the taxable income exceeds Rs. 10,00,000/-</td>
</tr>
</tbody>
</table>

Write a C program to read the Taxable Income amount and calculate the Tax payable as per the rates displayed in the table above. The Taxable Income and Tax Payable must be printed with appropriate messages.

2. A bank ATM software implements a small transaction module that displays the following menu of options:
   1. Deposit Cash
   2. Withdraw Cash
   3. Check Balance
   4. Exit

Write a C program that reads a menu option as typed by the user and performs the required transaction until the user gives option 4 finally to exit from the program. Assume an opening
balance of Rs. 10,000 in the account. The program should not allow withdrawal, if the balance is insufficient. The program can use any looping construct as well as switch statement to process menu option.

**Demonstration Experiments**

1. Input/Output stream handling in C++
2. String Class in C++ and basic String manipulation functions

**Text Books:**


**Reference Books:**


**Course Outcome (COs)**

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

<table>
<thead>
<tr>
<th>Bloom’s Level</th>
<th>COs</th>
</tr>
</thead>
<tbody>
<tr>
<td>L3</td>
<td>1. Identify various parts of computer hardware.</td>
</tr>
<tr>
<td>L2</td>
<td>2. Explain concepts of C Programming</td>
</tr>
<tr>
<td>L3</td>
<td>3. Design/Develop a computer program to solve real world problems of different requirements.</td>
</tr>
<tr>
<td>L4</td>
<td>4. Analyze problem statement and choose suitable constructs to write efficient program</td>
</tr>
<tr>
<td>L3</td>
<td>5. Select most suitable data structures for writing well structured program.</td>
</tr>
</tbody>
</table>

**Program Outcome of this course (POs)**

<table>
<thead>
<tr>
<th>PO No.</th>
<th>POs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.</td>
</tr>
<tr>
<td>3</td>
<td>Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.</td>
</tr>
<tr>
<td>5</td>
<td>Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.</td>
</tr>
<tr>
<td>8</td>
<td>Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.</td>
</tr>
<tr>
<td>12</td>
<td>Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.</td>
</tr>
</tbody>
</table>
Assessment methods

2. Lab Internal Assessment.

Scheme of Continuous Internal Evaluation (CIE):

<table>
<thead>
<tr>
<th>Components</th>
<th>Conduct of the lab</th>
<th>Journal submission</th>
<th>Total Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Marks: 25</td>
<td>10</td>
<td>15</td>
<td>25</td>
</tr>
</tbody>
</table>

- Submission and certification of lab journal is compulsory to qualify for SEE.
- Minimum marks required to qualify for SEE: 13

Scheme of Semester End Examination (SEE):

<table>
<thead>
<tr>
<th>Components</th>
<th>Part A</th>
<th>Part B</th>
<th>Viva- Voce</th>
<th>Total Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum</td>
<td>Write Up</td>
<td>Write Up</td>
<td>20</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Program Flow</td>
<td>Program Flow</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>05</td>
<td>05</td>
<td>15</td>
<td></td>
</tr>
</tbody>
</table>

- It will be conducted for 50 marks of 3 hours duration. **It will be reduced to 25 marks for the calculation of SGPA and CGPA.**
- Student should execute two experiments one from Part A & one from Part B (including open ended experiments).
- Minimum marks required in SEE to pass: 20/50 (10/25)
  - Initial write up: 10 marks
  - Conduct of experiments, results and conclusion: 20 marks
  - Viva-voce: 20 marks
- Viva-voce shall be conducted for individual student and not in a group.

Note:
1. Computer Hardware and Simulator experiments will be not included in SEE.

I/II Semester B.E.
Workshop and Manufacturing Practices
(Common to all branches)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course type</th>
<th>Credits</th>
<th>CIE Marks</th>
<th>SEE Marks</th>
<th>SEE Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>18WSL17/27</td>
<td>BS</td>
<td>2.5</td>
<td>25</td>
<td>25</td>
<td>3 Hours for 50 marks</td>
</tr>
</tbody>
</table>

Course learning objectives
1. Introduction to different manufacturing methods in different fields of engineering
2. Practical exposure to different fabrication techniques
3. Creation of simple components using different materials
4. Exposure to some of the advanced and latest manufacturing techniques being employed in the industry
Workshop and Manufacturing Practices [Theory]

1. **Introduction to Fitting Operations**
   Types of marking tools and its applications, Measurement tools and its applications, least counts of measuring tools. [01 Hr]

2. **Manufacturing process of casting**
   Need of patterns, types of patterns, Need of risers, runner, gates, Sand molding, metal molding, Melting furnaces, pouring [01 Hr]

3. **Machine Shop**
   Lathe machine operations, Specifications, Types of tools, Machine accessories, Drilling machine operations and tools [03 Hrs]

4. **Sheet metal work**
   Development of surfaces and its applications, Types of joints, riveting, soldering, seam [02 Hrs]

5. **Welding Process**
   Introduction to Metal joining process, Types of electric welding, Gas welding, and variations of flames and its effects, Brazing [01 Hr]

**LIST OF EXPERIMENTS**

1. **Fitting** : (01 model)
   - Models of V/Tee/Square/Dovetail/Step/Semicircular/Quarter circle joints

2. **Casting** – (2 Models)
   - Model making using sand mold/graphite molds.

3. **Machine Shop** – (2 Models) using lathe and drilling machine.
   - Lathe machine operations: facing plain, center drilling step turning, thread cutting, and knurling.
   - Drilling machine operations: Drilling, reaming, tapping, counter sunk and counter bore.

4. **Sheet Metal / Soldering / seam joints** – (2 Models)
   - Models of rectangular Cone/ tray/ Prisms of Square/ Pentagon/ Hexagon/ Square Truncated Cone by developing the surfaces.
   - Model Joint types of soldering/ seam (single and double)/ riveting.

5. **Welding Process** – (2 Models) using Arc welding, gas welding, brazing, spot welding
   - Preparation of welding model joints : butt/ Lap (transverse / longitudinal)/ Tee fillet/ Corner/ Edge joint

   **Mini Project/ SEE: Preparing a model by combining minimum two manufacturing processes**

**Books**

Course Outcome (COs)

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

1. Understanding different manufacturing techniques and their relative advantages/disadvantages with respect to different applications.

2. The selection of a suitable technique for meeting a specific fabrication needs.

3. Acquire a minimum practical skill with respect to the different manufacturing methods and develop the confidence to design & fabricate small components for their project work and also to participate in various national and international technical competitions.

Bloom’s Level

L1

L2

L6

Program Outcome of this course (POs)

1. An ability to analyze and apply knowledge of engineering

2. An ability to design and conduct the experiments and analyze the application

3. An ability to function / perform in Multidisciplinary streams

3. An ability to use the techniques, skills and modern engineering tools necessary for engineering practices.

PO No.

PO1

PO3

PO5

PO6

Assessment methods

1. Use of various operations to prepare Model

2. Viva-Voce

3. Journal write-up/ Drawings of Model

Scheme of Continuous Internal Evaluation (CIE):

<table>
<thead>
<tr>
<th>Components</th>
<th>Conduct of the lab</th>
<th>Journal submission</th>
<th>Mini Project</th>
<th>Total Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Marks: 25</td>
<td>15</td>
<td>05</td>
<td>05</td>
<td>25</td>
</tr>
</tbody>
</table>

➢ Submission and certification of lab journal is compulsory to qualify for SEE.

➢ Minimum marks required to qualify for SEE: 13 out of 25

Scheme of Semester End Examination (SEE):

1. It will be conducted for 50 marks of 3 hours duration. It will be reduced to 25 marks for the calculation of SGPA and CGPA.

2. Minimum marks required in SEE to pass:

3. Conduct of experiments Any one job using two or more operations = 30 marks

Viva- voce 20 marks

50 marks
II Sem
Mathematics
II Semester
Integral Calculus and Laplace Transforms
(Common to all branches)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>18MAT21</th>
</tr>
</thead>
<tbody>
<tr>
<td>Credits</td>
<td>4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course type</th>
<th>BS</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIE Marks</td>
<td>50 marks</td>
</tr>
<tr>
<td>SEE Marks</td>
<td>50 marks</td>
</tr>
<tr>
<td>Total Hours</td>
<td>40</td>
</tr>
<tr>
<td>SEE Duration</td>
<td>3 Hours for 100 marks</td>
</tr>
</tbody>
</table>

Course learning objectives

1. Learn Differential Equations of first and second order and apply them.
2. Be proficient in Laplace Transforms and solve problems related to them.
3. Get acquainted with Inverse Laplace transform and solution of
differential equations using Laplace Transforms.
4. Get acquainted with Double and Triple Integration and employ them to evaluate area and volume.
5. Study the concept of Vector Integration and its applications.

Pre-requisites:

1. Basic Differentiation and Integration
2. Trigonometry
3. Vector Algebra

Unit – I 8 Hours

Differential Equations:

Unit – II 8 Hours

Laplace Transforms:
Definition, Laplace Transforms of elementary functions. Laplace Transforms of \( e^{at}f(t) \), \( t^n f(t) \), \( \int_0^t f(t)dt \), \( \frac{f(t)}{t} \) (without proof), Periodic functions(with proof), Unit step function and Impulse function-Problems.

Unit – III 8 Hours

Inverse Laplace Transforms:
Unit – IV

Double And Triple Integrals:

Evaluation of Double Integrals, Evaluation by changing the order of Integration and changing into polar coordinates. Evaluation of Triple Integrals. Application of Double and Triple Integrals to find area and volume.

Unit - V 8 Hours

Vector Integration:

Line Integral, Surface Integral, Volume Integral, Green’s Theorem, Stoke’s Theorem, Gauss Divergence Theorem (statement only) and problems.

Text Books:


Reference Books:


Course Outcome (COs)

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

1. **Apply** the Differential Equations of first and second order to solve relevant problems.  
   **Bloom’s Level**  
   **L1, L3**
2. **Define** Laplace Transforms and **Solve** problems related to them.  
   **L1, L3**
3. **Find** Inverse Laplace transforms and **Solve** differential equations.  
   **L3**
4. **Evaluate** Double and Triple Integration. Calculate area and volume by using Double and Triple Integrals.  
   **L3**
5. **Explain** the concept of vector Integration.  
   **L2**

Program Outcome of this course (POs)

1. An ability to apply knowledge of Mathematics, science and Engineering.  
   **PO No.**  
   **PO1**
2. An ability to identify, formulate and solve engineering problems.  
   **PO5**
**Course delivery methods** | **Assessment methods**
---|---
1. Black board | 1. Internal Assessment
2. Power point presentation | 2. Quiz
3. | 3. Assignments

<table>
<thead>
<tr>
<th>Components</th>
<th>Average of best two IA tests out of three</th>
<th>Average of two assignments / activity</th>
<th>Quiz</th>
<th>Class participation</th>
<th>Total Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Marks: 50</td>
<td>25</td>
<td>10</td>
<td>5</td>
<td>10</td>
<td>50</td>
</tr>
</tbody>
</table>

- Writing two IA test is compulsory.
- Minimum marks required to qualify for SEE: Minimum total CIE marks 20

**Scheme of Semester End Examination (SEE):**

1. It will be conducted for 100 marks of 3 hours duration. It will be reduced to 50 marks for the calculation of SGPA and CGPA.

2. **Minimum marks required in SEE to pass:**

3. Question paper contains 08 questions each carrying 20 marks. Students have to answer FIVE full questions. SEE question paper will have two compulsory questions (any 2 units) and choice will be given in the remaining three units.