National Education Policy (NEP)
Scheme and Syllabus (I Year)
(Common to all Branches)
(With effect from 2021-22 Academic Year)

Bachelor Degree in Engineering
Outcome Based Education
with
Choice Based Credit System

P.E.S. College of Engineering, Mandya - 571 401, Karnataka
(An Autonomous Institution Affiliated to VTU, Belagavi)
Grant-in-Aid Institution (Government of Karnataka)
World Bank Funded College (TEQIP), Accredited by NBA, NAAC & Approved by AICTE, New Delhi.

P.E.S. ಕೊಲೇಜ್ ಆಫ್ ಇಂಗೇಂಜರಿ, ಮಂಡ್ಯ - 571 401, ಕರ್ನಾಟಕ
(ಆಟೋನ್ಯುಮೋಸ್ ಇಂಟೆರ್ನೈಷನ್ ಅಸ್ಸಿಕ್ಲ್ಯು ವಿ.ಟು., ಬೆಳಗಾವಿ)
ಗ್ರಾಂಟ್-ಇನ್-ಅಇಗ್ರೇಡ್ ಇನ್ಸ್ಟಿಟ್ಯುಟ್ (ಕರ್ನಾಟಕದ ಸರ್ಕಾರ)
ವರ್ಲ್ಡ್ ಬ್ಯಂಕ್ ಫುಂಡ್ ಕೋಲೇಜ್ (ಟೀಎಚ್ಯುಬಿಎಂ), ಅಕ್ಕೆಡೈಟ್ಡ್ ಆಬ್ಸ್ ನಾಸ್ಕ್ /ಆನ್ಡ್ ಆರುಬ್ಪ್ಲೇ ಆರ್ಪ್ಲೇಡ್ ಬ್ಯಾಜಿಟೆ, ನೀರ್ ದೇಲ್ಲಿ.

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Fax : 08232 – 222075
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NEP I and II Semester Syllabus [CBCS with OBE] w.e.f 2021-22 Academic Year

P.E.S. COLLEGE OF ENGINEERING, MANDYA
(An Autonomous Institution affiliated to VTU, Belagavi)
Bachelor of Engineering (I – Semester)
NEP Scheme of Teaching and Examination [CBCS with OBE]

### I – Semester [ Physics Group ]

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CIE: Continuous Internal Evaluation, SEE: Semester End Examination

AICTE Activity Points to be earned by the students admitted for BE Programme (For more details refer to Chapter 6, AICTE Activity Point Programme, Model Internship Guidelines): Over and above the academic grades, the BE regular student admitted to the 4 years Degree programme and every student entering 4 years Degree programme through lateral entry, shall earn 100 and 75 Activity Points respectively for the award of degree through AICTE Activity Point Programme. Students transferring from other institutions and Universities to the fifth semester are required to earn 50 Activity Points from the year of entry to PES College of Engineering, Mandya. The Activity Points earned shall be reflected on the student’s eighth semester Grade Card. The activities can be spread over the years, anytime during the semester weekends and holidays, as per the liking and convenience of the student from the year of entry to the programme. However, the minimum hours’ requirement should be fulfilled. Activity Points (non-credit) do not affect SGPA/CGPA and shall not be considered for vertical progression. In case students fail to earn the prescribed activity Points, the Eighth semester Grade Card shall be issued only after earning the required activity Points. Students shall be awarded for the degree only after the release of the Eighth semester Grade Card.
P.E.S. COLLEGE OF ENGINEERING, MANDYA
(An Autonomous Institution affiliated to VTU, Belagavi)
Bachelor of Engineering (II – Semester)
NEP Scheme of Teaching and Examination [CBCS with OBE]

II – Semester [ Physics Group ]

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II – Semester [ Chemistry Group ]

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### ENGINEERING MATHEMATICS-I

[As per Choice Based Credit System (CBCS) & OBE Scheme]

**SEMESTER - I**

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**Course Learning Objectives:** This course will enable students to:

- Apply principles of mathematics through Calculus and Differential Equations that serves as an essential tool in several engineering applications.
- Acquire knowledge of multivariate functions, types of derivatives involved with these functions and their applications.
- Appreciate the significance of vector differentiation and its applicability to Electromagnetic theory, Mechanics and other allied areas.
- Recognize and model differential equations, apply analytical techniques to compute solutions for engineering problems.

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<tr>
<th>UNIT – I</th>
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<tr>
<td><strong>Differential Calculus-I:</strong> Basics of Polar Coordinates. Polar curves- angle between the radius vector and the tangent, angle of intersection. Pedal equation (for polar curves) - problems only. Derivatives of arcs, curvature and radius of curvature-Cartesian, parametric, polar and pedal forms (No derivation)-Problems only. Centre and circle of curvature: Applications to evolutes and involutes.</td>
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<tr>
<td><strong>Self-Study Component:</strong> Review of Differential Calculus, nth derivative of standard functions and Leibnitz’s rule.</td>
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<td><strong>Differential Calculus-II:</strong> First fundamental theorem of Differential Calculus-Lagrange’s and Cauchy’s mean value theorem (statement only) - Illustrative examples, Taylor’s theorem for a function of single variable and Maclaurin’s series expansion (statement only) Illustrative examples. Indeterminate forms- L’Hospital’s rule (without proof), 0x∞, ∞-∞, 0^0, ∞^0 and 1^∞.</td>
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<td><strong>Self-Study Component:</strong> Continuity and Differentiability, Rolle’s theorem and its geometric interpretation, indeterminate forms [\frac{0}{0}] and [\frac{\infty}{\infty}].</td>
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<th>UNIT – III</th>
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<tr>
<td><strong>Partial Differential Calculus:</strong> Introduction to Partial Differential Calculus-Partial Differentiation and problems, Euler’s theorem and Euler’s extension theorem (No proof-problems only). Total derivatives-differentiation of composite and implicit functions-Problems. Vector differentiation: Differentiation of vectors/scalar point functions. Velocity and acceleration of a particle moving on a space curve. Gradient of a scalar point function, directional derivative –Problems only. Divergence and curl, solenoidal and irrotational vector fields-Problems only.</td>
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<td><strong>Self-study component:</strong> Elementary problems of partial differentiation, vector identities.</td>
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### UNIT – IV

| **Integral Calculus:** Reduction formulae for $\int \cos^n x$, $\int \sin^n x$, $\int \sin^m x \cos^n x$ and evaluation of these with limits $[0, \pi/2]$. Differentiation under integral sign (integrals with constant limits). Tracing of curves and its applications connected with standard curves viz., Cissoids, Astroid in parametric form and Cardioids. Application of integrals to area, length, volume and surface area of solids of revolution. |
|-----------------|----------------|
| **Self study component:** Reduction formula for $\int \tan^n x$, $\int \sec^n x$ and its reciprocals, Tracing of curves: Cycloid, Strophoid. |

### UNIT – V

| **Ordinary Differential Equations-I:** (ODE’s)- solutions of first order and first degree differential equations; reducible to homogeneous equation, Exact and reducible to Exact equations, Bernoulli equations. Applications of first order and first degree ODE’s-orthogonal trajectories of Cartesian and polar curves. Newton’s cooling, simple L-R circuits and Laws of decay and growth-Illustrative examples from engineering field. |
|----------------|----------------|
| **Self study component:** Solution of ODE by Variable separable and homogeneous types, Linear Equations. |

### Course Outcomes:

- **CO – 1:** Apply the knowledge of calculus to solve problems related to polar curves and its applications in determining the bentness of a curve.
- **CO – 2:** Explain mean value theorems and evaluate indeterminate form and power series using Taylor’s and Maclaurin’s series.
- **CO – 3:** Differentiate the function of several variables and composite functions. Evaluate the vector differentiation.
- **CO – 4:** Evaluate some standard integrals by applying reduction formula and solve application problems.
- **CO – 5:** Solve differential equations of first order and solve application problems in engineering field.

### Text Book(s):


### Reference Book(s):


### Web and Video link(s):

1. [https://www.youtube.com/watch?v=czt5Wmj_rvI](https://www.youtube.com/watch?v=czt5Wmj_rvI)
2. [https://nptel.ac.in/courses/111/105/111105121/](https://nptel.ac.in/courses/111/105/111105121/)
3. [https://nptel.ac.in/courses/111/106/111106100/](https://nptel.ac.in/courses/111/106/111106100/)
## COURSE ARTICULATION MATRIX [Engineering Mathematics-I - P21MA101]

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3 – HIGH, 2 – MEDIUM, 1 - LOW
ENGINEERING PHYSICS
[As per Choice Based Credit System (CBCS) & OBE Scheme]

SEMESTER – I / II

Course Code: P21PH102 / 202
Credits: 03

Teaching Hours/Week (L:T:P): 2:2:0
CIE Marks: 50

Total Number of Teaching Hours: 40
SEE Marks: 50

Course Learning Objectives: This course will enable the students to:

- Define the laws and principles of Physics used in the topics of the course pertaining to the engineering field.
- Explain the concepts and theories used in the topics to understand the properties and applications relevant to engineering field.
- Build a foundation in formulating the expressions for the quantities and solve the problems by applying the knowledge of Mathematical science pertaining to engineering and technology.

UNIT – I

Quantum Mechanics

8 Hours

Quantum theory of radiation: Properties of photons, Assumptions of Planck’s law of radiation, Planck’s radiation formula (Qualitative).


Wave function: Statement, Physical significance and properties. Definitions for Eigen functions and Eigen values. Time-independent one dimensional Schrodinger’s wave equation. Applications: Particle in one dimensional potential well – Expression for Eigen functions, Eigen values and normalized wave function - Numerical Problems.

Pedagogy
- Chalk and talk; power point presentation and videos.
- Self-study component: Concept of Black body radiation spectrum, Wien’s law, Rayleigh-Jean’s law, Stefan-Boltzmann’s law and their limits.
- Practical Topics: Stefan’s law; Planck’s constant.

UNIT – II

Properties of Engineering Materials

8 Hours

Elastic materials: Concept of elasticity, definition for stress and strain, different elastic moduli, Poisson’s ratio and its limits. Relation between the elastic constants and expression for poisson’s ratio in terms of elastic constants. Expression for bending moment of a beam with rectangular cross section. Applications: Couple per unit twist of a wire; I - shaped girders.


Pedagogy
- Chalk and talk; power point presentation and videos.
- Self-study component: Hooke’s law and stress-strain diagram. Application of
**NEP I and II Semester Syllabus [CBCS with OBE] w.e.f 2021-22 Academic Year**

<table>
<thead>
<tr>
<th><strong>UNIT – III</strong></th>
<th><strong>Electrical Conductivity in Solids</strong></th>
<th><strong>8 Hours</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Metals:</strong> Quantum free electron theory – Assumptions, Fermi Dirac Statistics (qualitative), Fermi level, Fermi energy, Fermi temperature, Fermi velocity and Fermi factor. Variation of Fermi factor with Energy and temperature, Expression for density of states. Mention the expression for Fermi energy and Electron density. Merits of quantum free-electron theory.</td>
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</tr>
<tr>
<td><strong>Semiconductors:</strong> Classification of Semiconductors, Fermi level in intrinsic and extrinsic semiconductors. Expression for electron concentration in conduction band and Mention the expression for hole concentration in valance band of an intrinsic semiconductor. Relation between $E_F$ and $E_g$. Expression for conductivity and resistivity of an intrinsic semiconductor in terms of mobility of charge carriers. Numerical Problems.</td>
<td></td>
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</tr>
</tbody>
</table>
| **Pedagogy** | ➢ Chalk and talk; power point presentation and videos.  
➢ **Self-study component:** Expressions for carrier concentration, conductivity and resistivity in terms of energy gap of an intrinsic semiconductor.  
➢ **Practical Topics:** Fermi energy, Energy gap of a semiconductor; Transistor Characteristics. |

<table>
<thead>
<tr>
<th><strong>UNIT – IV</strong></th>
<th><strong>Photonics</strong></th>
<th><strong>8 Hours</strong></th>
</tr>
</thead>
</table>
| **Pedagogy** | ➢ Chalk and talk; power point presentation and videos.  
➢ **Self-study component:** Construction and working of Ruby LASER. Application of Optical fibre: Sensors.  
➢ **Practical Topics:** Wavelength of LASER source by diffraction; Optical fibre; Newton’s rings. |

<table>
<thead>
<tr>
<th><strong>UNIT – V</strong></th>
<th><strong>Technical Acoustics</strong></th>
<th><strong>8 Hours</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Architectural Acoustics:</strong> Absorption, reverberation and time of reverberation, Sabine’s formula (Mention the expression), Factors affecting acoustics of a building and their remedies.</td>
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</tr>
<tr>
<td><strong>Ultrasonics:</strong> Introduction, Principle, Measurement of ultrasonic velocity in liquids. Application: Non-destructive method of testing the materials.</td>
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</tr>
</tbody>
</table>
| **Pedagogy** | ➢ Chalk and talk; power point presentation and videos.  
➢ **Self-study component:** Basics of SHM; free, damped and forced vibrations (Qualitative). |
### Practical Topics:
Spring constant; Ultrasonic interferometer; LCR resonance.

### Course Outcomes:
On completion of this course, students are able to:

<table>
<thead>
<tr>
<th>Course Outcomes with Action verbs for the Course topics – Quantum Mechanics, Properties of the Materials, Conductivity in Solids, Photonics and Technical Acoustics.</th>
<th>Bloom’s Taxonomy Level</th>
<th>Level Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO1 Recall the fundamental Definitions or Laws of physics relevant to Engineering field.</td>
<td>Remember</td>
<td>L1</td>
</tr>
<tr>
<td>CO2 Mention the various Properties and Applications by understanding the course topics pertaining to Engineering field.</td>
<td>Understanding</td>
<td>L2</td>
</tr>
<tr>
<td>CO3 Explain various Concepts and Principles used in the topics to understand the theory related to Engineering field.</td>
<td>Understanding</td>
<td>L2</td>
</tr>
<tr>
<td>CO4 Derive the expressions for the Physical Quantities on the topics of the course by applying the theory relevant to Engineering field.</td>
<td>Applying</td>
<td>L3</td>
</tr>
<tr>
<td>CO5 Solve the numerical problems by applying proper solutions to verify the theoretical concepts related to Engineering field.</td>
<td>Applying</td>
<td>L3</td>
</tr>
</tbody>
</table>

### Text Book(s):

### Reference Book(s):

### Web and Video link(s):
1. Quantum Mechanics: https://youtu.be/xlrvgLUsKqU
2. Lasers: https://youtu.be/Ab1nxkxgjH8

### E-Books/Resources:
- http://de.physnet.net/PhysNet/education.html
- http://hyperphysics.phy-astr.gsu.edu/hbase/hframe.html
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<tr>
<th>COs</th>
<th>PO1</th>
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<th>PO3</th>
<th>PO4</th>
<th>PO5</th>
<th>PO6</th>
<th>PO7</th>
<th>PO8</th>
<th>PO9</th>
<th>PO10</th>
<th>PO11</th>
<th>PO12</th>
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<th>PSO2</th>
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3 – HIGH, 2 – MEDIUM, 1 - LOW
ENGINEERING CHEMISTRY
[As per Choice Based Credit System (CBCS) & OBE Scheme]

SEMESTER – I / II

<table>
<thead>
<tr>
<th>Course Code:</th>
<th>P21CH102 / 202</th>
<th>Credits:</th>
<th>03</th>
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<tbody>
<tr>
<td>Teaching Hours/Week (L:T:P):</td>
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<td>CIE Marks:</td>
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</tr>
<tr>
<td>Total Number of Teaching Hours:</td>
<td>40</td>
<td>SEE Marks:</td>
<td>50</td>
</tr>
</tbody>
</table>

Course Learning Objectives: The course will enable the students to

- Impart the basic knowledge of chemistry and its principles involved in electrochemistry, energy storage devices and its commercial applications.
- Understand the basic principles of corrosion and its prevention, metal finishing and its technological importance
- Master the knowledge of synthesis, properties and utilization of engineering materials like composites, lubricants, cement and polymers.
- Apply the knowledge of Green Chemistry, principles for production of chemical compounds. Understanding the concepts of synthesis of nano-materials.
- Understand the theory, basic principle and applications of liquid crystals and Analytical instruments.

General Instructions:

i. These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.
ii. Lecturer method (L) does not mean only the traditional lecture method, but different type of teaching methods may be adopted to develop the outcomes.
iii. Show Video/animation films to explain methods of synthesis of non materials.
iv. Encourage collaborative (Group Learning) Learning in the class.
v. Ask at least three higher order thinking questions in the class, which promotes critical thinking.
vi. Adopt Problem Based Learning (PBL), which fosters student’s analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
vii. Topics will be introduced in a multiple representation.
viii. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
ix. Discuss how every concept can be applied to the real world - and when that's possible, it helps to improve the students understanding.

UNIT – I

Electrochemical energy and solar energy:

Chemical energy: Fuels: Introduction, Definition, importance of fuels, calorific value, types, fluidized bed catalytic cracking, knocking( Petrol engine), mechanism and its ill effects, biodiesel, power alcohol, octane and cetane number.


Energy storage Systems: Battery technology: Introduction, Classification, characteristics,
construction, working and applications of Li-ion battery, Ni-MH battery, Silver oxide-Zinc battery.

**Solar Energy:** Introduction, construction, working and applications of photovoltaic cell.

**Green fuel:** Hydrogen-production by photo catalytic water splitting method, storage and applications of Hydrogen. Construction, working and applications of Methanol-Oxygen fuel cell (H₂SO₄ as electrolyte)

<table>
<thead>
<tr>
<th>Pedagogy</th>
<th>Electrochemistry and energy systems - chalk and talk method, power point presentation, <strong>Practical topic:</strong> Determination of pKa value of weak acid using glass electrode. Energy storage Systems - Power point presentation, <strong>YouTube videos</strong> for Li-ion battery construction and working. <strong>Self-study component:</strong> recycling of Lithium-ion batteries, Solar Energy and types of fuel cells - you tube videos, chalk and talk method.</th>
</tr>
</thead>
</table>

**UNIT – II**  8 Hours

**Corrosion technology and it’s control:**


<table>
<thead>
<tr>
<th>Pedagogy</th>
<th>Chalk and talk method and power point presentation - Electrochemical theory of corrosion, Factors affecting the rate of corrosion, Types of corrosion and corrosion control. Technological importance. Electroplating: Introduction. <strong>Videos:</strong> Electroplating of chromium, electro less plating of nickel &amp; copper <strong>Self-study component:</strong> Organic coatings: Paint, components of paints and their functions. Varnish, definition, differences between paints and varnishes.</th>
</tr>
</thead>
</table>

**UNIT – III**  8 Hours

**Engineering Materials and Technology:**

**Composites:** Introduction, constitution, classification. Types: Particle, fiber, fiber glass, hybrid and reinforced Composites with applications.

**Lubricants:** Introduction, Classifications, functions, Properties- Viscosity index, Flash point, oiliness, cloud point, ash point and applications of lubricants.

**Cement:** Types of cement, constituents, properties of cement. Determination of percentage of CaO in cement.

**Polymers:** Introduction, Synthesis and applications of Polyurethane, polycarbonates, araldite (Epoxy resin), Kevlar, butyl rubber, Thiokol.

**Conducting Polymers:** Synthesis & Mechanism of conduction in poly acetylene.

**Biodegradable polymers:** Introduction and their requirements. Synthesis and properties of Poly lactic acid. Applications of biodegradable polymers in medical industry.

| Pedagogy | Chalk and talk method and power point presentation - Polymers, Conducting Polymers. |
**Self-study component:** Lubricants. Determination of CaO in cement.

<table>
<thead>
<tr>
<th>UNIT – IV</th>
<th>8 Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Green Chemistry:</strong></td>
<td></td>
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<tr>
<td><strong>Nano materials:</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Pedagogy</strong></td>
<td>Chalk and talk/power point presentation - Basic principles of green chemistry, size dependent properties of nanomaterials. Nanoscale materials: Fullerenes, Carbon nanotubes and graphenes – properties and applications. <strong>Videos:</strong> Various green chemical approaches, Synthesis of nano materials: Top down and bottom up approaches, Synthesis by Sol-gel, precipitation and chemical vapour deposition. <strong>Self-study component:</strong> Atom economy.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>UNIT – V</th>
<th>8 Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Water technology:</strong></td>
<td></td>
</tr>
<tr>
<td>Introduction, sources and impurities in water, portable water; meaning and specifications (as per WHO standards), Hardness of water, types, determination of hardness using EDTA titration, softening of hard water by ion- exchange process. Numerical problems on hardness of water. Biological oxygen demand (BOD) and Chemical Oxygen Demand (COD) with Numerical problems on COD. Determination of COD of industrial waste water. Purification of water for town supply.</td>
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<tr>
<td><strong>Instrumental methods of analysis:</strong></td>
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<tr>
<td>Introduction, Theory, Instrumentation and applications of colorimetry, Flame Photometry, Potentiometry, Conductometry.</td>
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</tr>
<tr>
<td><strong>Liquid Crystals:</strong></td>
<td>Introduction, Classification-Thermo-tropic and Lyo-tropic with example. Applications of liquid crystals in electronic and computer instruments and in medicine.</td>
</tr>
<tr>
<td><strong>Electroluminescence:</strong></td>
<td>Definition, Electroluminescent colors for various colors, Preparation of LED, Synthesis of poly (p-phenylene vinylene) PPV and its applications.</td>
</tr>
<tr>
<td><strong>Photoresist:</strong></td>
<td>Components, requirements, types of photo resist. Reactions in two components: positive and negative photoresist.</td>
</tr>
</tbody>
</table>
Pedagogy

Chalk and talk/power point presentation – principles of water technology. Instrumental methods of analysis and liquid crystals.

**Practical topic:** Volumetric titrations, instrumental methods.

**Self-study component** - definition of equivalent weight, acidity, basicity, primary and secondary standards. Requirement of a primary standard solution, units of standard solutions (normality, molarity, molality, mole fraction, ppm)

**Text books:**

**Reference books:**

**Web links and Video Lectures (e-Resources):**
- [https://www.youtube.com/watch?v=faESCaW9k](https://www.youtube.com/watch?v=faESCaW9k)
- [https://www.youtube.com/watch?v=TBqXMWaxZYM&list=PLyhmwFtznRhuz8L1bb3X-9ibHrDMjHWW](https://www.youtube.com/watch?v=TBqXMWaxZYM&list=PLyhmwFtznRhuz8L1bb3X-9ibHrDMjHWW)
- [https://www.youtube.com/watch?v=j5Hml6KN4TI](https://www.youtube.com/watch?v=j5Hml6KN4TI)
- [https://www.youtube.com/watch?v=X9GHBdyYcyo](https://www.youtube.com/watch?v=X9GHBdyYcyo)
- [https://www.youtube.com/watch?v=1xWBPZnEJk8](https://www.youtube.com/watch?v=1xWBPZnEJk8)
- [https://www.youtube.com/watch?v=wRAo-M8xBHM](https://www.youtube.com/watch?v=wRAo-M8xBHM)

**Course Outcomes:** On completion of this course, students are able to:

<table>
<thead>
<tr>
<th>COs</th>
<th>Course Outcomes with <strong>Action verbs</strong> for the Course topics – Electrochemical Energy, Corrosion, Properties of the Materials, Green chemistry, Water technology, Liquid crystals, Electroluminescence and Nano materials.</th>
<th>Bloom’s Taxonomy Level</th>
<th>Level Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO1:</td>
<td>Recollect the fundamental Definitions or Laws of Chemistry relevant to Engineering field.</td>
<td>Remember</td>
<td>L1</td>
</tr>
<tr>
<td>CO2:</td>
<td>Discuss the various Properties and Applications by understanding the course topics pertaining to Engineering field.</td>
<td>Understanding</td>
<td>L2</td>
</tr>
<tr>
<td>CO3:</td>
<td>Explain various Concepts and Principles used in the topics to understand the theory related to Engineering field.</td>
<td>Understanding</td>
<td>L2</td>
</tr>
<tr>
<td>CO4:</td>
<td>Describe the Synthesis and applications of materials in the engineering field.</td>
<td>Applying</td>
<td>L2</td>
</tr>
<tr>
<td>CO5:</td>
<td>Solve the numerical problems by applying proper solutions to verify the theoretical concepts related to engineering.</td>
<td>Applying</td>
<td>L3</td>
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<tr>
<td>COs</td>
<td>PO1</td>
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<td>CO-5</td>
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</table>

3 – HIGH, 2 – MEDIUM, 1 - LOW
ENGINEERING MECHANICS
[As per Choice Based Credit System (CBCS) & OBE Scheme]
SEMESTER – I / II

Course Code: P21CV103 / 203 Credits: 03
Teaching Hours/Week (L:T:P): 3:0:0 CIE Marks: 50
Total Number of Teaching Hours: 40 SEE Marks: 50

UNIT – I 8 Hours
INTRODUCTION: Basic idealization of mechanics, particle, rigid body, mass, time, continuum, force, force system, system of units, principle of transmissibility of forces, principle of superposition.

COPLANAR CONCURRENT FORCE SYSTEM: Resultant of forces. Resolution of forces, Composition of coplanar concurrent, parallel and non-concurrent forces, Moment of a force, Varignon’s theorem, free body diagram, equilibrant, equilibrium of particles and rigid bodies.

Self-Study Component: Application of triangle and polygon Law, vector method of resolution and Composition of forces.

UNIT – II 8 Hours
SUPPORT REACTIONS: Types of loads and types of supports, statically determinant beams, Numerical problems on support reactions for beams with point loads (normal and inclined), uniformly distributed load, uniformly varying load and moment.

FRICTION: Introduction, types of friction, laws of friction, angle of friction, angle of repose, cone of friction, characteristics of dry friction, application – body on horizontal plane and inclined plane and ladder friction.

Self-Study Component: Numerical problems on support reaction of beams loaded with trapezoidal loads, Support reactions for Compound beams and wedge friction - numerical problems.

UNIT – III 8 Hours
CENTROID AND CENTRE OF GRAVITY: Introduction to centroid and centre of gravity, Centroid of rectangular, triangular, circle, semicircle, quarter circle lamina and sector from first principles. Numerical problems on Centroid of composite lamina.

Self-Study Component: Determining Centroid for Composite Lamina with openings.

UNIT – IV 8 Hours

Self-Study Component: Determining moment of Inertia of Composite sections with reference to given axis.

UNIT – V 8 Hours
DYNAMICS: Introduction to dynamics, Classification, linear and curvilinear motion- projectiles, centripetal and centrifugal forces, banking/super elevation.
Introduction to work, power and energy, impulse – numerical problems.

Self-Study Component: Concept of motion with varying acceleration. Collision of elastic bodies.
Course Outcomes: On completion of this course, students are able to:

| CO – 1: | Apply the knowledge of basic science and mathematics to classify the force systems and compute its resultant. |
| CO – 2: | Analyse the system of forces in equilibrium with or without frictional forces. |
| CO – 3: | Locate the centroid and composite moment of inertia of irregular and built up sections. |
| CO – 4: | Analyse the problems with respect to linear motion, curvilinear motion and energy. |

Text Book(s):

Reference Book(s):
1. Ramamrutham S: A text book of applied mechanics, Dhanpatrai and sons

Course Articulation Matrix [Engineering Mechanics - P21CV103 / 203]

<table>
<thead>
<tr>
<th>COs</th>
<th>PO1</th>
<th>PO2</th>
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3 – HIGH, 2 – MEDIUM, 1 - LOW
PROBLEM SOLVING THROUGH C
[As per Choice Based Credit System (CBCS) & OBE Scheme]

SEMINAR – I / II

<table>
<thead>
<tr>
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<tr>
<td>Total Number of Teaching Hours:</td>
<td>40</td>
<td>SEE Marks:</td>
<td>50</td>
</tr>
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</table>

Course Learning Objectives:

1. Compose step by step procedure/flow diagram to solve a given problem
2. Identify the appropriate data and its type for the given problem
3. Apply programming constructs of C language to solve the real-world problem
4. Explore user-defined data structures like arrays, structures and pointers in implementing solutions to the problems
5. Design and Develop solutions to problems using functions
6. To process the large data stored in files

UNIT I

8 HOURS


Overview of C: Basic structure of C program, Variables and Data Types, Constants, Operators and expressions.

Self-Study Component: Execution of c program, Evaluation of Expression.

UNIT II

8 HOURS

Managing Input and Output Operations: scanf(), printf()(unformatted)

Decision making and Branching: Simple if statement, if…else statement, nested if…else statement, switch statement.

Decision making and looping: While statement, do statement and for statement, unconditional branching: break, continue, return.

Self-Study Component: Formatted Input and Output, unconditional branching: Go To statements, else…if ladder.

UNIT III

8 HOURS

Arrays: 1D- declaration and initialization of 1D arrays, 2D- declaration and initialization of 2D arrays, operations on strings without using built-in functions.

Self-Study Component: Multi-dimensional Arrays, String handling functions (strlen, strcpy, strrev, strcat, strcmp).

UNIT IV

8 HOURS

User-defined Functions: Elements of user-defined functions, categories of functions, parameter passing technique- call by value and call by reference.

Structures and Unions: Structure-Defining a structure, declaring structure variable, accessing structure variables, structure initialization, arrays of structure, Unions- Defining union, declaring union variable, accessing union variables.

Self-Study Component: passing arrays to functions, passing string to functions, size of structures, Bit fields.
UNIT V 8 HOURS

**Pointers:** Understanding pointers, declaring pointer variables, initialization of pointer variables, accessing a variable through its pointers, pointer to an array.

**File Management in C:** Definition, Declaration, Operations on files.

**Self-Study Component:** Operations on pointers, error handling during I/O operations.

**Course Outcomes:**

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

**CO1:** Compose step by step procedure /flow diagram to solve a given problem

**CO2:** Identify the right data types based on the requirements of the problem

**CO3:** Apply suitable programming constructs of C language and/or suitable data structures to solve the given problem

**CO4:** Analyse and Identify the errors in given code snippet and determine the output

**CO5:** Design and develop solutions to problems using structured or modular programming concept

**Text Book(s):**


**Reference Book(s):**


**Web and Video link(s):**

1. [https://nptel.ac.in/courses/106/105/106105171/](https://nptel.ac.in/courses/106/105/106105171/)

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**Course Articulation Matrix [Problem Solving through C - P21CS103 / 203]**

<table>
<thead>
<tr>
<th>COs</th>
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3 – HIGH, 2 – MEDIUM, 1 - LOW
# ELEMENTS OF MECHANICAL ENGINEERING

[As per Choice Based Credit System (CBCS) & OBE Scheme]

## SEMESTER – I / II

<table>
<thead>
<tr>
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<th>P21ME104 / 204</th>
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**Relevance of the course:** This course provides the essential basic knowledge of mechanical engineering science to all the students belonging to different disciplines of engineering.

## UNIT-I

* **8 HOURS**

**Introduction:** Role of mechanical engineering science in technology, definitions with examples: Prime movers, Mechanisms, Machines, & Machine Tools.

**Source of Energy:** Conventional (Fossil fuels, hydel energy) and Non-Conventional (Solar flat plate collector, Wind, Tidal, Geothermal, Bio-gas and Nuclear).

**Properties of steam:** Formation of steam with constant pressure, type and properties of steam-specific volume, internal energy and dryness fraction (numerical problems).

Self-Learning Component: Present energy resources in India and its sustainability, opportunities and obstacles to renewable energy for the present and future.

## UNIT-II

* **8 HOURS**

**Energy Conversion Systems:**

- **Steam turbine:** Introduction, classification, working principle of impulse & reaction turbines.

- **Gas turbine:** Introduction, classification, working principle of open and closed type.

- **Hydraulic turbine:** Introduction, classification, working principle of impulse (Pelton Wheel) & reaction (Francis) turbines.

- **IC Engines:** Classification, parts & its nomenclature, 4 stroke petrol and diesel engines (P-V diagram of Otto & Diesel cycles), diesel engine vs petrol engine, simple numericals on engine performance parameters - indicated power, brake power, indicated thermal efficiency, brake thermal efficiency, mechanical efficiency and specific fuel consumption. Automobiles - Transmission systems, suspension system, E-Vehicles, Hybrid vehicles.

Self-Learning Component: Working principle of MPFI and CRDI system

## UNIT-III

* **8 HOURS**

**Refrigeration & Air Conditioning:** Introduction, types of refrigerants & their properties, working of vapour compression refrigeration system, window and split air conditioners, simple numericals on COP of refrigerator.

**Power Transmission:** Belt Drives: Flat belt drives-open and cross (No derivation), slip & creep, velocity ratio, and idler pulley (No numerical). Gear drives: Classification of gears, velocity ratio for simple and compound gear trains (No derivation and numerical).

### UNIT-IV 8 HOURS

**Manufacturing Processes and Machine Tools:**
- **Castings processes:** Patterns & moulding, hot working and cold working.
- **Metal forming processes:** Extrusion, drawing, rolling, forging, forging operations.
- **Metal Joining Processes:** Soldering, Brazing, Arc Welding & Gas Welding.

**Machine Tools:**

**Self-Learning Component:** Super finishing operations- lapping and honing.

### UNIT-V 8 HOURS

**Modern Manufacturing Technologies:**
- **Non-conventional manufacturing:** Working principle and applications of EDM, ECM and WJM, Additive manufacturing: Definition, classification, advantages and dis-advantages, Basics of 3-D printing technology.
- **Robotics:** Introduction, joints and links, end effectors, common robot configurations; Cartesian, cylindrical, polar and spherical coordinates. Sensors in robotics, applications of robots.
- **Automation:** Introduction, types of Automation, Computer Numerical Control (CNC) machines: Basic elements of CNC, advantages and disadvantages.

**Self-Learning Component:** Working principle of servo and stepper motors.

### Course Outcomes:

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

**CO1:** Identify the basic concept and fundamentals of mechanical engineering and understanding of technical and operational features.

**CO2:** Describe the working principle of energy sources, energy conversion and power transmission systems in terms of societal and environmental aspects.

**CO3:** Understand and Explain the conventional and non-conventional methods of manufacturing process.

**CO4:** Identify various automation of manufacturing process encountered in engineering practice.

### Text Book(s):

### Reference Book(s):
Web and Video link(s):
1. https://www.youtube.com/watch?v=Zgp86PVVXuQ (Energy resources)
2. https://nptel.ac.in/courses/112/103/112103249/ (Hydraulic Machines)
3. https://www.youtube.com/watch?v=c52hm-IJPJw (Types of Boilers)
4. https://nptel.ac.in/courses/112/103/112103262/ (I C Engine)
5. https://nptel.ac.in/courses/112/105/112105128/ (Refrigeration)
6. https://nptel.ac.in/courses/116/102/116102012/ (Notes on Drives)
7. https://nptel.ac.in/courses/112/107/112107213/ (Manufacturing and Joining)
8. https://nptel.ac.in/courses/112/105/112105233/ (Metal forming Processes)
9. https://nptel.ac.in/courses/112/105/112105211/ (CNC)
10. https://nptel.ac.in/courses/112/105/112105249/ (Robotics)

Course Articulation Matrix [Elements of Mechanical Engineering - P21ME104 / 204]

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3 – HIGH, 2 – MEDIUM, 1 - LOW
# COMPUTER-AIDED ENGINEERING DRAWING

[As per Choice Based Credit System (CBCS) & OBE Scheme]

## SEMESTER – I / II

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### Relevance of the course:
The course aims at imparting the knowledge of drafting skills, enhancing imagination and visualization capacity of the students.

## UNIT-I  
**4 HOURS**

**Orthographic Projections of Points:** Introduction to drawing standards, creation of 2D environment using CAD software, principles of orthographic projections, projections of points in all the four quadrants.

## UNIT-II  
**6 HOURS**

**Orthographic Projections of Lines:** Projections of straight lines using first angle projection, true and apparent lengths, true and apparent inclinations with reference planes.

## UNIT-III  
**8 HOURS**

**Orthographic Projections of Plane Surfaces:** Triangle, square, rectangle, pentagon, hexagon and circular plates resting on HP in different positions by change of position method only.

## UNIT-IV  
**12 HOURS**

**Projections of Solids:** Projections of hexahedron, right regular prisms, cylinders, pyramids and cones resting on HP.

## UNIT-V  
**10 HOURS**

**Isometric Projections:** Introduction to isometric scale, isometric projection of cube, right regular prisms, pyramids, cylinders, cones, spheres, cut spheres, frustums of cones and pyramids in simple positions, combination of solids (Maximum of two solids).

### Course Outcomes:

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

- **CO1:** Understand basics of engineering graphics and use of computer tools to create simple geometries.
- **CO2:** Recognize the location of the object with respect to the reference planes and draw its orthographic views.
- **CO3:** Create simple two dimensional objects, draw their orthographic views and show the dimensions.
- **CO4:** Draw the isometric projection of regular solids.

### Text Book(s):


### Reference Book(s):

### A. Evaluation Scheme

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<td>Questions to Answer: 03</td>
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**Unit I & II to be evaluated only through CIE**
- Test: 20
- Submission: 30

**SEE**
- Questions to be Set: 06
- Questions to Answer: 03

**Scheme for Semester End Examination**
- One out of two Questions from unit III: 15 Marks
- One out of two Questions from unit IV: 20 Marks
- One out of two Questions from unit V: 15 Marks

**Total**: 50 Marks

### Course Articulation Matrix

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**3 – HIGH, 2 – MEDIUM, 1 - LOW**

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NEP I and II Semester Syllabus [CBCS with OBE] w.e.f 2021-22 Academic Year

P.E.S. College of Engineering, Mandya

Page No.: SY - 23
BASIC ELECTRICAL ENGINEERING  
[As per Choice Based Credit System (CBCS) & OBE Scheme]  
SEMINER – I / II

Course Code: P21EE105 / 205  Credits: 03
Teaching Hours/Week (L:T:P): 2:2:0  CIE Marks: 50
Total Number of Teaching Hours: 40  SEE Marks: 50

Course Learning Objectives: This course will enable students to:

- Analyze the basic concepts of single phase and three phase AC circuits.
- Describe the working of DC & AC Machines.
- Discuss the concept of Green energy & Power system

UNIT – I  8 Hours
Single Phase AC circuits
Generation of sinusoidal AC voltage, Definition of Average value, RMS value, Form factor and Peak factor of sinusoidally varying voltage and current, meaning of lagging and leading of sinusoidal wave, Real power, Reactive power, Apparent power and Power factor, Analysis of RL, RC & RLC series circuits & problems, parallel circuits (only problems)

Self-Study Component: Analysis of series - parallel circuits

UNIT – II  8 Hours
DC Generator & Motors
DC Generator: Working principle of DC machine as generator and motor, constructional features, EMF equation of generator, types of armature winding, types of DC generators, problems on EMF equation.

DC Motor: Back EMF and its significance, types of DC motors, torque equation of DC motor and numerical problems, Applications of DC Motors

Self-Study Component: Construction & Working of Special motors

UNIT – III  8 Hours
Three Phase AC circuits & Induction motors
Three Phase AC circuits: EMF Generation, Necessity and advantages of three phase system, Phase sequence, balanced supply and load, relationship between line and phase values for balanced star and delta connections

Induction motors: Concept of rotating magnetic field, principle of operation, types and constructional features, Slip and its significance, Illustrative examples

Self-Study Component: Measurement of 3-Phase power by Two wattmeter method

UNIT – IV  8 Hours
Transformer & Alternator
Transformers: Principle of operation and construction of single phase transformers (core and shell type), EMF equation, power losses, efficiency, illustrative problems on EMF equation and efficiency only.
**Synchronous Generators:** Principle of operation, Types and constructional features, EMF equation numerical problems of emf equation

**Self-Study Component:** Regulation of Transformer & winding factors of alternators

**UNIT – V**  
8 Hours

**Green Energy & Basics of Power systems**

**Green Energy:** Concept of renewable energy sources, Types, working of solar and wind energy system.

**Power system:** Introduction, Single Line Diagram of AC Power Transmission System

Safety & Protection: Electric shock & Precautions, HRC Fuse, circuit breaker & its types

Earthing: necessity & working of pipe earthing

**Self-Study Component:** Working of Biomass energy source

**Course Outcomes:** On completion of this course, students are able to:

CO – 1: Analysis of single phase AC circuits.

CO – 2: Illustrate the working DC Machine as a Generator and Motor

CO – 3: Analyze the three phase AC circuits and explain the working of three phase induction motor.

CO – 4: Discuss the working of transformer and alternator.

CO – 5: Describe the concept of green energy and basics of power systems.

**Text Book(s):**

**Reference Book(s):**

**Web and Video link(s): Basic Electrical Technology**
1. [https://nptel.ac.in/courses/108/108/108108076/](https://nptel.ac.in/courses/108/108/108108076/)
# Basic Electronic Devices and Circuits

*As per Choice Based Credit System (CBCS) & OBE Scheme*

## SEMESTER - I

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### Course Learning Objectives:

This course will enable students to:

1. Understand the principles and operation of semiconductor devices, circuits and communication system.
2. Analyze the circuits by applying the knowledge of devices and circuits.
3. Design primitive analog and digital circuits.

### UNIT – I

#### 8 Hours

**Diode Applications:** Introduction, Load-line analysis, Series diode configuration, Parallel and series – parallel configurations, Sinusoidal inputs Half Wave Rectification, Full wave rectification, Zener diodes.

**Power Supplies:** Introduction, General filter considerations, Capacitor filter.

Text 1: 2.1 to 2.4, 2.6, 2.7, 2.11, 15.1 to 15.3.

#### Self-Study Component:

Other diode applications like Clipper and clamper circuits

### UNIT – II

#### 8 Hours

**Field-Effect Transistors:** Depletion-Type MOSFET, Enhancement-Type MOSFET.

**FET Biasing** (Only voltage divider method): Depletion-Type MOSFET, Enhancement-Type MOSFET.

**FET Amplifiers:** Depletion-Type MOSFET, Enhancement-Type MOSFET, E-MOSFET Voltage divider configuration.

**Feedback and Oscillator Circuits:** Feedback Amplifier—Phase and Frequency Considerations

Text 1: 6.7, 6.8, 7.7, 7.8, 8.8, 8.9, 8.11, 14.4.

#### Self-Study Component:

LC Tank circuit, Hartley, Colpitts and RC phase shift oscillators

### UNIT – III

#### 8 Hours


**Op-Amp Applications:** Constant-Gain Multiplier, Voltage Summing, Voltage Buffer, Controlled Sources, Instrumentation Circuits (Instrumentation Amplifier Only), Active Filters (First order LPF and HPF Filters).

Text 1: 10.1, 10.4, 10.5, 10.9, 11.1 to 11.6.

#### Self-Study Component:

Opamp precision rectifiers
UNIT – IV

Digital logic: Switching and Logic levels, Digital Waveforms, Logic gates.
Digital Electronics: Introduction, Number Systems, Boolean Algebra Theorems, Example of Combinational Circuits,
Boolean algebra and Combinational Circuit: Binary number systems, Number Conversion, Binary Arithmetic, Signed Numbers, Hexadecimal Number Systems, Hexadecimal to Binary and Binary to Hexadecimal conversion, Hexadecimal Arithmetic, Algebraic simplification, NAND and NOR Implementation


UNIT – V


Text 2: 18.1, 18.2, 18.3, 18.3.1, 18.3.3, 18.4, 18.6, 18.7, 18.8, 18.9, 18.10, 18.11, 18.12, 18.13, 18.14, 18.15, 18.16, 18.17, 18.18, 18.21, 18.22.

Self-Study Component: GSM, GPS

Course Outcomes: On completion of this course, students are able to:

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<td>CO – 1: Apply the knowledge of physics and mathematics to understand the principle of devices, number system, circuits and communication system.</td>
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<td>CO – 2: Analyze the analog and digital circuits.</td>
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<td>CO – 3: Design circuits for rectification, regulation, amplification and filtering.</td>
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<td>CO – 4: Design the combination logic circuit.</td>
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Program Outcome Addressed (PO#) with BTL PO1[L1,L2] PO2[L3] PO2,PO3[L3, L4], PO2,PO3[L3, L4].

Text Book(s):

Reference Book(s):

5. Electronic Principles, 7e, by Albert Malvino and David J. Bates, Mcgraw Hill Education. ISBN: 978-00-706-3424-4


Web and Video link(s):

COURSE ARTICULATION MATRIX (Basic Electronic Devices and Circuits - P21EC105 / 205)

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BASIC MECHANICAL ENGINEERING SCIENCE LABORATORY
[As per Choice Based Credit System (CBCS) & OBE Scheme]
SEMESTER – I/II

Course Code: P21MEL106 / 206
Credits: 01

Teaching Hours/Week (L:T:P): 0:0:2
CIE Marks: 50

Total Number of Teaching Hours: 26
SEE Marks: 50

Relevance of the course: The course aims at making the students to understand, the use of different fabrication techniques, characteristics of fuels and to provide basic knowledge of robotics, CNC through activity based environment to develop kinesthetic skills for students.

PART – A
12 Hours
1. Metal joining processes – soldering, brazing and welding. 3hrs
2. Determination of flash and fire point of lubricating oils. 2hrs
3. Demonstration on lathe milling, drilling, grinding and CNC Machine tools. 3hrs
4. Demonstration on fitting and tapping methods. 2hrs
5. Study of four wheeler chassis layout. 2hrs

PART – B
14 Hours
1. Use of planimeter to calculate area of irregular shape. 2hrs
2. Calibration of pressure gauge and thermocouple 3hrs
3. Hands on training on co-ordinate system of robots. 3hrs
4. Hands on training on sensing and actuation system in robots. 3hrs
5. Study of dismantle and assembling of petrol and diesel engines 3hrs

Course Outcomes: On completion of this course, students are able to:
1. Learn the concepts of metal joining process, calibration of thermocouple and pressure gauge.
2. Test lubrication oil for flash and fire points, measure area of irregular shapes using planimeter.
3. Study the assembling, dissembling of engines and working of conventional machine tools.
4. Create a learning environment by training to evaluate applications of robots and its features.

Text Book(s) / Reference Book(s):

A. Evaluation Scheme

<table>
<thead>
<tr>
<th>Scheme</th>
<th>Weightage</th>
<th>Marks</th>
<th>Event Break Up</th>
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<tr>
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<td>50%</td>
<td>50</td>
<td>Test 20</td>
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<tr>
<td><strong>SEE</strong></td>
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B. Scheme for Semester End Examination

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<tr>
<th>Event</th>
<th>Marks</th>
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<tbody>
<tr>
<td>Part –A</td>
<td>20 Marks</td>
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<tr>
<td>Part -B</td>
<td>20 Marks</td>
</tr>
<tr>
<td>Viva – Voice</td>
<td>10 Marks</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>50 Marks</strong></td>
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</tbody>
</table>
## Course Articulation Matrix (Basic Mechanical Engineering Science Laboratory - P21MEL106 / 206)

<table>
<thead>
<tr>
<th>COs</th>
<th>PO1</th>
<th>PO2</th>
<th>PO3</th>
<th>PO4</th>
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C PROGRAMMING LABORATORY
[As per Choice Based Credit System (CBCS) & OBE Scheme]

SEMESTER – I/II

<table>
<thead>
<tr>
<th>Course Code:</th>
<th>P21CSL106 / 206</th>
<th>Credits:</th>
<th>01</th>
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<th>CIE Marks:</th>
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</table>

<table>
<thead>
<tr>
<th>Total Number of Teaching Hours:</th>
<th>26 Hrs</th>
<th>SEE Marks:</th>
<th>50</th>
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</thead>
</table>

OBJECTIVES
1. To design the given problem using Flowchart/Algorithms
2. To introduce students to the basic knowledge of fundamentals of C language.
3. To impart writing skill of C programming to the students in solving the problems.
4. To apply the concepts like looping, array, functions, pointers, file, structure for the given Problem.

Programs List

1. A Person invest Rs. 1000.00 in a saving account yielding 5% interest. Assuming all interest is left on deposit in the account. Calculate & print the amount of money in the account at the end of each year for n years. Use the following formula for determining these amounts
   \[ a = p(1+r)^n \]
   where
   \[ p \rightarrow \text{Principal (original amount invested)} \]
   \[ r \rightarrow \text{the annual interest rate} \]
   \[ n \rightarrow \text{number of years} \]
   \[ a \rightarrow \text{amount on deposit at the end of } n^{th} \text{ year} \]

2. Create a BMI (Body mass Index) that reads the person weight in kg & height in meters then calculate & displays the body mass index. Your application should display the following information [BMI = weight(kg)/height (m)^2]
   BMI Values:
   - Under weight: less than 18.5
   - Normal: 18.5 to 24.9
   - Over weight: 25 to 29.9
   - Obese: 30 or greater

3. Write a program that will help an elementary school student to learn multiplication. Use the \texttt{rand()} to produce two positive one-digit integers. The program should then prompt the user with a question, such as:
   How much is 6 times 7?
   The student then inputs the answer. Next, the program checks the student’s answer. If it is correct, display the message “Very good!” and ask another multiplication question. If the answer is wrong, display the message “No. Please try again” and let the student try the same question repeatedly until the student finally gets it right.

4. Write a Program to read name and grade of n students. Display the number of students who received each grade (both lower- & upper-case letters are allowed). Check for the validity of grades (S, A, B, C, D, E, F).

5. Write a program to find the value of \( y = 2x^2 + x + 1 \), where \( x \) varies from -3 to +3 in step of 0.1
6. Write a program to evaluate the following series up to given accuracy
   \[ e^x = 1 + x/1! + x^2/2! + \ldots \ldots \]

7. Write a program to read a sentence & replace every character by next character in the alphabet set [z/Z by a/A]

8. Write a program that uses 2D array to store daily maximum temperature of four different cities and print the average weekly temperature of each city.

9. Write a program to check whether the given n numbers are sorted or not. If not sorted, call the function by name BUBBLE_SORT to sort the elements.

10. Create a structure called complex with data member as real and imaginary. Write a program to perform addition and multiplication of two complex numbers.

11. Write a program to store n integer data in a file and find their sum. Write the sum to another file

12. Write a program to find the sum of all the element of an array using pointers

**Course outcomes**

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

1. Apply knowledge of C constructs to design and develop programs/applications
2. Conduct practical experiments for demonstrating features of C using Turbo C.

**Text Book(s):**


**Reference Book(s):**

1. Reema Thareja, Programming in C, Oxford University Press

**COURSE ARTICULATION MATRIX [C Programming Laboratory - P21CSL106/206]**

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<thead>
<tr>
<th>COs</th>
<th>PO1</th>
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ENGINEERING PHYSICS LABORATORY
[As per Choice Based Credit System (CBCS) & OBE Scheme]

SEMESTER – I/II

<table>
<thead>
<tr>
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<th>Credits:</th>
<th>01</th>
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<td>CIE Marks:</td>
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<tr>
<td>Total Number of Teaching Hours:</td>
<td>26</td>
<td>SEE Marks:</td>
<td>50</td>
</tr>
</tbody>
</table>

Course Learning Objectives: This course will enable students to:

- Identify the laws or principles of physics on which the experiments are working relative to Engineering field.
- Setup the experiment or construct the circuit to perform the experiments pertaining to Engineering applications.
- Apply the knowledge of mathematical science to calculate or analyse the results correlated with theory pertaining to Engineering field.

<table>
<thead>
<tr>
<th>PART – A</th>
<th>Non-Circuit Experiments</th>
<th>12 Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Newton’s ring - Determination of wavelength of the given monochromatic source.</td>
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<tr>
<td>2. Uniform bending - Determination of the Young’s modulus of the given material.</td>
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<tr>
<td>3. Diffraction grating - Determination of wavelength of the given LASER source.</td>
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<tr>
<td>4. Torsional pendulum - Determination of Rigidity modulus of the given material.</td>
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<tr>
<td>5. Optical fibre - Determination of acceptance angle, V-parameter and number of modes of optical fibre.</td>
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<tr>
<td>6. Hooke’s law – Determination of spring constant and verification of series and parallel combination of springs.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>PART – B</th>
<th>Circuit Experiments</th>
<th>12 Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>7. Transistor - Draw the output characteristics of a transistor in CE-mode and hence find output resistance, current gain and current amplification factor.</td>
<td></td>
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</tr>
<tr>
<td>8. Capacitor - Determination of the dielectric constant of a material by charging and discharging method of a capacitor</td>
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<tr>
<td>9. Fermi energy - Determination of the Fermi energy and Fermi temperature of a given metal.</td>
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<tr>
<td>10. Stefan-Boltzmann law - Verification of Stefan’s 4th power law of radiation.</td>
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<tr>
<td>11. Planck’s Radiation law - Determination of wavelengths of different LED’s and Planck’s constant.</td>
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<tr>
<td>12. LCR resonance circuits - Determination of self-inductance of a given coil.</td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PART – C</th>
<th>Open Ended Experiments</th>
<th>2 Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>13. Ultrasonic Interferometer - Determination of velocity of ultrasonics and compressibility of the given liquid.</td>
<td></td>
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<tr>
<td>14. Semiconductor - Determination of energy gap of a given semiconductor by four probe method.</td>
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</tbody>
</table>
Course Outcomes: On completion of this course, students are able to:

<table>
<thead>
<tr>
<th>COs</th>
<th>Course Outcomes with Action verbs for the Engineering Physics Laboratory Course – Experiments related to the theory Course.</th>
<th>Bloom’s Taxonomy Level</th>
<th>Level Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO1</td>
<td>Recall the laws or Principles of Physics on which the Experiments are working related to engineering field.</td>
<td>Remember</td>
<td>L1</td>
</tr>
<tr>
<td>CO2</td>
<td>Develop the practical knowledge to setup the experiments related to Engineering field.</td>
<td>Understanding</td>
<td>L2</td>
</tr>
<tr>
<td>CO3</td>
<td>Construct the circuits to perform the experiments pertaining to Engineering applications.</td>
<td>Understanding</td>
<td>L2</td>
</tr>
<tr>
<td>CO4</td>
<td>Identify the proper instruments or tools by knowing their concepts of working to take accurate readings.</td>
<td>Understanding</td>
<td>L2</td>
</tr>
<tr>
<td>CO5</td>
<td>Apply the knowledge of mathematics to calculate/analyse the results in correlation with the theory.</td>
<td>Applying</td>
<td>L3</td>
</tr>
</tbody>
</table>

Text Book(s):


Reference Book(s):

2. C.L. Arora, Practical physics, S. Chand Publication.

Web and Video link(s):

1. https://drive.google.com/file/d/1HRgO_thOLs8CbT9WSlW-5HHpg_64Iy5E/view?usp=sharing

COURSE ARTICULATION MATRIX [Engineering Physics Laboratory - P21PHL107 / 207]

<table>
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<th>PO4</th>
<th>PO5</th>
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<th>PO10</th>
<th>PO11</th>
<th>PO12</th>
<th>PSO1</th>
<th>PSO2</th>
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3 – HIGH, 2 – MEDIUM, 1 - LOW
# ENGINEERING CHEMISTRY LABORATORY

[As per Choice Based Credit System (CBCS) & OBE Scheme]

## SEMESTER – I/II

<table>
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<th>Course Code</th>
<th>Credits</th>
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<tr>
<td>P21CHL107 / 207</td>
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| Teaching Hours/Week (L:T:P) | 0:0:2    | 26        |

### Course Learning objectives:
- Instrumental methods for developing experimental skills in building technical competence.
- Quantitative analysis of materials by volumetric analysis.

### Sl. No. | PART- A | Instrumentation Experiments
---|---------|-------------------------
1 | Potentiometric estimation of FAS using standard potassium dichromate solution. |
2 | Estimation of acid mixture by Conductometric method. |
3 | Determination of viscosity coefficient of an organic liquid using Ostwald’s viscometer. |
4 | Determination of concentration of copper by colorimetric method. |
5 | Determination of pKa value of a given weak acid using pH meter. |

### PART- B

#### Volumetric experiments

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Description</th>
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<tbody>
<tr>
<td>1</td>
<td>Determination of Chemical Oxygen Demand (COD) of industrial waste water</td>
</tr>
<tr>
<td>2</td>
<td>Estimation of % of iron in the given rust solution using standard potassium dichromate solution.</td>
</tr>
<tr>
<td>3</td>
<td>Determination of % of copper in brass using standard sodium thiosulphate solution.</td>
</tr>
<tr>
<td>4</td>
<td>Estimation of Total hardness of water by EDTA complex-metric method.</td>
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<tr>
<td>5</td>
<td>Estimation of CaO in cement solution by rapid EDTA method.</td>
</tr>
</tbody>
</table>

### Demonstration Experiments

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Flame photometric estimation of Sodium &amp; Potassium.</td>
</tr>
<tr>
<td>2</td>
<td>Determination of dissolved oxygen in water by Winkler method.</td>
</tr>
</tbody>
</table>

### Course outcomes:

On completion of this course, student are able to:

**CO-1** Determine the pKa value of weak acid and coefficient of Viscosity of a given organic liquid.

**CO-2** Estimate the amount of substance present in the given solution using Potentiometer Conductometric and Colorimetric analysis

**CO-3** Determine the total hardness and chemical oxygen demand in the given water sample by volumetric analysis method

**CO-4** Determine the percentage of CaO, Copper and Iron in the given analyte solution by titration method.

**CO-5** Demonstrate flame photometric estimation of sodium & potassium and Determination of dissolved oxygen in water by Winkler method.
Text Books:

Reference books:

Course Learning Objectives: This course will enable students to:
- Identify the laws or principles of Chemistry on which the experiments are working relative to engineering field.
- Setup the experiment or preparation of solutions to perform the experiments pertaining to engineering applications.
- Apply the knowledge of Chemical science to calculate the results correlated with theory pertaining to engineering field.

Course Outcomes: On completion of this course, students are able to:

<table>
<thead>
<tr>
<th>COs</th>
<th>Course Outcomes with Action verbs for the Engineering Chemistry Laboratory Course – Experiments related to the theory.</th>
<th>Bloom’s Taxonomy Level</th>
<th>Level Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO1</td>
<td>Recall the Principles of Chemistry on which the Experiments are working related to engineering field.</td>
<td>Remember</td>
<td>L1</td>
</tr>
<tr>
<td>CO2</td>
<td>Develop the practical knowledge to setup the Experiments related to Engineering field.</td>
<td>Understanding</td>
<td>L2</td>
</tr>
<tr>
<td>CO3</td>
<td>Preparation of standard solutions to perform the experiments pertaining to Engineering applications.</td>
<td>Understanding</td>
<td>L2</td>
</tr>
<tr>
<td>CO4</td>
<td>Identify the proper instruments or glassware’s by knowing their concepts and working principles to take accurate results.</td>
<td>Understanding</td>
<td>L2</td>
</tr>
<tr>
<td>CO5</td>
<td>Apply the knowledge of Chemistry to calculate/analyze the results in correlation with the theory.</td>
<td>Applying</td>
<td>L3</td>
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</tbody>
</table>

COURSE ARTICULATION MATRIX [Engineering Chemistry Laboratory - P21CHL107/207]

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3 – HIGH, 2 – MEDIUM, 1 - LOW
HEALTH AND WELLNESS

[As per Choice Based Credit System (CBCS) & OBE Scheme]

SEMESTER – I/II

Course Code: P21AEC109A / 209A Credits: 01
Teaching Hours/Week (L:T:P): 0:2:0 CIE Marks: 50
Total Number of Teaching Hours: 14 SEE Marks: 50

Course Learning Objectives: This course will enable students to:

- To know about Health and wellness (and its Beliefs)
- To acquire Good Health & It’s balance for positive mind-set
- To Build the healthy lifestyles for good health for their better future
- To Create of Healthy and caring relationships to meet the requirements of MNC and LPG world To learn about Avoiding risks and harmful habits in their campus and outside the campus for their bright future
- To Prevent and fight against harmful diseases for good health through positive mindset.

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.

- Teachers shall adopt suitable pedagogy for effective teaching - learning process.
  The pedagogy shall involve the combination of different methodologies which suit modern technological tools and software’s to meet the present requirements of the Global employment market.
  i. Direct instructional method (Low /Old Technology),
  ii. Flipped classrooms (High/advanced Technological tools),
  iii. Blended learning (combination of both),
  iv. Enquiry and evaluation based learning,
  v. Personalized learning,
  vi. Problems based learning through discussion,
  vii. Following the method of expeditionary learning Tools and techniques,
- Apart from conventional lecture methods, various types of innovative teaching techniques through videos, animation films may be adapted so that the delivered lesson can progress the students In theoretical applied and practical skills in teaching of the concepts of Health and Wellness in general.

UNIT – I INTRODUCTION 5 Hours

1. Meaning, Definition and dimensions of Health and Wellness (WHO/Yoga)
2. Factors affecting Fitness and Wellness
3. Role of Fitness in maintaining Health and Wellness
4. Importance of Health Education and Wellness

UNIT – II Methods to Maintain Health and Wellness 5 Hours

1. Role of Physical Activities and Recreational Games for Health and Wellness
2. Role of Yogasanas and Meditation in maintaining Health and Wellness
3. Nutrition for Health & Wellness
UNIT – III | Anxiety, Stress and Aging | 4 Hours
---|---|---
1. Meaning of Anxiety, Stress and Aging
2. Types and Causes of Stress
3. Stress relief through Exercise and Yoga

**Course Outcomes:** On completion of this course, students are able to:

- CO 1: To understand Health and wellness (and its Beliefs)
- CO 2: To acquire Good Health & It’s balance for positive mindset
- CO 3: To inculcate and develop the healthy lifestyle habits for good health.
- CO 4: To adopt the innovative & positive methods to avoid risks from harmful habits in their campus & outside the campus.
- CO 5: To positively fight against harmful diseases for good health through positive mindset.

**Text Book(s) / Reference Book(s):**

1. AAPHERD “Health related Physical Fitness Test Manual.” 1980 Published by Association drive Reston Virginia

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The student has to obtain a minimum of 40% of maximum marks in both CIE and SEE.

**Continuous Internal Evaluation:**

- TWO Unit Tests each of 40 Marks (duration 01 hours) (All tests are similar to the SEE pattern i.e. question paper pattern is MCQ)
- Two assignments each of 10 Marks.
- At the end of the Semester, Two Unit Tests and assignments average marks will be considered as CIE i.e. for 50 Marks.

**Semester End Exam (SEE):**

- SEE is conducted for 50 marks (1-hour duration). SEE paper will be set for 25 questions of each of 02 marks. The pattern of the question paper is MCQ. The time allotted for SEE is 01 hour.
ECOLOGY AND ENVIRONMENT  
[As per Choice Based Credit System (CBCS) & OBE Scheme]  
SEMESTER – I/II

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**Course Learning Objectives (CLOs):**

1. To identify the major challenges in environmental issues and evaluate possible solutions.
2. Develop analytical skills, critical thinking and demonstrate socio-economic skills for sustainable development.
3. To analyze an overall impact of specific issues and develop environmental management plan.

**Course Content**

<table>
<thead>
<tr>
<th>UNIT – I</th>
<th>5 Hours</th>
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<table>
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<tr>
<th>UNIT – II</th>
<th>5 Hours</th>
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<tbody>
<tr>
<td>Air Pollution &amp; Automobile Pollution: Definition, Effects – Global Warming, Acid rain &amp; Ozone layer depletion, controlling measures.</td>
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<tr>
<td>Solid Waste Management, E-Waste Management &amp; Biomedical Waste Management - Sources, Characteristics &amp; Disposal methods.</td>
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<tr>
<th>UNIT – III</th>
<th>5 Hours</th>
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</table>

**Course outcomes**

1. Understand the principles of ecology and environmental issues that apply to air, land, and water issues on a global scale,
2. Develop critical thinking and/or observation skills, and apply them to the analysis of a problem or question related to the environment,
3. Demonstrate ecology knowledge of a complex relationship between biotic and abiotic components
4. Apply their ecological knowledge to illustrate and graph a problem and describe the realities that managers face when dealing with complex issues

Books and References:
Text Books
5. R Rajagopalan, “Environmental Studies – From Crisis to Cure”, Oxford University Press, 2005,

Assessment Details (both CIE and SEE)
The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The student has to obtain a minimum of 40% of maximum marks in both CIE and SEE.

Continuous Internal Evaluation:
- TWO Unit Tests each of 40 Marks (duration 01 hours) (All tests are similar to the SEE pattern i.e. question paper pattern is MCQ)
- Two assignments each of 10 Marks.
- At the end of the Semester, Two Unit Tests and assignments average marks will be considered as CIE i.e. for 50 Marks.

Semester End Exam (SEE):
SEE is conducted for 50 marks (1-hour duration). SEE paper will be set for 25 questions of each of 02 marks. The pattern of the question paper is MCQ. The time allotted for SEE is 01 hour.
Employability Enhancement Skills (EES) - I  
[As per Choice Based Credit System (CBCS) & OBE Scheme]  
SEMESTER - I

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<td>SEE Marks:</td>
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Course Learning Objectives: This course will enable students to:

- Get introduced to some of the concepts of soft skills and enhance communication skills
- Recognize common mistakes done by an individual in the course of his / her communication
- Write effective emails
- Identify their strengths, weakness, opportunities and threats
- Understand the basic rules of sentence structures
- Understand the correct usage of parts of speech, tenses and articles
- Explain divisibility roles, properties of various types of numbers
- Explain application of percentage in our daily life
- Describe the concepts of profit, loss, discounts
- Explain concepts behind logical reasoning modules of arrangements and blood relations

UNIT – I  
10 Hours

Soft Skills: LSRW, Listening, communication skills (verbal and non-verbal skills), public speaking, Email writing, SWOT Analysis

Self-Study: Motivation and Time Management

UNIT – II  
10 Hours

Verbal Ability: Parts of Speech - Prepositions, Adjectives and Adverbs ; Tenses, Articles, Idioms and Phrasal verbs, Subject verb agreement, Synonyms and Antonyms

Self-Study: Para jumbles and one word substitution

UNIT – III  
8 Hours

Quantitative Aptitude: Number system, Percentage, Profit & Loss
Logical Reasoning: Blood Relations and Arrangements

Self-Study: Speed Maths
Course Outcomes: On completion of this course, students are able to:

CO – 1: Exhibit amplified level of confidence to express themselves in English

CO – 2: Understand the correct usage of tenses and articles

CO – 3: Increase the number of words in his/her day to day

CO – 4: Solve logical reasoning problems based on blood relations and arrangements

CO - 5: Solve the problems based on number system, percentage and profit & loss

Text Book(s):
2. Essential English Grammar by Raymond Murphy, Cambridge University Press, new edition
3. The 7 habits of Highly Effective People by Stephen R. Covey
4. Quantitative aptitude by Dr. R. S Agarwal, published by S.Chand private limited.
5. Verbal reasoning by Dr. R. S Agarwal, published by S. Chand private limited.

Reference Book(s):
1. Quantitative Aptitude by Arun Sharma, McGraw Hill Education Pvt Ltd
2. CAT Mathematics by Abhijith Guha, PHI learning private limited.

Web and Video link(s):
1. Improve Your English Communication Skills Specialization
   https://www.coursera.org/specializations/improve-english

<table>
<thead>
<tr>
<th>COURSE ARTICULATION MATRIX</th>
<th>[Employability Enhancement Skills (EES) - I]</th>
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P.E.S. College of Engineering, Mandya
Page No.: SY - 42
ENGINEERING MATHEMATICS-II

[As per Choice Based Credit System (CBCS) & OBE Scheme]

SEMESTER - II

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Course Learning Objectives:

To enable students to apply the knowledge of Mathematics in various engineering fields by making them to learn the following:

- Linear Algebra to find analytical solution of system of linear equation.
- Solution of homogeneous and non-homogeneous Linear differential equations
- Laplace transform of various function and solutions of IVP.
- Applications of Partial Differentiation.
- Vector Integration, and OCC.
- Double, triple integration and Beta-Gama functions.

UNIT – I

10 Hours

**Linear Algebra:** Introduction - Rank of matrix by elementary row operations - Echelon form of a matrix. Consistency of system of linear equations: Gauss elimination method, Gauss-Jordan method and L-U decomposition method. Eigen values and Eigen vectors of square matrices. Similarity of matrices and diagonalisation of matrices (For $2 \times 2$ real matrices only). Quadratic forms: Reduction to canonical form by orthogonal transformation.

**Self-study component** Review of elementary properties of matrices.

UNIT – II

10 Hours

**Linear differential equations of higher order:** Linear differential equations of second and higher order with constant coefficients. Homogeneous / non-homogeneous equations. Inverse differential operators. $f(D)y = R(x)$ Where $R(x) = e^{ax}, \sin ax / \cos ax$ and polynomial in $x$ and $e^{ax} \sin ax / \cos ax$. $e^{ax} \sin ax / \cos ax$. Solution of initial value problems, method of variation of parameters. Solution of Cauchy’s and Legendre’s linear differential equations.

**Self-study component** Review of linear differential equation $f(D)y = R(x)$ where $(x) = e^{ax} V(x)$.

UNIT – III

10 Hours

**Laplace Transforms:** Definition – Transforms of elementary functions. Properties of Laplace transforms, Transforms of periodic function, unit step function (All results without proof)-Problems only.

**Inverse Laplace transforms:** Definition – Evaluation of inverse transforms by standard methods, Convolution theorem - Problems only. Solutions of second order linear differential equations using Laplace transforms method.
### Self-study component
Problems on unit impulse function. Solution of Simultaneous ODE by Laplace method.

<table>
<thead>
<tr>
<th>UNIT – IV</th>
<th>10 Hours</th>
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<tr>
<td><strong>Applications of Partial Differential Calculus</strong>: Jacobians, Taylor's Theorem for a function of two variables (without proof). Maxima and Minima for a function of two variables. Illustrative examples with applications. Lagrange’s' method of undetermined multipliers with one subsidiary condition.</td>
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<tr>
<td><strong>Vector integration</strong>: Integration of vector functions. Line integrals, surface and volume integrals. Green’s, Stoke’s and Gauss’s divergence theorem/s (without proof)-Illustrated examples. Orthogonal curvilinear coordinates (OCC).</td>
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<tr>
<td><strong>Self study component</strong>: Errors and approximations Expressions for $\nabla \phi$, $\text{div} \mathbf{A}$, $\text{curl} \mathbf{A}$ and Laplacian of $\phi$ in OCC.</td>
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<tr>
<th>UNIT – V</th>
<th>11 Hours</th>
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<tr>
<td><strong>Self study component</strong> - Computation of mass, centre of gravity, centre of pressure and moment of inertia, by using multiple integrals.</td>
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</table>

### Course Outcomes:
On completion of this course, students are able to:

- **CO-1**: Explain linear system of equations, Eigen values/vectors similarity and diagonalisation of matrices.
- **CO-2**: Solve linear second order differential equations. Evaluate Laplace transforms and inverse Laplace transforms.
- **CO-3**: Evaluate the Jacobians, and the Taylors series expansion and find the extreme value.
- **CO-4**: Analyse the vector integration to use in the study of line integrals.
- **CO-5**: Evaluate the multiple integrals and Evaluate application oriented problems.

### Text Book(s):

### Reference Book(s):
Web and Video link(s):

2. https://nptel.ac.in/courses/111/106/111106100/, https://nptel.ac.in/courses/111/107/111107111/,
   https://nptel.ac.in/courses/111/108/111108081/, https://nptel.ac.in/courses/111/104/111104031/,
   https://nptel.ac.in/courses/122/107/122107037/
3. https://nptel.ac.in/courses/111/106/111106139/,
4. https://nptel.ac.in/courses/111/105/111105122/,
5. https://nptel.ac.in/courses/111/105/111105122/, https://nptel.ac.in/noc/courses/noc20/SEM1/noc20-
   ma07/
6. https://nptel.ac.in/courses/111/104/111104125/

COURSE ARTICULATION MATRIX [Engineering Mathematics-II P21MA201]

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Employability Enhancement Skills (EES) - II
[As per Choice Based Credit System (CBCS) & OBE Scheme]
SEMESTER – II

Course Code:            P21HSMC208  Credits:  01
Teaching Hours/Week (L:T:P):   0:2:0  CIE Marks:  50
Total Number of Teaching Hours:  28  SEE Marks:  50

Course Learning Objectives: This course will enable students to:
- Get introduced to the concepts of teamwork and leadership
- Understand the importance of professional etiquettes
- Describe the reading with comprehension
- Explain the purpose, plan and ways to identify specific details in a paragraph for better comprehension
- Form grammatically correct sentences
- Explain the basic concepts in calculating simple interest and compound interest
- Explain concepts behind logical reasoning modules of direction sense, coding & decoding, series and visual reasoning

UNIT – I  10 Hours
Soft Skills: Etiquette, Presentation Skills, Introduction to Body Language, Interpersonal and Intrapersonal Skills, Team work, Leadership skills, Extempore

Self-Study: Concepts of Sympathy and Empathy

UNIT – II  10 Hours
Verbal Ability: Verbal Analogies, Sentence completion & correction, Reading comprehension

Self-Study: Paragraph sequencing

UNIT – III  8 Hours
Quantitative Aptitude: Simple & Compound Interest, Ratio & Proportion, Time & Work
Logical Reasoning: Direction Sense, Coding and Decoding, Series, Visual reasoning

Self-Study: Directions and Pythagoras Theorem, differences between mirror and water images
Course Outcomes: On completion of this course, students are able to:

CO – 1: Exhibit amplified level of confidence to express themselves in English

CO – 2: Critical awareness of the importance of teamwork and development of the skills for building effective teams

CO – 3: Solve the questions under reading comprehension confidently with higher accuracy

CO – 4: Solve the problems based on interest, ratio & proportion, time & work

CO – 5: Solve logical reasoning problems based on direction sense, coding & decoding and series

Text Book(s):
2. Essential English Grammar by Raymond Murphy, Cambridge University Press, new edition
3. The 7 habits of Highly Effective People by Stephen R. Covey
4. Quantitative aptitude by Dr. R. S Agarwal, published by S.Chand private limited.
5. Verbal reasoning by Dr. R. S Agarwal, published by S. Chand private limited.

Reference Book(s):
1. Quantitative Aptitude by Arun Sharma, McGraw Hill Education Pvt Ltd
2. CAT Mathematics by Abhijith Guha, PHI learning private limited.

Web and Video link(s):
1. Teamwork Skills: Communicating Effectively in Groups
   https://www.coursera.org/learn/teamwork-skills-effective-communication

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