



Jawahar Education Society's,  
**INSTITUTE OF TECHNOLOGY,  
MANAGEMENT & RESEARCH, NASHIK.**  
(Approved by AICTE, New Delhi, DTE, Government of Maharashtra, Affiliated to Savitribai Phule Pune University)

## **SE Mechanical 2024 Pattern Course Outcomes**

## ***Department of Mechanical Engineering***

### **Course Outcomes (CO)**

#### **Syllabus Pattern:-2024**

Class:-SE

Semester:- I

| Sr. No | Subject   | Course Outcomes (CO)   |
|--------|---|--|
| 1      | <b>Solid Mechanics (PCC-201-MEC)</b>                        | CO1. INVESTIGATE various types of stresses and strain developed on determinate and indeterminate members.<br>CO2. CALCULATE Shear force and bending moment for various types of transverse loading and support.<br>CO3. COMPUTE the bending stresses and shear stresses on a beam.<br>CO4. DETERMINE torsional shear stress in shaft and buckling on the column.<br>CO5. APPLY the concept of principal stresses and theories of failure to determine stresses on a 2-D element.   |
| 2      | <b>Engineering Thermodynamics (PCC-202-MEC)</b>             | CO 1: DESCRIBE the basics of thermodynamics with heat and work interactions.<br>CO 2: APPLY the second law of thermodynamics to steady flow and non-flow processes.<br>CO 3: APPLY the concept of entropy and availability for an open and closed system.<br>CO 4: ANALYSE the performance of a vapour power cycle with working mediums a pure substance.<br>CO 5: DEMONSTRATE the performance of steam generators.  |
| 3      | <b>Engineering Materials &amp; Metallurgy (PCC-203-MEC)</b> | CO1. COMPARE crystal structures and ASSESS different lattice parameters.<br>CO2. CORRELATE crystal structures and imperfections in crystals with mechanical behavior of materials.<br>CO3. DIFFERENTIATE and DETERMINE mechanical properties using destructive and nondestructive testing of materials.<br>CO4. IDENTIFY & ESTIMATE different parameters of the system viz., phases, variables, component, grains, grain boundary, and degree of freedom. etc.<br>CO5. ANALYSE effect of alloying element & heat treatment on properties of ferrous & nonferrous alloy.<br>CO6. SELECT appropriate materials for various applications. |

| Sr<br>No | Subject  | Course Outcomes (CO)   |
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| 4        | <b>Material Testing and Characterization Lab (PCC-204-MEC)</b>                       | <p>CO1: DETERMINE various types of stresses and strain developed on determinate and indeterminate members.</p> <p>CO2: CALCULATE Shear force and bending moment for various types of transverse loading and Support and COMPUTE the slope &amp; deflection, bending stresses and shear stresses on a beam.</p> <p>CO3: EXAMINE micro structures and different phases also LINK phase distribution with mechanical properties of materials.</p> <p>CO4: DIFFERENTIATE and TEST mechanical properties using destructive and nondestructive methods</p> <p>CO5: CATEGORIZE and RECOMMEND appropriate materials for various applications.</p> <p>CO6: UTILIZE the concepts of SFD &amp; BMD, principal stresses, heat treatment and microstructure to<br/>SOLVE combined loading application-based problems virtually IoT based tools</p>  |
| 5        | <b>Engineering Mathematics-III (MDM-221-MEC:)</b>                                    | <p>CO1: <b>SOLVE</b> higher order linear differential equations and its applications to model and analyze mass spring systems.</p> <p>CO2: <b>APPLY</b> Statistical methods like correlation, regression in analyzing and interpreting experimental data applicable to reliability engineering and probability theory in testing and quality control.</p> <p>CO3: <b>SOLVE</b> Algebraic &amp; Transcendental equations and System of linear equations using numerical techniques.</p> <p>CO4: <b>OBTAIN</b> Interpolating polynomials, numerical differentiation and integration, numerical solutions of ordinary differential equations used in modern scientific computing applicable to Mechanical engineering.</p> <p>CO5: <b>PERFORM</b> Vector differentiation &amp; integration, <b>ANALYZE</b> the vector fields and <b>APPLY</b> to fluid flow problems.</p>   |
| 6        | <b>Electrical/ Electronics and Computer Interfacing Technology Lab (MDM-222-MEC)</b> | <p>CO1: IDENTIFY and DEMONSTRATE the use of microcontroller-based input/output interfacing techniques.</p> <p>CO2: DEVELOP programs to acquire and process data from analog and digital sensors.</p> <p>CO3: IMPLEMENT control strategies for actuators such as DC, stepper, and servo motors using microcontrollers.</p> <p>CO4: DESIGN and INTEGRATE sensor-actuator systems to create basic automation projects</p>   |
| 7        | <b>Workshop Practices (VSE-231-MEC)</b>  | <p><b>CO1. INTERPRET</b> and <b>APPLY</b> standard drawing sheet layouts, fundamental principles of machine drawing, IS standards and conventions, and appropriate dimensioning practices to produce technically accurate and standardized engineering drawings.</p> <p><b>CO2. READ, INTERPRET,</b> and <b>ANALYZE</b> industrial drawings by applying standard industrial practices to effectively communicate design and manufacturing intent.</p> <p><b>CO3. UNDERSTAND</b> and <b>APPLY</b> the principles of GD&amp;T as well as <b>INTERPRET</b> surface finish and welding symbols to enhance design accuracy and manufacturability.</p> <p><b>CO4: APPLY</b> the fundamental principles of design to create efficient, user-friendly, and safe product designs, supported with suitable real-world examples.</p> <p><b>CO5: IDENTIFY</b> and <b>ANALYZE</b> safety standards and safety measures applicable to various sections of mechanical workshops and effectively</p> |

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|    |  | <p>communicate these through the preparation of informative posters or reports.</p> <p><b>CO6: PLAN</b> and <b>EXECUTE</b> the production of an assembly job by performing a sequence of machining operations while selecting appropriate materials and processes to meet functional and assembly requirements.</p>  |
| 8  | <b>HSSM-232-MEC: Entrepreneurship Development and Innovation</b> | <p>CO1: DESCRIBE entrepreneurial traits and innovation processes (Remember/Understand), and IDENTIFY business opportunities through design thinking (Apply).</p> <p>CO2: DEVELOP a lean business model and MVP (Apply/Analyze) and CREATE a startup pitch and demonstrate entrepreneurial mindset (Create)</p>   |
| 9  | <b>VEC-233-MEC: Universal Human Values</b>                       | <p>1. RECOGNIZE the concept of self-exploration as the process of value education and see they have the potential to explore on their own right.</p> <p>2. EXPLORE the human being as the coexistence of self and body to see their real needs / basic aspirations clearly.</p> <p>3. EXPLAIN relationship between one self and the other self as the essential part of relationship and harmony in the family.</p> <p>4. INTERPRET the interconnectedness, harmony and mutual fulfilment inherent in the nature and the entire existence and draw ethical conclusions in the light of Right understanding</p> |
| 10 | <b>CEP-241-MEC: Community Engagement Project</b>                 | <p>CO1: Identify and Analyze local community needs and challenges by engaging with stakeholders and evaluating real-world problems.</p> <p>CO2: Design and Implement practical, creative, and context-specific solutions using engineering principles to address community issues.</p> <p>CO3: Reflect and Evaluate the effectiveness of their interventions and articulate lessons learned through reports and presentations.</p>   |

## ***Department of Mechanical Engineering***

### **Course Outcomes (CO)**

#### **Syllabus Pattern:-2019**

Class:-SE

Semester:- II

| Sr. No | Subject  | Course Outcomes (CO)   |
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| 1      | <b>Fluid Mechanics (PCC-251-MEC)</b>           | <p>CO.1 APPLY concepts of fluid properties and Hydrostatics to real world engineering systems.</p> <p>CO.2 EXPLORE the detailed analysis of kinematics and dynamics of fluid and exploit the conservation equations for the flow regimes of practical interest.</p> <p>CO.3 APPLY principles of fluid dynamics to laminar flow and ESTIMATE friction and minor losses in internal flows.</p> <p>CO.4 DETERMINE boundary layer formation over an external surface and Understand the concept of lift &amp; drag.</p> <p>CO.5 CONSTRUCT mathematical correlation considering dimensionless parameters, also able to PREDICT the performance of prototype using model laws.</p>   |
| 2      | <b>PCC-252-MEC: Manufacturing Processes -I</b> | <p>CO1. APPLY metal cutting mechanics and tool wear analysis to optimize machining processes.</p> <p>CO2. DESIGN gating systems, risers, and ANALYZE casting defects for efficient metal casting processes.</p> <p>CO3. COMPUTE forces, power, and deformation in rolling, forging, and sheet metal operations.</p> <p>CO4. COMPARE welding techniques, interpret weld symbols, and EVALUATE defects for quality joining.</p> <p>CO5. SELECT appropriate grinding and finishing processes based on surface finish requirements</p>   |
| 3      | <b>PCC-253-MEC: Applied Thermodynamics</b>     | <p>CO1. ANALYZE the working principles of IC engines, the effects of fuel-air and actual cycles on engine performance, and the impact of cycle losses.</p> <p>CO2. ASSESS the combustion characteristics in SI and CI engines, the influence of fuel properties on knocking, and the suitability of alternative fuels for improved efficiency and emissions.</p> <p>CO3. EVALUATE engine performance by conducting tests, interpreting characteristic curves, and applying emission control strategies to meet regulatory standards.</p> <p>CO4. INVESTIGATE the functions of ignition, cooling, and lubrication systems, along with advanced IC engine technologies such as EMS, AI-based diagnostics, and HCCI.</p> <p>CO5. APPLY thermodynamic principles to solve problems on reciprocating and rotary compressors, including multi-stage compression and FAD.</p> |

| Sr. No | Subject   | Course Outcomes (CO)  |
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| 4      | <b>PCC-254-MEC: Thermo- Fluid Engineering Lab</b>                   | CO1 EVALUATE steam properties and boiler performance through experimental analysis.<br>CO2 ANALYZE engine and compressor performance characteristics using test procedures and calculations.<br>CO3 INVESTIGATE fluid flow behavior and pressure losses in pipelines and flow systems.<br>CO4 MEASURE and INTERPRET viscosity and discharge characteristics of various fluids using laboratory tools.<br>CO5 APPLY theoretical knowledge to real-world industrial systems through case studies and site visits  |
| 5      | <b>MDM-271-MEC: Artificial Intelligence and Machine Learning</b>    | CO1. DEMONSTRATE fundamentals of artificial intelligence and machine learning.<br>CO2. APPLY feature extraction and selection techniques.<br>CO3. APPLY machine learning algorithms for classification and regression problems.<br>CO4. DEVELOP a machine learning model using various steps.<br>CO5. APPLY concepts of reinforced and deep learning.   |
| 6      | <b>VSE-281-MEC: Solid Modeling and Drafting</b>                     | CO1: APPLY (3) the tools from CAD software's to complete 2D sketches of the mechanical components<br>CO2: BUILD (3) a complete 3D model of components by applying different commands and constraints<br>CO3: CONCLUDE (4) on appropriate constraints between different parts of the assemblies for generating the complete model<br>CO4: CREATE (5) a complete working drawing of mechanical components/Assembly.<br>CO5: DEVELOP (5) a 3D model based on surface parameters  |
| 7      | <b>VSE-282-MEC: Data Science &amp;AIML</b>                          | CO1. UNDERSTAND different machine learning paradigms and their use cases.<br>CO2. ANALYZE and VISUALIZE datasets for machine learning applications.<br>CO3. APPLY feature engineering techniques including PCA and selection methods.<br>CO4. DEVELOP and EVALUATE classification and regression models.<br>CO5. IMPLEMENT Markov models, RL, GA, or NN for solving real-world problems   |
| 8      | <b>HSSM-284-MEC: Engineering Economics and Financial Management</b> | CO1: DEMONSTRATE an understanding of the business environment, fundamental economic concepts, and the demand-supply framework.<br>CO2: COMPREHEND accounting principles and effectively ANALYSE financial statements through ratio analysis.<br>CO3: INTERPRET key financial terms and ratios, and competently PREPARE various types of financial statements.<br>CO4: DEVELOP and SELECT appropriate budgeting techniques, understand budgetary control, and EVALUATE the influence of government policies, taxation, and inflation on financial decision-making.<br>CO5: UNDERSTAND the structure and functioning of national and international trade systems and their financial implications |

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| 9 | <b>VEC-285-MEC:<br/>Environmental<br/>Science and<br/>Sustainable<br/>Development</b> | <p>CO.1 To UNDERSTAND and EVALUATE the interdependence between environment, ecology, and natural resources, assess the impact of air pollution and ecological footprints, and ANALYZE the dynamic interactions between socio-economic systems.</p> <p>CO. 2 To EVALUATE the causes of soil degradation and apply effective soil conservation and management practices to maintain soil health, enhance agricultural productivity, and promote sustainable land use.</p> <p>CO.3 To IDENTIFY various water sources, ANALYZE issues related to water availability and quality, and APPLY sustainable water management practices to support environmental conservation and meet societal needs.</p> <p>CO.4 To UNDERSTAND the principles of sustainability, EVALUATE environmental, social, and economic challenges, and APPLY practical sustainability practices to promote responsible resource use.</p> <p>CO.5 To ANALYZE the principles of sustainable habitat design and sustainable energy systems, and APPLY environmentally responsible solutions such as green buildings, energy-efficient technologies, and renewable energy sources to promote sustainable living and reduce ecological impact.</p> |
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