



Shri. Gajanan Maharaj Shikshan Prasarak Mandal's  
**Sharadchandra Pawar College of Engineering**

Dumbarwadi(Otur), Tal- Junnar, Dist-Pune 410504

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**POs:**

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the

engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

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

Course Code	Course Name	Course Outcomes
202041	Solid Mechanics	<p><b>Course Objectives:</b></p> <ol style="list-style-type: none"> <li>1. To acquire basic knowledge of stress, strain due to various types of loading.</li> <li>2. To draw Shear Force and Bending Moment Diagram for transverse loading.</li> <li>3. To determine Bending, Shear stress, Slope and Deflection on Beam.</li> <li>4. To solve problems of Torsional shear stress for shaft and Buckling for the column.</li> <li>5. To apply the concept of Principal Stresses and Theories of Failure.</li> <li>6. To utilize the concepts of Solid Mechanics on application based combined mode of loading.</li> </ol> <p><b>Program-Outcomes :</b> On completion of the course, learner will be able to</p> <ol style="list-style-type: none"> <li>1. DEFINE various types of stresses and strain developed on determinate and indeterminate members.</li> <li>2. DRAW Shear force and bending moment diagram for various types of transverse loading and support.</li> <li>3. COMPUTE the slope &amp; deflection, bending stresses and shear stresses on a beam.</li> <li>4. CALCULATE torsional shear stress in shaft and buckling on the column.</li> <li>5. APPLY the concept of principal stresses and theories of failure to determine stresses on a 2-D element.</li> <li>6. UTILIZE the concepts of SFD &amp; BMD, torsion and principal stresses to solve combined loading application based problems.</li> </ol>

202042	<b>Solid Modeling and Drafting</b>	<p><b>Course-Objectives :</b></p> <ol style="list-style-type: none"> <li>1. To understand basic structure of CAD systems and their use to create geometric models of simple engineering parts</li> <li>2. To introduce the curves and surfaces and their implement in geometric modeling</li> <li>3. To apply basic concepts of 3D modeling, viewing and evaluate mass properties of components and assemblies</li> <li>4. To apply geometrical transformations in CAD models</li> <li>5. To understand data exchange standards and translators for various applications</li> <li>6. To create engineering drawings, design documentation and use in manufacturing activities</li> </ol> <p><b>Program-Outcomes :</b></p> <p>On completion of the course, learner will be able to</p> <ol style="list-style-type: none"> <li>1. UNDERSTAND basic concepts of CAD system, need and scope in Product Lifecycle Management</li> <li>2. UTILIZE knowledge of curves and surfacing features and methods to create complex solid geometry</li> <li>3. CONSTRUCT solid models, assemblies using various modeling techniques &amp; PERFORM mass property analysis, including creating and using a coordinate system</li> <li>4. APPLY geometric transformations to simple 2D geometries</li> <li>5. USE CAD model data for various CAD based engineering applications viz. production drawings, 3D printing, FEA, CFD, MBD, CAE, CAM, etc.</li> <li>6. USE PMI &amp; MBD approach for communication</li> </ol>
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202043	<b>Engineering Thermodynamics</b>	<p><b>Course Objectives:</b></p> <ol style="list-style-type: none"> <li>1. To introduce the fundamentals of thermodynamics.</li> <li>2. To understand the concepts of laws of thermodynamics.</li> <li>3. To apply the concepts of thermodynamics towards open and closed systems.</li> <li>4. To be acquainted with Entropy generation and Exergy Analysis.</li> <li>5. To understand the behaviour of a Pure substance and to analyze Vapour power cycles.</li> <li>6. To undertake the performance analysis of a steam generator.</li> </ol> <p><b>Program-Outcomes :</b> On completion of the course, learner will be able to</p> <ol style="list-style-type: none"> <li>1. DESCRIBE the basics of thermodynamics with heat and work interactions.</li> <li>2. APPLY laws of thermodynamics to steady flow and non-flow processes.</li> <li>CO3. APPLY entropy, available and non available energy for an Open and Closed System,</li> <li>4. DETERMINE the properties of steam and their effect on performance of vapour power cycle.</li> <li>5. ANALYSE the fuel combustion process and products of combustion.</li> <li>6. SELECT various instrumentations required for safe and efficient operation of steam generator.</li> </ol>
202044	<b>Engineering Materials and Metallurgy</b>	<p><b>Course-Objectives :</b></p> <ol style="list-style-type: none"> <li>1. To impart fundamental knowledge of material science and engineering.</li> <li>2. To establish significance of structure property relationship.</li> <li>3. To explain various characterization techniques.</li> <li>4. To indicate the importance of heat treatment on structure and properties of materials.</li> <li>5. To explain the material selection process.</li> </ol> <p><b>Program-Outcomes :</b> On completion of the course, learner will be able to</p> <ol style="list-style-type: none"> <li>1. COMPARE crystal structures and ASSESS different lattice parameters.</li> <li>2. CORRELATE crystal structures and imperfections in crystals with mechanical behaviour of materials.</li> <li>3. DIFFERENTIATE and DETERMINE mechanical properties using</li> </ol>

		<p>destructive and non-destructive testing of materials.</p> <p>4. IDENTIFY &amp; ESTIMATE different parameters of the system viz., phases, variables, component, grains, grain boundary, and degree of freedom. etc.</p> <p>5. ANALYSE effect of alloying element &amp; heat treatment on properties of ferrous &amp; nonferrous alloy.</p> <p>6. SELECT appropriate materials for various applications</p>
203156	Electrical and Electronics Engineering	<p><b>Course Objectives:</b></p> <ol style="list-style-type: none"> <li>1. To understand Arduino IDE; an open source platform and its basic programming features</li> <li>2. To interface Atmega328 based Arduino board with different devices and sensors</li> <li>3. To study principle of operation of DC machines and speed control of DC motors</li> <li>4. To know about three phase induction motor working and its applications</li> <li>5. To get acquainted with Electric Vehicle (EV) technology and subsystems</li> <li>6. To get familiar with various energy storage devices and electrical drives</li> </ol> <p><b>Course Outcomes:</b></p> <p>On completion of the course, learner will be able to</p> <ol style="list-style-type: none"> <li>1. APPLY programming concepts to UNDERSTAND role of Microprocessor and Microcontroller in embedded systems</li> <li>2. DEVELOP interfacing of different types of sensors and other hardware devices with Atmega328 based Arduino Board</li> <li>3. UNDERSTAND the operation of DC motor, its speed control methods and braking</li> <li>4. DISTINGUISH between types of three phase induction motor and its characteristic features</li> <li>5. EXPLAIN about emerging technology of Electric Vehicle (EV) and its modular subsystems</li> <li>6. CHOOSE energy storage devices and electrical drives for EVs</li> </ol>

207002	<b>Engineering Mathematics - III</b>	<p><b>Course Objectives:</b></p> <ol style="list-style-type: none"> <li>1. To make the students familiarize with concepts and techniques in Ordinary &amp; Partial differential equations, Laplace transform &amp; Fourier transform, Statistical methods, Probability theory and Vector calculus.</li> <li>2. The aim is to equip them with the techniques to understand advanced level mathematics and its applications that would enhance analytical thinking power, useful in their disciplines.</li> </ol> <p><b>Course Outcomes:</b> On completion of the course, learner will be able to</p> <ol style="list-style-type: none"> <li>1. SOLVE higher order linear differential equations and its applications to model and analyze mass spring systems.</li> <li>2. APPLY Integral transform techniques such as Laplace transform and Fourier transform to solve differential equations involved in vibration theory, heat transfer and related mechanical engineering applications.</li> <li>3. APPLY Statistical methods like correlation, regression in analyzing and interpreting experimental data applicable to reliability engineering and probability theory in testing and quality control.</li> <li>4. PERFORM Vector differentiation &amp; integration, analyze the vector fields and APPLY to fluid flow problems.</li> <li>5. SOLVE Partial differential equations such as wave equation, one and two dimensional heat flow equations.</li> </ol>
202047	<b>Kinematics of Machinery</b>	<p><b>Course Objectives:</b></p> <ol style="list-style-type: none"> <li>1. To make the students conversant with kinematic analysis of mechanisms applied to real life and industrial applications.</li> <li>2. To develop the competency to analyze the velocity and acceleration in mechanisms using analytical and graphical approach.</li> <li>3. To develop the skill to propose and synthesize the mechanisms using graphical and analytical technique.</li> <li>4. To develop the competency to understand &amp; apply the principles of gear theory to design various applications.</li> <li>5. To develop the competency to design a cam profile for various follower motions.</li> </ol> <p><b>Course Outcomes:</b></p>

		<p>On completion of the course, learner will be able to</p> <p>CO1. APPLY kinematic analysis to simple mechanisms</p> <p>CO2. ANALYZE velocity and acceleration in mechanisms by vector and graphical method</p> <p>CO3. SYNTHESIZE a four bar mechanism with analytical and graphical methods</p> <p>CO4. APPLY fundamentals of gear theory as a prerequisite for gear design</p> <p>CO5. CONSTRUCT cam profile for given follower motion</p>
202048	Applied Thermodynamics	<p><b>Course Objectives:</b></p> <ol style="list-style-type: none"> <li>1. To determine COP of refrigeration cycle and study Psychrometric properties and processes.</li> <li>2. To study working of engine, Actual, Fuel-Air and Air standard cycle and its Performance.</li> <li>3. To understand Combustion in SI and CI engines and factors affecting performance parameters</li> <li>4. To study emission from IC Engines and its controlling method, various emission norms.</li> <li>5. To estimate performance parameters by conducting a test on I. C. Engines.</li> </ol> <p><b>Course Outcomes:</b></p> <p>On completion of the course, learner will be able to</p> <p>CO1. DETERMINE COP of refrigeration system and ANALYZE psychrometric processes.</p> <p>CO2. DISCUSS basics of engine terminology, air standard, fuel air and actual cycles.</p> <p>CO3. IDENTIFY factors affecting the combustion performance of SI and CI engines.</p> <p>CO4. DETERMINE performance parameters of IC Engines and emission control.</p> <p>CO5. EXPLAIN working of various IC Engine systems and use of alternative fuels.</p>

202049	Fluid Mechanics	<p><b>Course Objectives:</b></p> <ol style="list-style-type: none"> <li>1. To understand basic properties of fluids.</li> <li>2. To learn fluid statics and dynamics</li> <li>3. To study basics of flow visualization</li> <li>4. To understand Bernoulli's theorem and its applications.</li> <li>5. To understand losses in flow, drag and lift forces</li> <li>6. To learn to establish relation between flow parameters.</li> </ol> <p><b>Course Outcomes:</b> On completion of the course, learner will be able to</p> <ol style="list-style-type: none"> <li>1. DETERMINE various properties of fluid</li> <li>2. APPLY the laws of fluid statics and concepts of buoyancy</li> <li>3. IDENTIFY types of fluid flow and terms associated in fluid kinematics</li> <li>4. APPLY principles of fluid dynamics to laminar flow</li> <li>5. ESTIMATE friction and minor losses in internal flows and DETERMINE boundary layer formation over an external surface</li> <li>6. CONSTRUCT mathematical correlation considering dimensionless parameters, also ABLE to predict the performance of prototype using model laws</li> </ol>
202050	Manufacturing Processes	<p><b>Course Objectives:</b></p> <ol style="list-style-type: none"> <li>1. Describe various sand and permanent mould casting methods, procedure and mould design aspects.</li> <li>2. Understand basics of metal forming processes, equipment and tooling.</li> <li>3. Understand sheet metal forming operations and die design procedure.</li> <li>4. Classify, describe and configure the principles of various welding techniques.</li> <li>5. Understand plastic processing techniques.</li> <li>6. To know about composites, its fabrication processes.</li> </ol> <p><b>Course Outcomes:</b> On completion of the course, learner will be able to</p> <ol style="list-style-type: none"> <li>1. SELECT appropriate moulding, core making and melting practice and estimate pouring time, solidification rate and DESIGN riser size and location for sand casting process</li> <li>2. UNDERSTAND mechanism of metal forming techniques and</li> </ol>

		<p>CALCULATE load required for flat rolling</p> <p>3. DEMONSTRATE press working operations and APPLY the basic principles to DESIGN dies and tools for forming and shearing operations</p> <p>4. CLASSIFY and EXPLAIN different welding processes and EVALUATE welding characteristics</p> <p>5. DIFFERENTIATE thermoplastics and thermosetting and EXPLAIN polymer processing techniques</p> <p>6. UNDERSTAND the principle of manufacturing of fibre-reinforced composites and metal matrix composites</p>
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