CAYMET's

Siddhant College of Engineering

Savitribai Phule Pune University, Pune

Second Year Mechanical Engineering (2019 Course)

COURSE OBJECTIVE & OUTCOMES

SEM I

Subject Code &Name -202041 - Solid Mechanics

Course Objectives

1. To acquire basic knowledge of stress, strain due to various types of loading.

2. To draw Shear Force and Bending Moment Diagram for transverse loading.

3. To determine Bending, Shear stress, Slope and Deflection on Beam.

4. To solve problems of Torsional shear stress for shaft and Buckling for the column.

5. To apply the concept of Principal Stresses and Theories of Failure.

6. To utilize the concepts of Solid Mechanics on application based combined mode of loading

Course Outcomes

On completion of the course, learner will be able to

1. DEFINE various types of stresses and strain developed on determinate and indeterminate members.

2. DRAW Shear force and bending moment diagram for various types of transverse loading and support.

3. COMPUTE the slope & deflection, bending stresses and shear stresses on a beam.

4. CALCULATE torsional shear stress in shaft and buckling on the column.

5. APPLY the concept of principal stresses and theories of failure to determine stresses on a 2-D element.

6. UTILIZE the concepts of SFD & BMD, torsion and principal stresses to solve combined loading application based problems.

Subject Code &Name -202042 - Solid Modeling and Drafting

Course Objectives

1. To understand basic structure of CAD systems and their use to create geometric models of simple engineering parts

2. To introduce the curves and surfaces and their implement in geometric modeling

3. To apply basic concepts of 3D modeling, viewing and evaluate mass properties of components and assemblies

4. To apply geometrical transformations in CAD models

5. To understand data exchange standards and translators for various applications

6. To create engineering drawings, design documentation and use in manufacturing activities

Course Outcomes

On completion of the course, learner will be able to

1. UNDERSTAND basic concepts of CAD system, need and scope in Product Lifecycle Management

2. UTILIZE knowledge of curves and surfacing features and methods to create complex solid geometry

3. CONSTRUCT solid models, assemblies using various modeling techniques & PERFORM mass property analysis, including creating and using a coordinate system

4. APPLY geometric transformations to simple 2D geometries

5. USE CAD model data for various CAD based engineering applications viz. production drawings, 3D printing, FEA, CFD, MBD, CAE, CAM, etc.

6. CO6. USE PMI & MBD approach for communication

Subject Code &Name -<u>202043 - Engineering Thermodynamics</u>

Course Objectives

1. To introduce the fundamentals of thermodynamics.

2. To understand the concepts of laws of thermodynamics.

3. To apply the concepts of thermodynamics towards open and closed systems.

4. To be acquainted with Entropy generation and Exergy Analysis.

5. To understand the behaviour of a Pure substance and to analyze Vapour power cycles.

6. To undertake the performance analysis of a steam generator.

Course Outcomes

Describe the basics of thermodynamics with heat and work interactions.

1. APPLY laws of thermodynamics to steady flow and non-flow processes.

2. APPLY entropy, available and non available energy for an Open and Closed System,

3. DETERMINE the properties of steam and their effect on performance of vapour power cycle.

4. ANALYSE the fuel combustion process and products of combustion.

5. SELECT various instrumentations required for safe and efficient operation of steam generator.

Subject Code &Name -<u>202044 - Engineering Materials &Metallurgy</u>

Course Objectives

1. To impart fundamental knowledge of material science and engineering.

2. To establish significance of structure property relationship.

3. To explain various characterization techniques.
4. To indicate the importance of heat treatment on structure and properties of materials.
5. To explain the material selection process.

Course Outcomes

On completion of the course, learner will be able to

1. COMPARE crystal structures and ASSESS different lattice parameters.
2. CORRELATE crystal structures and imperfections in crystals with mechanical behaviour of materials.
3. DIFFERENTIATE and DETERMINE mechanical properties using destructive and non-destructive testing of materials.
4. IDENTIFY & ESTIMATE different parameters of the system viz., phases, variables, component, grains, grain boundary, and degree of freedom. etc.
5. ANALYSE effect of alloying element & heat treatment on properties of ferrous & nonferrous alloy.
6. SELECT appropriate materials for various applications.

Subject Code &Name -203156 Electrical & Electronics Engineering

Course Objectives

1. 1.To understand Arduino IDE; an open source platform and its basic programming features.
2. To interface Atmega328 based Arduino board with different devices and sensors
3. To study principle of operation of DC machines and speed control of DC motors
4. To know about three phase induction motor working and its applications
5. To get acquainted with Electric Vehicle (EV) technology and subsystems
6. To get familiar with various energy storage devices and electrical drives

Course Outcomes

1. On completion of the course, learner will be able to
2. APPLY programming concepts to UNDERSTAND role of Microprocessor andMicrocontroller in embedded systems
3. DEVELOP interfacing of different types of sensors and other hardware devices withAtmega328 based Arduino Board
4. UNDERSTAND the operation of DC motor, its speed control methods and braking
5. DISTINGUISH between types of three phase induction motor and its characteristic features

6. EXPLAIN about emerging technology of Electric Vehicle (EV) and its modular subsystems

7. CHOOSE energy storage devices and electrical drives for EVs

Subject Code &Name -202045 Geometric Dimensioning and Tolerancing Lab

Course Objectives

1. To understand requirements of industrial drawings

2. To read, understand and explain basic Geometric Dimensioning & Tolerancing concepts

3. To apply various geometric and dimension tolerances based on type of fit

4. To include surface roughness symbols based on manufacturing process

5. To measure and verify position tolerances with applied material conditions

6. To understand requirements for manufacturing and assembly

Course Outcomes

On completion of the course, learner will be able to

1. SELECT appropriate IS and ASME standards for drawing

2. READ & ANALYSE variety of industrial drawings

3. APPLY geometric and dimensional tolerance, surface finish symbols in drawing

4. EVALUATE dimensional tolerance based on type of fit, etc.

5. SELECT an appropriate manufacturing process using DFM, DFA, etc.

Subject Code &Name -207002 - Engineering Mathematics - III

Course Objectives

1. To make the students familiarize with concepts and techniques in Ordinary & Partial differential equations, Laplace transform & Fourier transform, Statistical methods, Probability theory and Vector calculus.

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.

Course Outcomes

On completion of the course, learner will be able to

1. SOLVE higher order linear differential equations and its applications to model and analyze mass spring systems.

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.

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.

4. PERFORM Vector differentiation & integration, analyze the vector fields and APPLY to fluid flow problems.

5. SOLVE Partial differential equations such as wave equation, one and two dimensional heat flow equations.

Subject Code &Name -202047 - Kinematics of Machinery

Course Objectives

1. To make the students conversant with kinematic analysis of mechanisms applied to real life and industrial applications.

2. To develop the competency to analyze the velocity and acceleration in mechanisms using analytical and graphical approach.

3. To develop the skill to propose and synthesize th mechanisms using graphical and analytical technique.

4. To develop the competency to understand & apply the principles of gear theory to design various applications.

5. To develop the competency to design a cam profile for various follower motions.

Course Outcomes

On completion of the course, learner will be able to

1. APPLY kinematic analysis to simple mechanisms
2. ANALYZE velocity and acceleration in mechanisms by vector and graphical method
3. SYNTHESIZE a four bar mechanism with analytical and graphical methods
4. APPLY fundamentals of gear theory as a prerequisite for gear design
5. CONSTRUCT cam profile for given follower motion

Subject Code & Name -202048 - Applied Thermodynamics

Course Objectives

1. To determine COP of refrigeration cycle and study Psychrometric properties and processes.
2. To study working of engine, Actual, Fuel-Air and Air standard cycle and its Performance.
3. To understand Combustion in SI and CI engines and factors affecting performance parameters
4. To study emission from IC Engines and its controlling method, various emission norms.
5. To estimate performance parameters by conducting a test on I. C. Engines.
6. To determine performance parameters of Positive displacement compressor.

Course Outcomes

On completion of the course, learner will be able to

1. DETERMINE COP of refrigeration system and ANALYZE psychometric processes.
2. DISCUSS basics of engine terminology, air standard, fuel air and actual cycles.
3. IDENTIFY factors affecting the combustion performance of SI and CI engines.
4. DETERMINE performance parameters of IC Engines and emission control
5. EXPLAIN working of various IC Engine systems and use of alternative fuels.
6. CALCULATE performance of single and multi stage reciprocating compressors and DISCUSS rotary positive displacement compressors his/her own words.

Subject Code &Name -202049 - Fluid Mechanics

Course Objectives

1. To understand basic properties of fluids.
2. To learn fluid statics and dynamics
3. To study basics of flow visualization
4. To understand Bernoulli's theorem and its applications.
5. To understand losses in flow, drag and lift forces

6. To learn to establish relation between flow parameters.

Course Outcomes

On completion of the course, learner will be able to

1. DETERMINE various properties of fluid
2. APPLY the laws of fluid statics and concepts of buoyancy
3. IDENTIFY types of fluid flow and terms associated in fluid kinematics
4. APPLY principles of fluid dynamics to laminar flow
5. ESTIMATE friction and minor losses in internal flows and DETERMINE boundary layer formation over an external surface
6. CONSTRUCT mathematical correlation considering dimensionless parameters, also
7. ABLEto predict the performance of prototype using model laws

Subject Code &Name -202050 - Manufacturing Processes

Course Objectives

1. Describe various sand and permanent mould casting methods, procedure and mould design aspects.
2. Understand basics of metal forming processes, equipment and tooling.
3. Understand sheet metal forming operations and die design procedure.
4. Classify, describe and configure the principles of various welding techniques.
5. Understand plastic processing techniques.
6. To know about composites, its fabrication processes.

Course Outcomes

On completion of the course, learner will be able to

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
2. UNDERSTAND mechanism of metal forming techniques and CALCULATE load required for flat rolling
3. DEMONSTRATE press working operations and APPLY the basic principles to DESIGN dies and tools for forming and shearing operations
4. CLASSIFY and EXPLAIN different welding processes and EVALUATE welding characteristics
5. DIFFERENTIATE thermoplastics and thermosetting and EXPLAIN polymer processing techniques

6. UNDERSTAND the principle of manufacturing of fibre-reinforce composites and metal matrix composites

Subject Code &Name -202051 - Machine Shop

Course Objectives

1. To understand the basic procedures, types of equipment, tooling used for sand casting and metal forming processes through demonstrations and/(or) Industry visits..
2. To understand TIG/ MIG/ Resistance/Gas welding welding techniques.
3. To acquire skills to handle grinding and milling machine and to produce gear by milling.
4. To acquire skills to produce a composite part by manual process.

Course Outcomes

On completion of the course, learner will be able to

1. PERFORM welding using TIG/ MIG/ Resistance/Gas welding technique
2. MAKE Fibre-reinforced Composites by hand lay-up process or spray lay-up techniques
3. PERFORM cylindrical/surface grinding operation and CALCULATE its machining time
4. CO4. DETERMINE number of indexing movements required and acquire skills to PRODUCE a spur gear on a horizontal milling machine
5. CO5. PREPARE industry visit report
6. CO6. UNDERSTAND procedure of plastic processing

Subject Code &Name -202052 - Project Based Learning - II

Course Objectives

1. To emphasize project based learning activities that are long-term, interdisciplinary and student-centric.
2. To inculcate independent and group learning by solving real world problems with the help of available resources.
3. To be able to develop applications based on the fundamentals of mechanical engineering by possibly applying previously acquired knowledge.
4. To get practical experience in all steps in the life cycle of the development of mechanical systems: specification, design, implementation, and testing.
5. To be able to select and utilize appropriate concepts of mechanical engineering to design and analyze selected mechanical system.

Course Outcomes

On completion of the course, learner will be able to

1. IDENTIFY the real-world problem (possibly of interdisciplinary nature) through a rigorous literature survey and formulate / set relevant aims and objectives.

2. ANALYZE the results and arrive at valid conclusions.

3. PROPOSE a suitable solution based on the fundamentals of mechanical engineering by possibly integration of previously acquired knowledge.

4. CONTRIBUTE to society through proposed solutions by strictly following professional ethics and safety measures.

5. USE of technology in proposed work and demonstrate learning in oral and written form. CO6. DEVELOP ability to work as an individual and as a team member.

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