CAYMET's

Siddhant College of Engineering

Savitribai Phule Pune University, Pune

Third Year Mechanical Engineering (2015 Course)

<u>COURSE OBJECTIVE & OUTCOMES</u>

<u>SEM I</u>

Subject Code &Name -<u>302041 Design of Machine Elements - I</u>

Course Objectives –

1. Student shall gain appreciation and understanding of the design function in Mechanical Engineering, different steps involved in designing and the relation of design activity with manufacturing activity.

2. The student shall learn to choose proper materials for different machine elements depending on their physical and mechanical properties. They will learn to apply the knowledge of material science in real life situations.

3. Student shall gain a thorough understanding of the different types of failure modes and criteria. They will be conversant with various failure theories and be able to judge which criterion is to be applied for a particular situation.

4. Student shall gain design knowledge of the different types of elements used in the machine design process, for e.g. fasteners, shafts, couplings etc. and will be able to design these elements for each application.

Course Outcomes –

1. Ability to identify and understand failure modes for mechanical elements and design of machine elements based on strength.

2. Ability to design Shafts, Keys and Coupling for industrial applications.

3. Ability to design machine elements subjected to fluctuating loads.

4. Ability to design Power Screws for various applications.

5. Ability to design fasteners and welded joints subjected to different loading conditions.

6. Ability to design various Springs for strength and stiffness.

Subject Code &Name -302042 Heat Transfer

Course Objectives –

1. Identify the important modes of heat transfer and their applications.
2. Formulate and apply the general three dimensional heat conduction equations.
3. Analyze the thermal systems with internal heat generation and lumped heat capacitance.
4. Understand the mechanism of convective heat transfer
5. Determine the radiative heat transfer between surfaces.
6. Describe the various two phase heat transfer phenomenon. Execute the effectiveness and rating of heat exchangers

Course Outcomes –

1. Analyze the various modes of heat transfer and implement the basic heat conduction equations for steady one dimensional thermal system.
2. Implement the general heat conduction equation to thermal systems with and without internal heat generation and transient heat conduction.
3. Analyze the heat transfer rate in natural and forced convection and evaluate through experimentation investigation.
4. Interpret heat transfer by radiation between objects with simple geometries.
5. Analyze the heat transfer equipment and investigate the performance.

Subject Code &Name -302043 Theory of Machine –II

Course Objectives -

1. To develop competency in understanding of theory of all types of gears.
2. To understand the analysis of gear train.
3. To develop competency in drawing the cam profile.
4. To make the student conversant with synthesis of the mechanism.
5. To understand step-less regulations.
6. To understand mechanisms for system control – Gyroscope.

Course Outcomes –

1. Student will be able to understand fundamentals of gear theory which will be the prerequisite for gear design.
2. Student will be able to perform force analysis of Spur, Helical, Bevel, Worm and Worm gear.
3. The student to analyze speed and torque in epi-cyclic gear trains which will be the prerequisite for gear box design.

4. Student will be able to design cam profile for given follower motions and understand cam Jump phenomenon, advance cam curves.

5. The student will synthesize a four bar mechanism with analytical and graphical methods.

6. *a.* The student will analyze the gyroscopic couple or effect for stabilization of Ship Aeroplane and Four wheeler vehicle.

b. Student will choose appropriate drive for given application (stepped / step-less).

Subject Code &Name -302044 Turbo Machines

Course Objectives

1. To provide the knowledge of basic principles, governing equations and applications of turbo machine.

2. To provide the students with opportunities to apply basic thermo-fluid dynamics flow equations to Turbo machines.

3. To explain construction and working principle and evaluate the performance characteristics of Turbo Machines

Course Outcomes

1. Apply thermodynamics and kinematics principles to turbo machines.

2. Analyze the performance of turbo machines.

3. Ability to select turbo machine for given application.

4. Predict performance of turbo machine using model analysis.

Subject Code &Name -302045 Metrology And Quality Control

Course Objectives

1. Select suitable instrument / gauge / method of inspection for determining geometrical and dimensional measurements.

2. Calibrate measuring instruments and also design inspection gauges.

3. Understand the advances in Metrology such as use of CMM, Laser, Machine Vision System for Metrology etc.

4. Select and apply appropriate Quality Control Technique for given application.

5. Select and Apply appropriate Quality Management Tool and suggest appropriate Quality Management System(QMS).

Course Outcomes

1. Understand the methods of measurement, selection of measuring instruments / standards of measurement, carryout data collection and its analysis.

2. Explain tolerance, limits of size, fits, geometric and position tolerances and gauge design

3. Understand and use/apply Quality Control Techniques/ Statistical Tools appropriately.

4. Develop an ability of problem solving and decision making by identifying and analyzing the cause for variation and recommend suitable corrective actions for quality improvement.

Subject Code &Name -302046 Skill Development

Course Objectives

1. To develop the skill for required in shop floor working.

2. To have knowledge of the different tools and tackles used in machine assembly shop.

3. Use of theoretical knowledge in practice.

4. Practical aspect of the each component in the assembly of the machine

Subject Code &Name -302047 Numerical Methods and Optimization

Course Objectives

Students are expected to –

1 Recognize the difference between analytical and Numerical Methods.

2 Effectively use Numerical Techniques for solving complex Mechanical engineering Problems.

3 Prepare base for understanding engineering analysis software.

4 Develop logical sequencing for solution procedure and skills in soft computing.

5 Optimize the solution for different real life problems with available constraints.

6 Build the foundation for engineering research

Course Outcomes

The student should be able to –

1. Use appropriate Numerical Methods to solve complex mechanical engineering problems.

2. Formulate algorithms and programming.

3. Use Mathematical Solver.

4. Generate Solutions for real life problem using optimization techniques.

5. Analyze the research problem.

Subject Code &Name -302048 Design of Machine Elements –II

Course Objectives

1. Enable students to attain the basic knowledge required to understand, analyze, design and select machine elements required in transmission systems.

2. Reinforce the philosophy that real engineering design problems are open-ended and challenging

3. Impart design skills to the students to apply these skills for the problems in real life industrial applications

4. Inculcate an attitude of team work, critical thinking, communication, planning and scheduling through design projects

5. Create awareness amongst students about safety, ethical, legal, and other societal constraints in execution of their design projects.

6. Develop an holistic design approach to find out pragmatic solutions to realistic domestic and industrial problems.

Course Outcomes

1. To understand and apply principles of gear design to spur gears and industrial spur gear boxes.

2. To become proficient in Design of Helical and Bevel Gear

3. To develop capability to analyse Rolling contact bearing and its selection from manufacturer's Catalogue.

4. To learn a skill to design worm gear box for various industrial applications.

5. To inculcate an ability to design belt drives and selection of belt, rope and chain drives.

6. To achieve an expertise in design of Sliding contact bearing in industrial applications.

Subject Code &Name -302049 Refrigeration and Air Conditioning

Course Objectives

1. Learning the fundamental principles and different methods of refrigeration and air conditioning.

2. Study of various refrigeration cycles and evaluate performance using Mollier charts and/ or refrigerant property tables.

3. Comparative study of different refrigerants with respect to properties, applications and environmental issues.

4. Understand the basic air conditioning processes on psychometric charts, calculate cooling load for its applications in comfort and industrial air-conditioning.

5. Study of the various equipment-operating principles, operating and safety controls employed in refrigeration air conditioning systems.

Course Outcomes

1. Illustrate the fundamental principles and applications of refrigeration and air conditioning system

2. Obtain cooling capacity and coefficient of performance by conducting test on vapour compression refrigeration systems

3. Present the properties, applications and environmental issues of different refrigerants

   a. Calculate cooling load for air conditioning systems used for various

   b. Operate and analyze the refrigeration and air conditioning systems

Subject Code &Name -302050 Mechatronics

Course Objectives

1. Understand key elements of Mechatronics system, representation into block diagram

2. Understand concept of transfer function, reduction and analysis

3. Understand principles of sensors, its characteristics, interfacing with DAQ microcontroller

4. Understand the system modeling and analysis in time domain and frequency domain.

5. Understand control actions such as Proportional, derivative and integral and study its significance in industrial applications.

Course Outcomes

1. Identification of key elements of mechatronics system and its representation in terms of block diagram

2. Understanding the concept of signal processing and use of interfacing systems such as ADC, DAC, digital I/O

3. Interfacing of Sensors, Actuators using appropriate DAQ micro-controller

4. Time and Frequency domain analysis of system model (for control application)

5. PID control implementation on real time systems.

6. Development of PLC ladder programming and implementation of real life system.

Subject Code &Name -302051 Manufacturing Process –II

Course Objectives

1. To analyze and understand the metal cutting phenomena.

2. To select process parameter and tools for obtaining desired machining characteristic

3. To understand principles of manufacturing processes.

Course Outcomes

1. Student should be able to apply the knowledge of various manufacturing processes.

2. Student should be able to identify various process parameters and their effect on processes.

3. Student should be able to figure out application of modern machining.

4. Students should get the knowledge of Jigs and Fixtures for variety of operations

Subject Code &Name -302052 Machine Shop –II

Course Objectives

1. To set the manufacturing set–up appropriately and study the corresponding set up parameters.

2. To select appropriate process parameter for obtaining desired characteristic on work piece.

3. To understand the operational problems and suggest remedial solution for adopted manufacturing process.

Course Outcomes

1. Ability to develop knowledge about the working and programming techniques for various machines and tools

Subject Code &Name -302053 Seminar

Course Objectives

1. Identify and compare technical and practical issues related to the area of course specialization.
2. Outline annotated bibliography of research demonstrating scholarly skills.
3. Prepare a well organized report employing elements of technical writing and critical thinking.
4. Demonstrate the ability to describe, interpret and analyze technical issues and develop competence inpresenting.

Course Outcomes

1. Establish motivation for any topic of interest and develop a thought process for technical presentation.
2. Organize a detailed literature survey and build a document with respect to technical publications.
3. Analysis and comprehension of proof-of-concept and related data.
4. Effective presentation and improve soft skills.
5. Make use of new and recent technology (e.g. Latex) for creating technical reports.

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