MME307: Machine Design- I

Programme: B.Tech. (MME) Year: II Semester: IV sem, EVEN
Course: Core Credits : 3 Hours : 40

Course Context and Overview (100 words):

The objective of the course is to provide the knowledge on the fundamental concepts and processes of machine design. This will help the students for designing and analyzing the machine components as per the customer or client requirements. The further detailed objectives are as following:

1. To understand the basic concepts of machine design.
2. To understand the concepts of design for manufacturing.
3. To understand the concepts of design against static and fluctuating load.
4. To learn the various types of analytical approach used for designing machine components or assemblies.
5. To learn the all aspects of design of machine components including material selection and life or performance estimation under static, fatigue and impact loading conditions.

Prerequisite Courses: Mechanics of Solids

Course Outcomes (COs):

On completion of this course, the students will have the ability to:	
CO1 Understand the fundamental concepts and processes of machine design.	Unit 1
CO2 Understand the importance of manufacturing consideration in design.	Unit 2
CO3 Understand the design concept under static and fatigue load	Unit 3, 4
CO4 Understand the design approach of threaded and riveted joints	Unit 5, 6
CO5 Understand the design approach for mechanical springs.	Unit 7

Course Topics:

Topics	**Lecture Hours**		**Student development**
UNIT - I **1. Topic:** Introduction		4	Employability and Skill Development
1.1 Machine Design	1		
1.2 Basic Procedure and Requirements of Machine Design	1		
1.3 Selection of Engineering Materials	2		
Unit – II **2. Topic: Manufacturing Considerations in Design**		6	

2.1 Selection of Manufacturing Method	1		Employability and Skill Development
2.2 Design Consideration of Castings and Forgings	2		
2.2 Design For Manufacturing and Assembly	1		
2.3 Fits and Tolerances	2		
Unit - III **3. Topic:** Design Against Static Loads		5	Employability and Skill Development
3.1 Introduction and Modes Of Failure	1		
3.2 Factor of Safety And Stresses Due to Various Types of Loading	1		
3.3 Design of Knuckle Joint	1		
3.4 Theory of Failures	2		
Unit - IV **4. Topic:** Design Against Fluctuating Loads		7	Employability and Skill Development
4.1 Introduction	1		
4.2 Stress Concentration Factor, Notch Sensitivity and Reduction of Stress Concentration Factor	2		
4.3 Endurance Limit and Endurance Strength	1		
4.4 Goodman, Soderberg and Gerber Diagram	1		
4.5 Design of Machine Components For Finite and Infinite Life	1		
4.6 Cumulative damage	1		
UNIT – V **5. Topic:** Threaded Joints		6	Employability and Skill Development
5.1 Introduction	1		
5.2 Bolted Joint- Simple Analysis	1		
5.3 Eccentrically Loaded Bolted Joint in Shear	2		
5.3 Eccentrically Load Perpendicular to Axis of Bolt	1		
5.4 Elastic Analysis of Bolted Joints	1		
UNIT – VI **6. Topic:** Riveted Joints		5	Employability and Skill Development
6.1 Introduction	1		
6.2 Rivet Joints and Types	1		
6.3Types of Failures and Strength Equations	1		
6.4 Eccentric Loaded Riveted Joint	2		
UNIT – VII **7. Topic:** Springs		7	Employability and Skill Development
7.1 Introduction	1		
7.2 Stress and deflection equation	1		
7.3 Design of Helical Springs	2		
7.4 Helical Torsion Springs	1		
7.5 Design of Leaf Spring	2		

Textbook references (IEEE format):

Text Book:

1. Bhandari V B, *Design of Machine Elements*, 3rd ed., McGraw-Hill.
2. Norton L. Robert., *Machine Design an Integrated Approach* 2nd ed., Pearson.

Reference books:

1. Shigley's *et al*., *Mechanical Engineering Design*, 9th ed., McGraw-Hill.
2. Jindal U. C., *Machine Design*, Pearson.

Additional Resources (NPTEL, MIT Video Lectures, Web resources etc.):

Evaluation Methods:

Item	Weightage (%)
Quiz 1: 7.5	20
Quiz 2: 7.5	
Assignments: 5	
Midterm	30
Final Examination	50

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Last Update: _11-10-2017