MME312: Machine Design II

Programme: B.Tech. (MME)   Year: 2018   Semester: V sem, ODD
Course :Core   Credits :4   Hours :   40

Course Context and Overview (100 words):

Machine design is part of the broader discipline of Engineering Design. This course is a follow-up to the course Machine Design I. The objective of the course is to apply the fundamental concepts and knowledge acquired in the first course, to designand analyze the machine components such as Gears, Bearings, and Components of I.C. Engine - Piston Cylinder assembly, Connecting rod, Crank Shaft and some miscellaneous machine elements, Clutches and Brakes.

The further detailed objectives are as following:

1. To understand the concepts of power transmission devices.
2. To learn the various types of analytical approach used for designing of gears.
3. **To learn the all aspects of selection and design of rolling contact bearings and sliding contact bearing respectively.**
4. To apply the design concepts in designing of some important I.C. engine components like, piston cylinder, connecting rod and crank Shaft.
5. To apply the design concepts in designing of frictional clutches and mechanical brakes.

Prerequisites Courses: Mechanics of Solids, Machine Design I

Course outcomes(COs):

On completion of this course, the students will have the ability to:	
CO1 Understand the design aspects of gears.	Unit 1
C02 Understand the design procedure for spur, helical and bevel Gears.	Unit 1
C03 Understand the method for selection of bearings from manufacture's catalogue for given load, speeds and reliability.	Unit 2
C04 Understand the design approach for hydrostatic and hydrodynamic bearings.	Unit 3

C05 Understand the design procedure for piston assembly, connecting rod and crank Shaft	Unit 4
C06 Understand the design procedure for frictional clutches and band brakes.	Unit 5

Course Topics:

Topics	Lecture Hours		Student Development
UNIT - I 　**1.　Topic: Gear Design**			Skill development & Employability
1.1 Introduction	1	10	
1.2 Type and selection of gears	1		
1.3 Design of Spur gear	3		
1.4 Design of Helical gear	3		
1.5 Design of Bevel gear	2		
Unit – II 　**2.　Topic: Rolling Contact Bearing**			Skill development & Employability
2.1 Introduction &Selection of Bearing- Type	1	7	
2.2 Load- Life relationship &Selection of Bearing from Manufacturer's Catalouge	3		
2.3 Design for cyclic loads and Speeds	1		
2.4 Reliability of Bearings	1		
2.5 Bearing Failure- Causes and Remedies	1		
Unit - III 　**3.　Topic: Sliding Contact Bearings**			Skill development & Employability
3.1 Introduction	1	6	
3.2 Basic Modes of Lubrication	1		
3.3 Petroff's Equation and Mckeee's Investigation	1		
3.4 Bearing Design- Selection of Parameters	2		
3.5 Bearing Failure- Causes and Remedies	1		
Unit - IV 　**4.　Topic: Design of I.C. Engine Components**			Skill development & Employability
4.1 Introduction	1	10	
4.2 Design of Piston –Cylinder assembly	2		
4.3 Design of Connecting rod	3		
4.4 Buckling of Connecting rod and Whipping stress	2		
4.5 Design of Centre Crankshaft	2		
UNIT – V		7	

5. Topic: Design of Miscellaneous Machine Elements			Skill development & Employability
5.1 Introduction	1		
5.2 Design of Plate Clutch	2		
5.3 Design of Cone Clutch	1		
5.3 Design of Block Shoe Brakes	1		
5.4 Design of Band Brakes	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
Quiz1: 10	
Quiz2: 10	30
Assignment1: 5	
Assignment2: 5	
Midterm	30
Final Examination	40

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