Subject Code	Subject Title	L	T	P	C	H
BME2201	Design of Machine Elements-I	3	1	0	4	4
Prerequisite	Engineering Mechanics, Strength of Materials, Engineering Drawing					

Course Objective:

- To understand the fundamental principles of machine element design.
- To develop the ability to analyze and design various types of mechanical joints.
- To gain proficiency in the design of keys, couplings, and shafts.
- To apply appropriate materials and manufacturing processes for machine elements.
- To integrate design considerations related to safety, reliability, and cost-effectiveness.

Modules	Lec.
Module-I: Basics of Design Concept of machine design and its types, basic procedure of machine design, basic requirements of machine elements, design of machine elements, concept of concurrent engineering, modes of failure, factor of safety, fracture mechanics, concept of fatigue and endurance strength, Selection of Engineering Materials, principles of design in aesthetics and ergonomics.	**7**
Module II : Riveted and Welded Joints Introduction, types of riveted joint, modes of failure of a riveted joint, strength and efficiency of a riveted joint, Riveted joints for boiler shell according to I.B.R.; riveted structural joint; and riveted joint with eccentric loading; Types of welded joints; strength of welds under axial load.	**10**
Module-III: Design of Keys and coupling **Design of Keys and Couplings**: Design of sunk keys under crushing and shearing, design of splines, design of sleeve and solid muff coupling, clamp or compression coupling, rigid and flexible flange coupling,	**9**
Module-IV: Cotter & Knuckle Joints Design of spigot and socket cotter joint, sleeve and cotter joint, Gib and cotter joint and knuckle joint	**8**

Module-V: Shaft Design of shafts subjected to pure torsion; Pure bending load; Combined bending and torsion; Combined torsion; Bending and axial loads.	**11**
Total Hours	**45**

COURSE OUTCOMES

CO1	Explain the fundamental principles of machine design and the different types of machine elements.
CO2	Apply appropriate design methodologies to analyze and design riveted and welded joints considering different failure modes.
CO3	Design keys, couplings (sleeve, muff, flange), and shafts considering various loading conditions (torsion, bending, axial).
CO4	Analyze the stress and strain distribution in cotter and knuckle joints under different load conditions.
CO5	Evaluate the suitability of different materials and manufacturing processes for various machine elements based on design requirements and cost considerations.

CORRELATION OF COS WITH POS

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1
CO1	3	1	2										1
CO2	3	2	3										2
CO3	3	2	3										2
CO4	2	3	2										1
CO5	2	1	2				1						1
Avg.	2.6	1.8	2.4				0.2						1.4

Text book:

1. Richard G. Budynas and Keith J. Nisbett, “Shigley's Mechanical Engineering Design”, McGraw-Hill.

Reference book:

1. V.B. Bhandari, “Design of Machine Elements”, 3rd Edition, Tata McGraw-Hill.

Evaluation scheme

Internal Assessment	MID Semester Exam	End Semester Exam
30%	20 %	50%
Assignment, MCQ, Report Submission, Quiz, Class Test, Presentation	MCQ or Test	Theory Paper