SCHEME OF COURSE WORK

Course Details:

Course Title	**:DESIGN OF MACHINE ELEMENTS-II**		
Course Code	**: 13ME1126**	**L T P C**	**: 4 10 3**
Program:	**: B.Tech.**		
Specialization:	**: MECHANICAL ENGINEERING**		
Semester	**:VI**		

Course Outcomes (COs):

The student will be able to
1. Explain basic concepts, application and design of threaded fasteners and devices
2. Design shafts, keys, couplings and welded joints for static and fluctuating loads
3. Explain the theory and design of sliding and rolling contact bearings for static and dynamic loads
4. Explain the theory and design springs, chain and rope drives
5. Design spur and helical gears

Program Outcomes (POs):

A graduates of Mechanical Engineering will have the,

PO 1	Ability to apply knowledge of mathematics, science, and mechanical engineering.
PO 2	Ability to identify, formulate, analyzing and solve mechanical engineering problems.
PO 3	Ability to design a system, component, or process to meet desired needs including both thermal and mechanical systems.
PO 4	Ability to apply innovative thinking capabilities to carry out the research, conduct experiments, interpret and analyze data, and report results.
PO 5	Ability to apply current software tools and equipment to analyze mechanical engineering problems.
PO 6	Ability to contribute to society through innovation, enterprise and leadership.
PO 7	The broad education necessary to understand the impact of mechanical engineering solutions in a global and societal context.
PO 8	Ability to understanding of ethical and social responsibility.
PO 9	Ability to carry out tasks by working independently and also in a group of engineers.
PO 10	Ability to communicate effectively in both verbal and written forms.
PO 11	Ability to exhibit project and finance management skills to manage projects.

PO 12	Awareness of the need for and ability to engage in lifelong learning.

Course Outcome (CO)versus**Program Outcomes (PO):**

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-1	M	S	S				S					
CO-2			S	M			S					
CO-3		S	M	S			S					
CO-4		S	M	S			S					
CO-5	M		S	M			M					

S - Strongly correlated, *M - Moderately* correlated, *Blank - No correlation*

AssessmentMethods:	Assignment / Quiz / Seminar / Case Study / Mid-Test / End Exam

Teaching-Learning and Evaluation

Week	Topics / Contents	CO	Sample questions	Teaching-learning strategy	Assessment Method & Schedule
1	**THREADED FASTENERS**:Introduction, threaded forms, terminology, standards ,threaded fastener types	CO-1	Classify different types of threaded forms? What do you mean by lead and pitch of the thread?	▫ Lecture ▫ Problem solving	
2	Materials, bolt tightening, initial tension,thread locking, bolt design for static loads,axial and eccentric and fatigue loads	CO-1	How the initial tension is determined in bolted joints?	▫ Lecture ▫ Problem solving	
3	**POWER SCREWS**:Introduction, comparison of types of power screw threads, differential and compound power screws,derivations for torque for lifting, lowering, self locking conditions , efficiency	CO-1 CO-1	1.Describe the comparision of power screw threads. 2.Derive the relation for torque for lifting the load in a square threaded joint.	▫ Lecture ▫ Problem solving	
4	effect of collar friction, design of power screws, applications, screw jack, C- clamp	CO-1	1.Explain the design of power screws. 2.What are the applications of power screws?	▫ Lecture ▫ Discussion	
5	**SHAFT, KEYS AND COUPLINGS**:Introduction, terminology, overall shaft design, axial bending and torsional loading design for torsional rigidity	CO-2	1.Derive the power transmitted for a solid shaft and hollow shaft.	▫ Lecture ▫ Discussion ▫ Problem solving	
6	keys, pins and splines, types of couplings, concept of shaft alignment	CO-2	1.Whatare the different types of couplings?	▫ Lecture ▫ Discussion	**Assignment- 1 (Week 6 - 8)**
7	**WELDED JOINTS**:Introduction, types of welded joints, static, axial, direct shear,torsion, bending loads, fatigue considerations	CO-2	1.Design the welded joints for static and fatigue loading.	▫ Lecture ▫ Problem solving	**Quiz-1 (Week 7)**
8.	**BEARINGS:**Introduction, sliding bearings, basic concepts of hydrostatic and hydrodynamic lubrication, Petroff, Steinbeck, McKee's equations, bearing design, design charts, heat dissipation and equilibrium oil film temperature	CO-3	1.Design the procedure for sliding contact braring.	▫ Lecture ▫ Problem solving	
	Mid-Test 1				**Mid-Test 1 (Week 8)**

9	rolling contact bearings – Introduction, types, comparison with sliding element bearings, design and selection of rolling bearings – static loads dynamic load, life, reliability, influence of axial load, variable loads.	CO-3	1. How do you design the bearing for the static and dynamic loading?	▫ Lecture ▫ Discussion ▫ Problem solving	
10	**SPRINGS**:Introduction, types and terminology, design of helical springs – static and fluctuating loads, shear stress, deflection	CO-4	1.How do you design the design of Helical springs?	▫ Lecture ▫ Problem solving	
11	spring rate, initial compression, types of ends, buckling, surging, helical torsion springs, leaf springs – bending stress, deflection.	CO-4	Derive the bending stressand deflection equations for leaf springs.	▫ Lecture ▫ Problem solving	
12	**CHAIN DRIVES AND WIRE ROPES**: Introduction to chain drives, roller chains, inverted – tooth chains, geometric relationshipspolygon effect, power rating, design of chain drives.	CO-4	Write the design procedure for the chain drive.	▫ Lecture ▫ Problem solving	
13	Wire rope types – construction, breaking strength, selection of wire ropes	CO-4	Explain the construction of the Wire ropes.	▫ Lecture ▫ Problem solving	
14	**SPUR AND HELICAL GEARS :**Spur Gears, gear tooth strength, basic analysis of gear tooth bending stress (Lewis equation), velocity factor, service factor, overload correction factor	CO-5	Write the design procedure for the Spur gear.	▫ Lecture ▫ Problem solving	**Assignment- 2 (Week 14- 16)**
15	Buckingham equation for incremental dynamic load, ooth surface durability and fatigueanalysis, helical gears- metry, force analysis, tooth bending, surface fatigu th**.**	CO-5	1.What do you mean by Buckingham Equation?. 2.How do you calculate force analysis in Helical gears?	▫ Lecture ▫ Problem solving	**Quiz-2 (Week 15)**
16	**Mid-Test 2**				**Mid-Test 2 (Week 16)**
17	**Practical Examinations**				
18	**End Semester Theory Examinations**				

TEXT BOOKS:

1. RC Juvinall& K M Marshek, “Fundamental of Machine Components Design”, John Wiley&Sons, 5th Edition, 2011
2. Design Data Hand Book, PSG College of Technology, Coimbatore, 1992