III B. Tech – I Semester

(20ME5009) DESIGN OF MACHINE MEMBERS-II

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

Pre-Requisites: Engineering mechanics, Strength of materials

Course Objectives:

The students will acquire the knowledge:

- To predict life of slider and roller bearings.
- To design I.C engine parts.
- To design curved beams for various applications.
- Design the mechanical systems for power transmission elements such as gears, belts, ropes, chains, keys and levers.
- To design gears for various engineering applications**.**

UNIT–I: Bearings

Classification of bearings - applications, types of journal bearings – rubrication – bearing modulus - full and partial bearings – clearance ratio – heat dissipation of bearings, bearing materials – journal bearing design – ball and roller bearings –static loading of ball & roller bearings, bearing life.

UNIT–II: Engine Parts

Connecting Rod: Thrust in connecting rod – stress due to whipping action on connecting rod ends - cranks and crank shafts, strength and proportions of over hung and center cranks – crank pins, crankshafts. Pistons, forces acting on piston –construction design and proportions of piston, cylinder, cylinder liners, Levers and brackets: design of levers – hand levers –foot lever – cranked lever – lever of a lever loaded safety valve- rocker arm straight

UNIT–III: Curved Beams

Introduction, stresses in curved beams, expression for radius of neutral axis for rectangular, circular, trapezoidal and t-section, design of crane hooks, c –clamps.

UNIT–IV: Design of Flexible Mechanical Elements

Transmission of power by belt and rope drives, transmission efficiencies, belts – flat and v types – ropes - pulleys for belt and rope drives, materials, chain drives.

Wire Ropes: Construction, Designation, Stresses in wire ropes, rope sheaves and drums

Power Screws: Design of screw, square ACME, buttress screws, design of nut, compound screw, differential screw, ball screw- possible failures.

UNIT–V: Gears and Gear Drives

Spur gears- helical gears – load concentration factor – dynamic load factor, surface compressive strength – bending strength – design analysis of spur gears–estimation of center distance, module and face width, check for plastic deformation, check for dynamic and wear considerations.

Note: Design data book is permitted for examination

Course Outcomes:

A student who successfully fulfills this course requirement will be able to:

S. No	Course Outcome	BTL
1.	Select the suitable bearing based on the application of the loads and predict the life of the bearing	L2
2.	Design various IC Engines parts.	L4
3.	Design curved beams for various engineering applications.	L4
4.	Select suitable drive for transmission of power and design.	L2
5.	Select suitable gear mechanism and design.	L4

Correlation of Cos with POs & PSOs:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	2	2	1	0	1	0	1	1	2	3	2
CO2	3	3	2	1	2	1	1	0	2	2	2	1	2	2
CO3	3	3	3	2	2	0	0	0	0	0	1	1	3	1
CO4	3	3	3	1	2	0	0	1	0	1	2	2	3	2
CO5	3	3	2	2	2	1	1	0	1	1	2	2	3	2

Text Books:

1. Machine Design / V.Bandari / TMH Publishers
2. Machine Design / NC Pandya & C S Shaw / Charotar publishers
3. Design data book.

References:

1. Machine Design: An integrated Approach / R.L. Norton / Pearson Education
2. Mech. Engg. Design / JE Shigley / Tata Mc Graw Hill education
3. Design of machine elements – spots / Pearson Publications
4. Machine Design – Norton / Pearson Publicati