

ME304 Design of Machine Elements - II

L	T	P	Credit	Area		CWS	PRS	MTE	ETE	PRE
3	0	2	4	DCC		15	25	20	40	-

Objective: To enable the students to formulate and analyze the stresses and strains in various machine elements under static and dynamic loads. Students will be able to select a suitable material and factor of safety depending upon the design parameters.

Syllabus		Contact Hours
Unit-1	Friction elements: Design of Friction clutches- Criteria of uniform wear, and uniform pressure assumptions; Single and Multi-plate clutches, Cone clutch, Centrifugal clutch and applications. Brakes: Design of internal expansion and external contraction type brakes, assumptions, design Band brakes, block brakes, short and long shoes, multiple block brakes, Design of disc brakes.	8
Unit-2	Bearings and Lubrication: Types of Lubrication, viscosity, journal bearing with perfect lubrication, hydrostatic and hydrodynamic lubrication theory, journal bearing design, heat generation and temperature rise criteria. Types, Selection, and applications of rolling element bearings with axial and radial loads, static and dynamic load rating capacity and calculations, bearing materials, bearing seals, mounting of bearings.	8
Unit-3	Design of Gears: Helical, Bevel, and Worm gears, design stresses, stress concentration, overload factors, velocity factors, bending strength of gear tooth, Buckingham equation for dynamic loads, and wear characteristics, AGMA design equations, Design of an automobile gear box.	8
Unit-4	Mechanical drives: selection of transmission, Belt and Chain drives: Flat belts, V-Belts, Roller chains.	6
Unit-5	Hoisting elements: Theory of curved beams, stresses in curved beams, expression for radius of neutral axis for different cross-sections, C-clamps, Crane hooks and its design, Snatch block assembly elements.	6
Unit-6	Design of Engine parts: Types and selection of materials for Connecting rod, Design of 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, and Crank shafts, design of pistons, Proportions of pistons and cylinders, liners.	6
	Total	42

Reference Books:

1	Mechanical Engineering Design Shigley, J. E., Mischke, C. R. and Budynas, R. G., , McGraw Hill, 7th Edition, 2004. International.
2	Fundamental of Machine Component Design, Juvinall, R. C., and Marshek, K. M., John Wiley and Sons, 2000.
3	Fundamentals of Machine Elements Hamrock, B. J., Jacobson, B. Schmidt, S. R., McGraw Hill, 1999.
4	Machine Design: An Integrated Approach, Norton, R. L. , Pearson Education, Indian Reprint-2001.
5	Machine Design D. K. Aggarwal and P. C. Sharma DhanpatRai
6.	Design of machine elements 5th edition, Bhandari

Course Outcomes

CO1	To define principles of gear design to spur gears and industrial spur gear boxes.
CO2	To develop proficiency in Design of Helical and Bevel Gear
CO3	To develop capability to analyze Rolling contact bearing and its selection from manufacturer's Catalogue
CO4	To learn a skill to design worm gear box for various industrial applications.
CO5	To inculcate an ability to design belt drives and selection of belt, rope and chain drives.
CO6	To achieve an expertise in design of Sliding contact bearing in industrial applications.

CO-PO/PSOMatrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2	2	0	0	0	0	0	0	2	2	1	1
CO2	3	3	2	3	1	0	0	0	0	0	0	1	2	1	1
CO3	3	3	3	3	1	0	0	0	0	0	0	2	3	3	2
CO4	3	3	3	3	1	0	0	0	0	0	0	1	3	3	2
CO5	2	2	2	2	2	0	0	0	0	0	0	1	2	2	2