

Branch Name:	Mechanical Engineering
Semester/Year:	Semester VI / Third Year
Subject Title:	Machine Design - II
Subject Code:	1ET1010603
Pre-requisite:	Machine Design-1

Course Objectives:

1. To learn about the design procedure for various types of gears.
2. To learn about the design procedure of gear box for machine tools.
3. To Learn design procedure for journal bearing selection of antifriction bearings.
4. To Learn design consideration of IC engine components & load lifting devices.
5. To learn design consideration of Machine Tool Elements.

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture	Tutorial	Practical	Credit	Theory		Practical		Total (T+P)
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
3	1	0	4	70	30	--	20	120

Subject Contents				
Sr. No.	Topic	Total Hours	Weight (%)	
01	Design of Gear Drives: Gear terminology, Kinematics of gear drive, Standard system of gear tooth, Gear materials, Design of Spur, helical and bevel gears (Tooth proportions, Force analysis, Dynamic loading of gear tooth, Heat Treatment and Wear Resistance, Gear Construction and stress concentration), Design of worm gear set.	10	25	
02	Design of Gear Box for Machine Tools: Comparison and Choice of progression (Arithmetic, Geometric, Harmonic and Logarithmic), general design procedure, determination and fixation of spindle speeds, selection of the best structure diagram, selection of gear layout and ray diagram, determination of number of teeth on gears.	06	15	
03	Load Lifting Devices: Selection of steel wire rope for hoists and cranes, crane hooks, design of hook block, sheaves and rope winding drums.	06	15	
04	Design of Bearings: Design of hydrodynamic journal bearings, Types, materials and selection of bearings, Working conditions for the bearings, Hydrodynamic lubrication theory for journal bearings, Design factors (minimum film thickness, flow variable, heat balance etc.) for journal bearings, Design procedure for journal bearings, Design of bearings (bearing materials, bearing housings, bearing shells etc.), Design of thrust (pivot and	08	20	

	collar) bearings, Ball and roller bearings, Load and life rating of bearings		
05	Design of I.C. Engine Parts: Components of I.C. engine, Materials for engine components, Working conditions, Forces and stresses acting on various engine components, Design of cylinder and cylinder liner, Design of piston, Design of Connecting Rod, Thrust in connecting rod, Stress due to whipping action on connecting rod ends, Design of cranks and crank shafts, Strength and proportions of over hung and center cranks, Design of crank pins.	08	20
06	Design of Machine Tool Elements: Design of beds, slide ways, spindles, material selection, design of strength and rigidity of parts.	03	5

Course Outcomes:

The student will be able to

1. Learn design procedure for various types of gears.
2. Learn design procedure of gearboxes for machine tools.
3. Learn design considerations of Journal bearing and selection of antifriction bearing.
4. Learn design consideration for IC engine components and crane parts.
5. Learn design consideration for machine tool elements.

List of References:

1. Sharma C. and Purohit Kamlesh. Design of Machine Elements. PHI Learning Pvt Ltd.
2. Sharma P. C. and Aggarwal D. K. Machine Design. S K Kataria Publishing.
3. Patel R.C., Sikh S.S, and Pandya A. Machine Design. Vol-II, C. Jamnadas & Company Publishers.
4. Khurmi, R.S and Gupta J.K. A Text book of Machine Design, S Chand Publication.
5. Shigley J.C. Mischke Budynas R. Mechanical Engineering Design. Tata-McGraw Hill Publishers.
6. Norton Robert. Machine Design: An Integrated Approach. Pearson Education Publishers.
7. Bhandari V. Design of Machine Elements Tata-McGraw Hill Publishers.
8. Sadhu Singh S. Machine Design Khanna Publishers.
9. P.S.G. Design. Data book. PSG College of Engg. & Tech. DPV Printers.
10. Mahadevan, K and Balveera Reddy K. Design Data Book . CBS Publishers & Distributors Pvt Ltd.

Note: Use of Design data book during the Lectures/Practical sessions is desirable.

List of Tutorials :

1. Design of Problems and Preparation of Report :

List of Design Problems:

1. Design exercise of Spur, Helical, Bevel & Worm gears.
1. Design exercise for hook block.
2. Design exercise for selection and mounting of Rolling element bearing.
3. Design exercise for Journal & antifriction bearings.
4. Design exercise for I.C. Engine components.
5. Design exercise for the Machine tool element.
6. Design exercise of Gear Box with its kinematic arrangement.

2. Design & Assembly and Detail Drawing.

Note: (Drawing should be on A1 size both detail & Assembly)

List of open Source Software/ Learning website:

1. <http://nptel.ac.in/courses/112106137/>
2. <https://ocw.mit.edu/courses/mechanical-engineering>