

ME385: DESIGN OF MACHINE ELEMENTS
CREDITS = 5 (L=3, T=0, P=2)

Course Objective: To design mechanical components under static and dynamic loads.

Teaching and Assessment Scheme:

Teaching Scheme			Credits	Assessment Scheme				
L	T	P		Theory		Practical		Total Marks
			ESE	CE	ESE	CE		
3	0	2	5	70	30	30	20	150

Course Contents:

Unit No.	Topics	Teaching Hours
1	<p><u>Introduction:</u></p> <p>Selection of preferred sizes, Standardization, Materials Selection in Machine Design, IS coding of steels and Cast Irons, Aesthetic and Ergonomic considerations in Design, Manufacturing and assembly considerations in Design.</p>	04
2	<p><u>Design for Fluctuating Loads:</u></p> <p>Stress Concentration, Endurance limit and Fatigue failure, Factors affecting endurance limit, S-N Diagram Fluctuating stresses: Soderberg, Gerber, Goodman and Modified-Goodman criteria, Combined stresses, Cumulative damage in fatigue.</p>	07
3	<p><u>Design of Springs:</u></p> <p>Classification of springs, Materials standard for springs , Helical Spring: Style of ends, Stresses, Correction Factors, and Deflection, Design against static and fluctuating loads, Concentric springs, Surge phenomenon. Helical, Torsional and Spiral Springs. Design of multi-leaf springs.</p>	07
4	<p><u>Belt and Chain Drives:</u></p> <p>Flat Belt Drive: Belt Construction, Methods for tensioning, Design of flat belt drive with pulley and Selection of Belts from catalogues. V-Belt Drive: Design of V belt drive Selection of V-Belts from catalogues, Timing belt drives selection procedure. Chain Drive: Nomenclature of roller chains, Length and power rating of chains, Design of chain drive.</p>	08

Unit No.	Topics	Teaching Hours
5	<u>Pressure Vessels:</u> Thin cylinders and spherical vessels, Thickness of cylindrical and spherical shells Thick cylinders: Principal stresses in cylinder subjected to internal/external pressure, Lamé's equation, Clavarino's and Birnie's equations, Auto-fretage, Wire wound cylinders, Compounding of cylinders. Gasketed Joints, Design of End closures. Introduction to pressure vessel design codes.	08
6	<u>Design of clutches and brakes:</u> Clutches: Classification, Material selection, Friction clutches -cone, single plate, Multiple plates and centrifugal clutches. Brakes: Design of shoe brakes, Design of band brake, Design of disc brakes.	08
Total		42

List of References:

1. V B Bhandari, Design of Machine Elements, 3/e, McGraw Hill.
2. R C Juvinall, Fundamentals of Machine Component Design, 4/e, Wiley.
3. R L Norton, Machine Design an Integrated Approach, Prentice Hall.
4. Shigley J.E. and Mischke C. R., "Mechanical Engineering Design", McGraw-Hill International

Course Outcomes (COs):

At the end of this course students will be able to ...

1. Apply various considerations for design of mechanical components.
2. Design mechanical components for variable loads.
3. Design various types of springs.
4. Design belt drives and chain drives.
5. Design pressure vessels.
6. Design various types of clutches and brakes.