

Lesson Plan

Subject : **Design of Machine Elements (DME) (MEC-304A)**
Lesson plan Duration : 15 Weeks
Work load (lecture) per week : Lectures: 3 hours/Week

Lecture No	Description
1	Unit-I : Introduction: Basic procedure of the design of machine elements
2	Standards in machine design, selection of preferred sizes, engineering materials
3	Properties and selection, BIS system of designation of steels.
4	Design against static load: Modes of failure, factor of safety
5	Stress concentration: causes and mitigation
6	Design against fluctuating load: Fluctuating stresses, endurance limit,
7	Low cycle and high cycle fatigue, notch sensitivity, endurance limit-approximate estimation
8	Reversed stresses- Infinite cycle
9	Reversed stresses- Finite cycle
10	Cumulative damage in fatigue
11	Soderberg and Goodman lines,
12	Modified Goodman diagrams
13	UNIT-II : Bolted, riveted and welded Joints: Bolt of uniform strength, b
14	Bolted joint- simple analysis, eccentrically loaded bolted joints,
15	Riveted joints for boiler shell according to I. B. R.
16	Riveted structural joint, eccentrically loaded riveted joint
17	Types of welded joints, strength of welds under axial load
18	Welds under eccentric loading
19	Springs: Types of spring, helical spring terminology,

20	Design for helical springs, spring design-trial and error method,
21	Design against fluctuating load, surge in springs,
22	Design of leaf springs, rubber springs
23	UNIT-III : Transmission shafts: Shaft design on strength basis and torsional rigidity basis,
24	ASME code for shaft design, design of hollow shaft on strength basis
25	Design of hollow shaft on torsional rigidity basis,
26	Keys: types of keys, design of square and flat keys
27	Clutches: Various types of clutches, design of friction clutches-single disc
28	Multi-disc, cone and centrifugal clutches
29	Torque transmitting capacity, friction materials, thermal considerations
30	Brakes: Energy equations, block brake with short shoe, block brake with long shoe
31	Internal expanding brake, band brakes,
32	Disc brakes, thermal considerations.
33	UNIT-IV : Rolling contact bearings: Types of rolling contact bearing
34	Selection of bearing-type, static and dynamic load carrying capacity
35	Equivalent bearing load, load-life relationship,
36	Selection of bearings from manufacturer's catalogue, selection of taper roller bearing,
37	Design for cyclic loads and speeds, bearing failure-causes and analysis.
38	Sliding contact bearings: Basic modes of lubrication,
39	Raimondi and Boyd method, bearing design- selection of parameters
40	Bearing materials, bearings failure-causes and remedies