Lesson Plan

Name of Institute : Ambala College of Engineering and Applied Research
Name of the Faculty member : Dr. Ashwani Verma (Assistant Professor)
Discipline : Mechanical Engineering
Semester : 6th
Subject : Design of Machine Elements (MEC-304)
Lesson Plan Duration : 15 weeks (from February 2021 to May 2021)
Work Load : L-2 T-4 P-0

Week	Theory		Tutorial	
	Lecture day	Topic (including assignment/test)	Tutorial day	Topic
1st	1st	**UNIT I** Introduction: Basic procedure of the design of machine elements.	1st	Basic procedure of the design of machine elements.
	2nd	Standards in machine design, selection of preferred sizes		Overall design considerations.
			2nd	Standards in machine design
				selection of preferred sizes
2nd	3rd	Engineering materials, properties and selection, BIS system of designation of steels.	3rd	Engineering materials, properties and selection
	4th	**Design against static load:** Modes of failure, factor of safety and stress concentration: causes and mitigation.		BIS system of designation of steels.
			4th	Stress concentration: causes
				Stress concentration: mitigation.
3rd	5th	**Design against fluctuating load:** Fluctuating stresses, endurance limit, low cycle and high cycle fatigue, and notch sensitivity.	5th	Endurance limit, notch sensitivity.
	6th	Endurance limit-approximate estimation, reversed stresses- design for finite and infinite life and cumulative damage in fatigue.		Design for finite and infinite life and cumulative damage in fatigue.
			6th	Numerical on design for finite life.
				Numerical on design for infinite life.
4th	7th	Soderberg Line, Goodman Line and Modified Goodman Diagrams. Assignment.	7th	Numerical on design for cumulative damage in fatigue.
	8th	**UNIT II Riveted Joints:** Riveted joints for boiler shell according to I. B. R.		Numerical on Soderberg Line.
			8th	Numerical on Goodman Line.
				Numerical on Modified Goodman Diagram.
5th	9th	Riveted structural joint, and eccentrically loaded riveted joint.	9th	Design and numerical on Riveted joints for boiler shell according to I. B. R.
	10th	**Welded Joints** Types of welded joints, strength of welds under axial load, welds under eccentric loading.		Design and numerical on Riveted joints for boiler shell according to I. B. R.
			10th	Design and numerical on Riveted structural joint.
				Design and numerical on eccentrically loaded riveted joint.

6th	11th	**Bolted Joints:** Bolt of uniform strength, bolted joint-simple analysis.	11th	Numerical on design of welds under axial load.
	12th	Eccentrically loaded bolted joints.		Numerical on design of welds under axial load.
			12th	Numerical on design of welds under eccentric loading.
				Numerical on design of welds under eccentric loading.
7th	13th	**Springs:** Types of springs, helical spring terminology, Design for helical springs.	13th	Numerical on design of bolted joints.
	14th	Spring design-trial and error method, Design against fluctuating load, surge in springs.		Numerical on design of bolted joints.
			14th	Numerical on design of bolted joints with eccentric loads.
				Numerical on design of bolted joints with eccentric loads.
8th	15th	Design of leaf springs, rubber springs. Assignment.	15th	Numerical on design for helical springs.
	16th	**UNIT III Transmission Shafts:** Shaft design on strength basis and torsional rigidity basis. ASME code for shaft design.		Numerical on design for helical springs.
			16th	Numerical on design for helical springs subjected to fluctuating loads.
				Numerical on design for helical springs subjected to fluctuating loads.
9th	17th	Design of hollow shaft on strength basis and torsional rigidity basis.	17th	Numerical on design of leaf springs.
	18th	**Keys:** Types of keys, design of square and flat keys.		Numerical on design of leaf springs.
			18th	Numerical on design of leaf springs.
				Numerical on design of shaft.
10th	19th	**Clutches:** Various types of clutches, design of friction clutches namely single disc, multidisc, torque transmitting capacity, friction materials.	19th	Numerical on design of hollow shaft on strength basis.
	20th	Design of cone clutch and, torque transmitting capacity.		Numerical on design of hollow shaft on torsional rigidity basis.
			20th	Numerical on design for square and flat key.
				Numerical on design of single disc clutch.
11th	21st	Design of centrifugal clutch, torque transmitting capacity. Thermal considerations.	21st	Numerical on design of multi disc clutch.
	22nd	**Brakes:** Energy equations, block brake with short shoe, block brake with long shoe.		Numerical on design of cone clutch.
			22nd	Numerical on design of centrifugal clutch.
				Numerical on design of clutch with thermal considerations.
12th	23rd	Internal expanding brake, band brakes, disc brakes, thermal considerations. Assignment.	23rd	Numerical on design of block brake with short shoe.

	24th	**UNIT IV Rolling contact bearings**: Types of rolling contact bearing, selection of bearing-type.		Numerical on design of block brake with long shoe.
			24th	Numerical on design of Internal expanding brake.
				Numerical on design of band brakes
13th	25th	Static and dynamic load carrying capacity, equivalent bearing load, load-life relationship.	25th	Numerical on design of disc brakes.
	26th	Selection of bearings from manufacturer's catalogue, selection of taper roller bearing,		Numerical on selection of bearings from manufacturer's catalogue
			26th	Numerical on selection of bearings from manufacturer's catalogue
				Numerical on selection of taper roller bearing.
14th	27th	Design for cyclic loads and speeds, bearing failure-causes and analysis.	27th	Numerical on selection of taper roller bearing.
	28th	**Sliding contact bearings:** Basic modes of lubrication, Raimondi and Boyd method,		Numerical on design for cyclic loads and speeds for ball bearing.
			28th	Numerical on design for cyclic loads and speeds for ball bearing.
				Numerical on design for cyclic loads and speeds for ball bearing.
15th	29th	Bearing design selection of parameters.	29th	Numerical on design of journal bearings using Raimondi and Boyd's Charts.
	30th	Bearing materials, bearings failure-causes and remedies. Assignment.		Numerical on design of journal bearings using Raimondi and Boyd's Charts.
			30th	Numerical on design of journal bearings using Raimondi and Boyd's Charts.
				Numerical on design of journal bearings using Raimondi and Boyd's Charts.

(Signature of the teacher concerned with date)