Lesson Plan

Name of the Faculty : Dr. Rajender Kumar Tayal

Discipline : Mechanical Engineering

Semester : 3rd

Subject : Strength of Materials (SOM)

Lesson Plan duration : 17 weeks (15.09.2022 to 16.01.2023)

Work load per week : Lecture – 03, Practical – 02

Week	Theory		EXECUTION	
	Lecture Day	Topic (Including assessment/test)	Date	Sign.
1st	1st	Introduction about the subject & brief overview.		
	2nd	**Unit 1: Stresses and Strains** 1.1 Basic concept of load, stress and strain 1.2 Tensile, compressive and shear stresses		
	3rd	1.3 Linear strain, Lateral strain, Shear strain, Volumetric strain, 1.4 Concept of Elasticity, Elastic limit and limit of proportionality		
2nd	4th	1.5 Hook's Law and Elastic Constants,		
	5th	1.6 Stress-strain curve for ductile and brittle materials, 1.7 Nominal stress		
	6th	1.8 Yield point, plastic stage, 1.9 Ultimate stress and breaking stress, 1.10 Percentage elongation		
3rd	7th	1.11 Proof stress and working stress, 1.12 Factor of safety, 1.13 Poisson's Ratio		
	8th	1.14 Thermal stress and strain, 1.15 Longitudinal and circumferential stresses in seamless thin walled cylindrical shells		
	9th	1.16 Introduction to Principal stresses		
4th	10th	**Unit 2: Resilience** 2.1 Strain Energy, Resilience, proof resilience and modulus of resilience		

	11th	2.2 Strain energy due to direct stresses and Shear Stress		
	12th	2.3 Stresses due to gradual, sudden and falling load		
5th	13th	**Unit 3: Moment of Inertia** 3.1 Concept of moment of inertia and second moment of area		
	14th	3.2 Radius of gyration, 3.3 Theorem of perpendicular axis and parallel axis (with derivation)		
	15th	3.4 Second moment of area of common geometrical sections : Rectangle, Triangle, Circle (without derivation); Second moment of area for L,T and I section		
6th	16th	3.5 Section Modulus		
	17th	**Unit 4: Bending Moment and Shearing Force** 4.1 Concept of various types of beams and form of loading, 4.2 Concept of end supports-Roller, hinged and fixed		
	18th	4.3 Concept of bending moment and shearing force, 4.4 B.M. and S.F. Diagram for cantilever with and without overhang subjected to concentrated and U.D.L		
7th	19th	4.4 B.M. and S.F. Diagram for cantilever and simply supported beams with and without overhang subjected to concentrated and U.D.L		
	20th	**1st sessional test (Tentative)**		
	21st	**Assessment**		
8th	22nd	**Unit 5: Bending Stresses** 5.1 Concept of Bending stresses		
	23rd	5.2 Theory of simple bending, Derivation of Bending Equation, 5.3 Use of the equation		
	24th	5.4 Concept of moment of resistance		
9th	25th	5.5 Bending stress diagram		
	26th	5.6 Section Modulus for rectangular, circular and symmetrical I section		
	27th	5.7 Calculation of maximum bending stress in beams of rectangular, circular, and T section		
10th	28th	**Unit 6: Columns** 6.1 Concept of column, modes of failure, 6.2 Types of columns, modes of failure of columns		
	29th	6.3 Buckling load, crushing load, 6.4 Slenderness ratio,		
	30th	6.5 Effective length, 6.6 End restraints, 6.7 Factors effecting strength of a column,		

11th	31st	6.8 Strength of column by Euler Formula without derivation, 6.9 RankineGourdan formula (without derivation)		
	32nd	**2nd sessional test (Tentative)**		
	33rd	**Assessment**		
12th	34th	**Unit 7:Torsion** 7.1 Concept of torsion, difference between torque and torsion		
	35th	7.2 Derivation of Torsion Equation, use of torsion equation for circular shaft, (solid and hollow)		
	36th	Numerical Problems		
13th	37th	7.3 Comparison between solid and hollow shaft with regard to their strength and weight,		
	38th	7.4 Power transmitted by shaft		
	39th	7.5 Concept of mean and maximum torque		
14th	40th	**Unit 8: Spring** 8.1 Closed coil helical springs subjected to axial load and calculation of: - Stress deformation		
	41st	8.1 Closed coil helical springs subjected to axial load and calculation of: - Stiffness and angle of twist and strain energy		
	42nd	8.1 Closed coil helical springs subjected to axial load and calculation of: - Stiffness and angle of twist and strain energy		
15th	43rd	8.1 Closed coil helical springs subjected to axial load and calculation of: - Strain energy and proof resilience.		
	44th	8.2 Determination of number of plates of laminated spring (semi elliptical type only)		
	45th	Revision		
16th	46th	**3rd sessional test (Tentative)**		
	47th	**Assessment**		
	48th	Revision		
17th	49th	Revision		
	50th	Revision		
	51st	Revision		

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Week			EXECUTION		
	Practical Day	Topic	G1	G2	Sign.
1st	1st	Introduction about the Lab & brief discussion over the Lab practical's to be conducted.			
2nd	2nd	1. Tensile test on bars of Mild steel and Aluminium			
3rd	3rd	1. Tensile test on bars of Mild steel and Aluminium			
4th	4th	2. Bending tests on a steel bar or a wooden beam			
5th	5th	2. Bending tests on a steel bar or a wooden beam			
6th	6th	3. Impact test on metals a) Izod test			
7th	7th	Checking of Practical file/ **1st sessional test (Tentative)**			
8th	8th	3. Impact test on metals b) Charpy test			
9th	9th	4. Torsion test of solid specimen of circular section of different metals for determining modulus of rigidity			

10th	10th	4. Torsion test of solid specimen of circular section of different metals for determining modulus of rigidity			
11th	11th	5. To plot a graph between load and extension and to determine the stiffness of a helical spring			
12th	12th	Checking of Practical file/ **2nd sessional test (Tentative)**			
13th	13th	5. To plot a graph between load and extension and to determine the stiffness of a helical spring			
14th	14th	6. Hardness test on different metals			
15th	15th	6. Hardness test on different metals			
16th	16th	Checking of Practical file/ **3rd sessional test (Tentative)**			
17th	17th	Checking of Practical file/ Evaluation			