

LESSON PLAN.				
ACADEMIC SESSION :--2021 (W)				
Subject :- STRUCTURAL MECHANICS , TH-1				
Teacher :- SIMADRI KUMAR BAL			Total Period :- 75 per Sem	
Theory :- 5P/week				
SEMESTER:-3RD (SECTION-B)				
MONT H	DATE	DAYS	SYLLABUS TO BE COVERED	NO.OF PERIOD S AVAILA BLE
			Chapter-1 Review of Basic Concepts (4p)	
OCTOBE R	10/26/2021	Tuesday	Introduction: Basic Principle of Mechanics: Force,	1
	10/27/2021	Wednesday	Moment, Equilibrium, Conditions of equilibrium,	1
	10/28/2021	Thursday	C.G	1
	10/30/2021	Saturday	MI, Free body diagram	1
			Chapter-2 Simple and Complex Stress, Strain.(15P)	
			2. 1 Simple Stresses and Strains	
	11/1/2021	Monday	Introduction to stresses and strains: Mechanical properties of materials – Rigidity, Elasticity, Plasticity, Compressibility, Hardness, Toughness, Stiffness, Brittleness, Ductility, Malleability, Creep, Fatigue, Tenacity, Durability -	1
	11/2/2021	Tuesday	- Types of stresses - Tensile, Compressive and Shear stresses - Types of strains - Tensile, Compressive and Shear strains	1

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11/3/2021	Wednesday	Complimentary shear stress - Diagonal tensile / compressive Stresses due to shear - Elongation and Contraction - Longitudinal and Lateral strains - Poisson's Ratio	1
11/6/2021	Saturday	Volumetric strain –computation of stress, strain, Poisson's ratio, change in dimensions and volume etc- Hooke's law	1
11/8/2021	Monday	Derivation of relationship between the elastic constants	1
11/9/2021	Tuesday	Derivation of relationship between the elastic constants	1
11/10/2021	Wednesday	Simple Numerical problems	1
		2.2 Application of simple stress and strain in engineering field:	
11/11/2021	Thursday	Behaviour of ductile and brittle materials under direct loads – Stress Strain curve of a ductile material - Limit of proportionality, Elastic limit, Yield stress, Ultimate stress, Breaking stress .	1
11/15/2021	Monday	Percentage elongation - Percentage reduction in area - Significance of percentage elongation and reduction in area of cross section	1
11/16/2021	Tuesday	Deformation of prismatic bars due to uniaxial load and Deformation of prismatic bars due to its self weight .	1
11/17/2021	Wednesday	Simple numerical problem	1
		2.3 Complex stress and strain	

11/18/2021	Thursday	Principal stresses and strains: Occurrence of normal and tangential stresses - Concept of Principal stress and Principal Planes – major and minor principal stresses and their orientations.	1
11/20/2021	Saturday	Simple numerical problems	1
11/22/2021	Monday	Simple numerical problems	1
11/23/2021	Tuesday	2.3 Complex stress and strain Principal stresses and strains: Occurrence of normal and tangential stresses - Concept of Principal stress and Principal Planes – major and minor principal stresses and their orientations, Mohr's Circle - Simple numerical problems	1
		3.0 SHEAR FORCE AND BENDING MOMENT (12)	
11/24/2021	Wednesday	3.1 Types of loads and beams: Types of Loads- Concentrated (or) Point load, Uniformly Distributed load (UDL), Types of Supports- Simple support, Roller support, Hinged support, Fixed support.	1
11/25/2021	Thursday	Types of Reactions: Vertical reaction, Horizontal reaction, Moment reaction- Types of Beams based on support conditions- –Support reactions calculation using static equilibrium equations.	1
11/29/2021	Monday	3.2 Shear force and bending moment in beams	1

DECEMBER

11/30/2021	Tuesday	: Shear Force and Bending Moment – Signs Convention for S.F. and B.M – S.F and B.M of general cases of determinate beams – S.F and B.M diagrams for Cantilevers	1
12/1/2021	Wednesday	S.F and B.M diagrams for Cantilevers, Simply supported beams	1
12/2/2021	Thursday	Over hanging beams – Position of maximum BM - Point of contra flexure	1
12/4/2021	Saturday	Relation between intensity of load , S.F and B.M.	1
12/6/2021	Monday	Simple numerical problem	1
12/7/2021	Tuesday	Simple numerical problem	1
12/8/2021	Wednesday	Simple numerical problem	1
12/9/2021	Thursday	Simple numerical problem	1
12/13/2021	Monday	Simple numerical problem	1
		4.0 SLOPE AND DEFLECTION (13p)	
12/14/2021	Tuesday	4.1 Introduction: Shape and nature of elastic curve (deflection curve); Relationship between slope, deflection and curvature (No derivation), Importance of slope and deflection.	1
12/15/2021	Wednesday	4.2 Slope and deflection of cantilever beams under concentrated and uniformly distributed load (by Double Integration method, Macaulay's method).	1

12/16/2021	Thursday	4.2 Slope and deflection of simply supported beams under concentrated and uniformly distributed load (by Double Integration method, Macaulay's method).	1
12/18/2021	Saturday	Simple numerical problem	1
12/20/2021	Monday	4.3 Slope and deflection of propped cantilever from principle of superposition. Typical simple cases only: • under u.d.l (Covering Full Span),	1
12/21/2021	Tuesday	4.3 Slope and deflection of propped cantilever from principle of superposition. Typical simple cases only: • Point Load (At mid span or end)	1
12/22/2021	Wednesday	Simple numerical problem	1
12/23/2021	Thursday	Simple numerical problem	1
12/27/2021	Monday	Moment Area Method –Derivation of moment area theorems for slope and deflection	1
12/28/2021	Tuesday	Determination of slope and deflection for Cantilever beam subjected to point load and uniformly distributed loads,	1
12/29/2021	Wednesday	Determination of slope and deflection for Simple supported beam subjected to point load and uniformly distributed loads.	1
12/30/2021	Thursday	Simple numerical problem	1
1/1/2022	Saturday	Simple numerical problem	1

			5.0 FIXED AND CONTINUOUS BEAM (12p)		
JANUARY	1/3/2022	Monday	5.1 Fixed Beam: Advantages of fixed beam, Analysis of Fixed Beam Determination of Fixed End Moments (No derivation).	1	
	1/4/2022	Tuesday	Bending Moment & Shear Force diagram under point load and uniformly distributed load for whole span.	1	
	1/5/2022	Wednesday	Simple numerical problem	1	
	1/6/2022	Thursday	Simple numerical problem	1	
	1/8/2022	Saturday	5.2 Continuous Beam: Application of Three Moment Equation for finding support moments of continuous beams (for two spans without sinking of support) under action of point load .	1	
	31 more classes required				
				5.2 Continuous Beam: Application of Three Moment Equation for finding support moments of continuous beams (for two spans without sinking of support) under action of U.D.L.	1
			Bending Moment and Shear Force diagram for the above cases.	1	
			Simple numerical problem	1	
			Simple numerical problem	1	
			Simple numerical problem	1	
			Simple numerical problem	1	
			6.0 STRESSES IN BEAMS (10p)		

		6.1 Stresses in beams due to bending: Bending stress in beams – Theory of simple bending – Assumptions	1
		Moment of resistance – Equation for Flexure– Flexural stress distribution – Curvature of beam	1
		Position of N.A. and Centroidal Axis – Flexural rigidity – Significance of Section modulus	1
		Simple numerical problem	1
		6.2 Shear stresses in beams : Shear stress distribution in beams of rectangular, circular and standard sections symmetrical about vertical axis.	1
		Simple Numerical Problems based on formulae.	1
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		6.3 Combined bending and direct stresses: Combination of stresses –Combined direct and bending stresses – Maximum and Minimum stresses in Sections	1
		Simple Problems – Conditions for no tension – Limit of eccentricity	1
		Middle third/fourth rule – Core or Kern for square, rectangular and circular sections	1
		7.0 COLUMNS AND STRUTS:(4P)	
		7.1 Columns and Struts – Definition – Short and Long columns – End conditions – Equivalent length / Effective length	1

		Slenderness ratio – Axially loaded short and long column – Euler’s theory of long columns (No derivation) – Critical load for Columns with different end conditions – Expressions only	1
		Simple numerical problem	1
		Simple numerical problem	1
		8.0 TRUSSES AND FRAMES:(10P)	
		Introduction –Types of trusses and frames, statically determinate and indeterminate trusses and frames,	1
		Degree of indeterminacy, concept of stable and unstable structure	1
		.Analysis of trusses: a) Analytical method (Method of joints)	1
		Simple Numerical Problems	1
		Simple Numerical Problems	1
		.Analysis of trusses: a) Analytical method (method of Section)	1
		Simple Numerical Problems	1
		Simple Numerical Problems	1
		Simple Numerical Problems	1
		Simple Numerical Problems	1