

LESSON PLAN

Academic Session: 2020-21

Semester – 3rd

Section - A

Name of the Faculty – Saroj Kanta Das

Name of the Subject - Structural Mechanics

Weeks	Dates	No. of Periods Available	Topics to be covered	Topics covered	Shortfall (If Any)	Reasons	Date of makeup of Short fall	Initial of Faculty
1 st of September	1/9 to 5/9	4	1.1 Basic Principle of Mechanics: Force, Moment, support conditions, Conditions of equilibrium, C.G & MI, Free body diagram 1.2 Review of CG and MI of different sections	All topics covered as per lesson plan	XXX	XXX	XXX	
2 nd of September	6/9 to 12/9	5	2.1 Simple Stresses and Strains Introduction to stresses and strains: Mechanical properties of materials – Rigidity, Elasticity, Plasticity, Compressibility, Hardness, Toughness	All topics covered as per lesson plan	XXX	XXX	XXX	
3 rd of September	13/9 to 19/9	4	Stiffness, Brittleness, Ductility, Malleability, Creep, Fatigue, Tenacity, Durability, Types of stresses -Tensile, Compressive and Shear stresses, Types of strains - Tensile, Compressive and Shear strains	All topics covered as per lesson plan	XXX	XXX	XXX	

4 th of September	20/9 to 26/9	5	Complimentary shear stress - Diagonal tensile / compressive Stresses due to shear, Elongation and Contraction, Longitudinal and Lateral strains, Poisson's Ratio, Volumetric strain, computation of stress, strain, Poisson's ratio, change in dimensions and volume etc, Hooke's law - Elastic Constants, Derivation of relationship between the elastic constants.	All topics covered as per lesson plan	XXX	XXX	XXX	
5 th of September	27/9 to 30/9	3	2.2 Application of simple stress and strain in engineering field: 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, Percentage elongation, Percentage reduction in area, Significance of percentage elongation and reduction in area of cross section	All topics covered as per lesson plan	XXX	XXX	XXX	
1 st of October	1/10 to 3/10	1	Problems on the above topic	All topics covered as per lesson plan	XXX	XXX	XXX	
2 nd of October	4/10 to 10/10	5	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 and its application to solve problems of complex stresses 3.1 Stresses in beams due to bending: Bending stress in beams – Theory of simple bending – Assumptions – Moment	All topics covered as per lesson plan	XXX	XXX	XXX	

			of resistance – Equation for Flexure– Flexural stress distribution – Curvature of beam – Position of N.A. and Centroidal Axis – Flexural rigidity – Significance of Section modulus					
3 rd of October	11/10 to 17/10	5	3.2 Shear stresses in beams: Shear stress distribution in beams of rectangular, circular and standard sections symmetrical about vertical axis. 3.3 Stresses in shafts due to torsion: Concept of torsion, basic assumptions of pure torsion, torsion of solid and hollow circular sections, polar moment of inertia, torsional shearing stresses, angle of twist, torsional rigidity, equation of torsion		XXX	XXX	XXX	
4 th of October	18/10 to 24/10	3	3.4 Combined bending and direct stresses: Combination of stresses, Combined direct and bending stresses, Maximum and Minimum stresses in Sections, Conditions for no tension, Limit of eccentricity, Middle third/fourth rule, Core or Kern for square, rectangular and circular sections, chimneys, dams and retaining walls		XXX	XXX	XXX	
5 th of October	25/10 to 31/10	0		XXX	XXX	XXX	XXX	
1 st of November	1/11 to 7/11	5	4.1 Columns and Struts, Definition, Short and Long columns, End conditions, Equivalent length / Effective length, Slenderness ratio, Axially loaded short and long column, Euler’s theory of long columns, Critical load for Columns with different end conditions Shear Force and Bending Moment -		XXX	XXX	XXX	

			Introduction					
2 nd of November	8/11 to 14/11	5	5.1 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, Types of Reactions: Vertical reaction, Horizontal reaction, Moment reaction, Types of Beams based on support conditions: Calculation of support reactions using equations of static equilibrium.		XXX	XXX	XXX	
3 rd of November	15/11 to 21/11	5	5.2 Shear force and bending moment in beams: Shear Force and Bending Moment: Signs Convention for S.F. and B.M, S.F and B.M of general cases of determinate beams with concentrated loads and udl only, S.F and B.M diagrams for Cantilevers, Simply supported beams and Over hanging beams, Position of maximum BM, Point of contra flexure, Relation between intensity of load, S.F and B.M. Problems on the above topic		XXX	XXX	XXX	
4 th of November	22/11 to 28/11	5	Problems on the above topic Introduction to Slope and Deflection					
5 th of November	29/11 to 30/11	0		XXX	XXX	XXX	XXX	