ASIAN SCHOOL OF TECHNOLOGY, BHUBANESWAR

DEPARTMENT OF CIVIL ENGINEERING

LESSON PLAN

Discipline: Civil engineering	Semester : 3rd	No. of periods available: 51	Name of Teaching Faculty: Ankita Rath
Subject: Mechanics of Materials	No. of Days/ per week class allotted : 4 periods per week		No. of weeks : 13
Week	Class Day		Topics to be covered
1st	1st	1	Basic Principle of Mechanics: Force, Moment, support conditions, Conditions of equilibrium, C.G & MI, Free body diagram
	2nd	1	Review of CG and MI of different sections
	3rd	1	Introduction to stresses and strains: Mechanical properties of materials – Rigidity, Elasticity, Plasticity, Compressibility, Hardness, Toughness, Stiffness, Brittleness, Ductility, Malleability, Creep, Fatigue, Tenacity, Durability
	4th	1	Types of stresses - Tensile, Compressive and Shear stresses, Types of strains - Tensile, Compressive and Shear strains
2nd	5th	1	Problem Practice & Doubt Clearing
	6th	1	Complimentary shear stress - Diagonal tensile / compressive Stresses due to shear, Elongation and Contraction, Longitudinal and Lateral strains, Poisson's Ratio, Volumetric strain
	7th	1	Computation of stress, Strain, Poisson's ratio,

			change in dimensions and volume etc.,
	8th	1	Hooke's law - Elastic Constants, Derivation of relationship between the elastic constants.
3rd	9th	1	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
	10th	1	Percentage elongation, Percentage reduction in area, Significance of percentage elongation and reduction in area of cross section, Deformation of prismatic bars due to uniaxial load, Deformation of prismatic bars due to its self-weight.
	11th	1	Problem Practice & Doubt Clearing
	12th	1	Unit Test-1
4th	13th	1	Occurrence of normal and tangential stresses, Concept of Principal stress and Principal Planes, Major and minor principal stresses and their orientations
	14th	1	Mohr's Circle and its application to solve problems of complex stresses
	15th	1	Bending stress in beams – Theory of simple bending – Assumptions
	16th	1	Moment of resistance – Equation for Flexure– Flexural stress distribution
5th	17th	1	Curvature of beam – Position of N.A. and Centroidal Axis – Flexural rigidity – Significance of Section modulus
	18th	1	Shear stress distribution

			in beams of rectangular, circular and standard sections symmetrical about vertical axis
	19th	1	Unit Test-2
	20th	1	Concept of torsion, basic assumptions of pure torsion
6th	21st	1	Torsion of solid and hollow circular sections & Problem Practice
	22nd	1	Polar moment of inertia, torsional shearing stresses, angle of twist, torsional rigidity, equation of torsion
	23rd	1	Combination of stresses, Combined direct and bending stresses
	24th	1	Maximum and Minimum stresses in Sections, Conditions for no tension & Problem Practice
7th	25th	1	Limit of eccentricity, Middle third/fourth rule,
	26th	1	Core or Kern for square, rectangular and circular sections, chimneys, dams and retaining walls
	27th	1	Problem Practice
	28th	1	Columns and Struts, Definition, Short and Long columns, End conditions, Equivalent length / Effective length, Slenderness ratio, Axially loaded short and long column
8th	29th	1	Euler's theory of long columns, Critical load for Columns with different end conditions
	30th	1	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
	31st	1	Calculation of support reactions using equations of static equilibrium
	32nd	1	Problem Practice
9th	33rd	1	Shear Force and Bending Moment: Signs Convention for S.F. and B.M, S.F and B.M of 43general cases of determinate beams with concentrated loads and udl only
	34th	1	S.F and B.M diagrams for Cantilevers
	35th	1	S.F and B.M diagrams for Simply supported beams and Over hanging beams
	36th	1	Position of maximum BM, Point of contra flexure, Relation between intensity of load, S.F and B.M.
10th	37th	1	Shape and nature of elastic curve (deflection curve); Relationship between slope, deflection and curvature (No derivation), Importance of slope and deflection
	38th	1	Slope and deflection of cantilever and simply supported beams under concentrated by Double Integration method
	39th	1	Slope and deflection of cantilever and simply supported beams under uniformly distributed load by Double Integration method.
	40	1	Slope and deflection of simply supported beams under concentrated and uniformly distributed load by Macaulay's method.
11th	41st	1	Indeterminacy in beams, Principle of consistent deformation/compatibility
	42nd	1	Analysis of propped cantilever
	43rd	1	Fixed and two span

			continuous beams by principle of superposition
	44th	1	Fixed and two span continuous beams by principle of superposition
12th	45th	1	SF and BM diagrams (point load and udl covering full span)
	46th	1	Types of trusses, statically determinate and indeterminate trusses, degree of indeterminacy, stable and unstable trusses, advantages of trusses
	47th	1	Analytical method (Method of joints, method of Section)
	48th	1	Previous years Q&A Discussion
13th	49th	1	Previous years Q&A Discussion
	50th	1	Previous years Q&A Discussion
	51st	1	Quiz-2
	52nd	1	Problem Practice