SAI INSTITUTE OF TECHNOLOGICAL SCIENCE,CHOUDWAR, CUTTACK
DEPARTMENT OF CIVIL ENGINEERING
LESSONPLAN

Discipline:Civil	Semester:3rd	Semesterfrom:01/08/2023-23/11/2023 No.ofweeks:16
Subject: Structural Mechanics Th.1	No.ofdays/per week Class Allotted: 5	Name of the teaching faculty: L.Jena
Week	Class/Day	TheoryTopics
1st	1st	BasicPrincipleofMechanics
	2nd	Force, Moment, support conditions, Conditions of equilibrium
	3rd	C.G&MI,Freebodydiagram
	4th	ReviewofCGandMIofdifferentsections
	5th	ReviewofCGandMIofdifferentsections
2nd	1st	Introductiontostressesandstrains
	2nd	Mechanicalpropertiesofmaterials–Rigidity,Elasticity, Plasticity, Compressibility, Hardness, Toughness, Stiffness, Brittleness,
	3rd	Ductility, Malleability, Creep, Fatigue, Tenacity, Durability
	4th	Types of stresses -Tensile, Compressive and Shear stresses
	5th	Typesofstrains- Tensile,CompressiveandShearstrains
3rd	1st	Complimentary shear stress - Diagonal tensile / compressive Stresses due to shear
	2nd	Elongation and Contraction, Longitudinal and Lateral strains
	3rd	Poisson's Ratio, Volumetric strain, computation of stress, strain
	4th	changeindimensionsandvolumeetc.
	5th	Numerical
4th	1st	Hooke'slaw-Elastic Constants
	2nd	Derivationofrelationshipbetweentheelasticconstants
	3rd	Application of simple stress and strain in engineering field
	4th	Behavior of ductile and brittle materials under direct loads, Stress Strain curve of a ductile material
	5th	Limitofproportionality,Elasticlimit,Yieldstress, Ultimate stress, Breaking stress, Percentage elongation, Percentage reduction in area
5th	1st	Significance of percentage elongation and reduction in area of cross section
	2nd	Deformation of prismatic bars due to uniaxial load, Deformation of prismatic bars due to its self-weight.
	3rd	Complexstressandstrain
	4th	Principal stresses and strains: Occurrence of normal and tangential stresses

	5th	ConceptofPrincipalstressandPrincipalPlanes
6th	1st	majorandminorprincipalstressesandtheirorientations
	2nd	Mohr's Circle and its application to solve problems of complexstresses
	3rd	Stresses in beams due to bending: Bending stress in beams – Theory of simple bending – Assumptions
	4th	Moment of resistance – Equation for Flexure– Flexural stress distribution
	5th	Curvature of beam –Position of N.A. and Centroidal Axis – Flexural rigidity – Significance of Section modulus
7th	1st	Shearstressesinbeams:Shearstressdistributionin beams of rectangular, circular and standard sections symmetrical about vertical axis.
	2nd	Shearstressesinbeams:Shearstressdistributionin beams of rectangular, circular and standard sections symmetrical about vertical axis.
	3rd	Conceptoftorsion,basicassumptionsofpuretorsion
	4th	torsion of solid and hollow circular sections, polar moment of inertia
	5th	torsional shearing stresses, angle of twist, torsional rigidity, equation of torsion
8th	1st	Combined bending and direct stresses: Combination of stresses, combined direct and bending stresses
	2nd	Maximum and Minimum stresses in Sections, Conditions for no tension, Limit of eccentricity
	3rd	Middlethird/fourthrule,CoreorKernforsquare
	4th	rectangular and circular sections, chimneys, dams and retaining walls
	5th	Numerical
9th	1st	Columns andStruts,Definition,ShortandLongcolumns
	2nd	End conditions, Equivalent length / Effective length, Slenderness ratio
	3rd	Axially loaded short and long column, Euler's theory of long columns
	4th	CriticalloadforColumnswithdifferentendconditions
	5th	Types of Loads: Concentrated (or) Point load, Uniformly Distributed load (UDL)
10th	1st	Types of Supports: Simple support, Roller support, Hinged support, Fixed support
	2nd	Types of Reactions: Vertical reaction, Horizontal reaction, Moment reaction
	3rd	TypesofBeamsbasedonsupportconditions
	4th	Calculation of support reactions using equations of static equilibrium
	5th	ShearForceandBendingMoment:SignsConventionfor S.F.andB.M
11th	1st	S.FandB.Mofgeneralcasesofdeterminatebeamswith

		concentratedloadsandudlonly
	2nd	S.FandB.MdiagramsforCantilevers
	3rd	Simplysupportedbeamsandoverhangingbeams
	4th	PositionofmaximumBM,Pointofcontraflexure
	5th	Relationbetweenintensity ofload,S.FandB.M.
12th	1st	Numerical
	2nd	Introduction: Shape and nature of elastic curve (deflectioncurve)
	3rd	Introduction: Shape and nature of elastic curve (deflectioncurve)
	4th	Relationship between slope, deflection and curvature (Noderivation)
	5th	Relationship between slope, deflection and curvature (Noderivation)
13th	1st	Importanceofslopeanddeflection
	2nd	Slope and deflection of cantilever and simply supported beams under concentrated and uniformly distributed load (by Double Integration method, Macaulay's method)
	3rd	Slope and deflection of cantilever and simply supported beams under concentrated and uniformly distributed load (by Double Integration method, Macaulay's method)
	4th	Slope and deflection of cantilever and simply supported beams under concentrated and uniformly distributed load (by Double Integration method, Macaulay's method)
	5th	Slope and deflection of cantilever and simply supported beams under concentrated and uniformly distributed load (by Double Integration method, Macaulay's method)
14th	1st	Indeterminacyinbeams
	2nd	Principle ofconsistentdeformation/compatibility
	3rd	Analysisofproppedcantilever
	4th	Analysisofproppedcantilever
	5th	Analysisofproppedcantilever
15th	1st	fixed and two span continuous beams by principle of superposition
	2nd	SF and BM diagrams (point load and udl covering full span)
	3rd	SF and BM diagrams (point load and udl covering full span)
	4th	SF and BM diagrams (point load and udl covering full span)
	5th	SF and BM diagrams (point load and udl covering full span)
16th	1st	Introduction:Typesoftrusses

	2nd	staticallydeterminateandindeterminatetrusses
	3rd	staticallydeterminateandindeterminatetrusses
	4th	degreeofindeterminacy
	5th	stableandunstabletrusses.advantagesoftrusses.