

Branch Name:	Civil engineering
Program Code:	ET401
Course Name:	Mechanics Of Structure-I
Course Code:	2ET4010301
Pre-requisite Course:	---

COURSE OBJECTIVE:

The content should be taught and implemented with the aim to develop skills so that students are able to acquire following competencies:

1. To learn properties of area and structural material properties.
2. To understand the concept of stress and strain.
3. To calculate shear force, bending moment for different shapes of structural elements.

TEACHING AND EVALUATION SCHEME:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)			
Lecture	Tutorial	Practical	Credit	Theory		Practical	
				University Assessment	Continuous Assessment	University Assessment	Continuous assessment
04	-	02	05	60	40	20	30

DETAILS OF COURSE CONTENTS:

S.NO.	TOPIC	Total Hrs.	WEIGHTAGE
1	Direct Stress & Strain 1.1 Different types of Structures and Loads 1.2 Direct Stress, linear Strain , Hook's Law, Definition of rigid body, plastic body, mechanical properties of metal such as elasticity & elastic limit. 1.3 Numerical Problems on Direct Stress & Linear Strain. 1.4 Stress Strain curve of Mild Steel. 1.5 Modulus of Elasticity. Yield ,Breaking & Ultimate Stress and factor of Safety along with numerical problems 1.6 Lateral Strain and Poisson's ratio with numerical problems 1.7 Basics Concepts of Shear Stress , Shear Strain & Shear Modulus, Bulk Modulus , volumetric Strain along with numerical Problems 1.8 Differentiate between Sudden , Gradual & Impact Loads with numerical problems 1.9 Define Strain Energy, Proof Resilience with numerical	14	24%
2	Moment Of Inertia 2.1 Moment of Inertia & its Importance 2.2 M.I of composite sections, symmetrical and unsymmetrical sections, radius of gyration & polar moment of inertia 2.3 Parallel & Perpendicular Axis Theorem 2.4 Formula of Moment of Inertia of solid & Hollow sections like Rectangle, Triangle, Circle 2.5 Moment of Inertia about C.G for I section ,H section , Channel Section , Angle Section ,T Section and Built up Section	10	20%

3	S.F & B.M In Beam 3.1 Statically Determinate Beam Like Cantilever , Simply Supported & Over Hang Beam, 3.2 Concepts of S.F and B.M, Sign Conversation 3.3 Shear Force and Bending Moment and its relationship 3.4 Sagging & Hogging Bending Moment and its importance 3.5 Point of Contra-flexure & its importance 3.6 S.F & B.M Diagram for Cantilever , Simply Supported & Over Hang Beam subjected to Point Load and/or U.D.L	12	20%
4	Bending & Shear Stresses In Beam 4.1 Introduction - Assumptions in the Theory of Simple Bending, Bending Theory Equation 4.2 Bending stress , Sectional Modulus , Neutral Axis 4.3 Apply Bending theory to Statically determinate beams having rectangular or circular section 4.4 Shear Stress equation 4.5 Shear Stress Distribution Diagram for Solid & Hollow Rectangular And Circular Section 4.6 Apply shear Stress Equation & Draw Shear Stress Distribution Diagram for I , H , T , Channel & Angle Section	12	20%
5	Column & Strut 5.1 Column & Strut 5.2 Short & Long Column 5.3 End Condition of Column and effective Length of Column & Modes of Failure in column 5.4 Slenderness Ratio & Euler's Crippling Load 5.5 Rankin's load / Buckling Load of Column	08	16%

LIST OF PRACTICAL:

SR. No.	Experiment / Exercises
1	Conduct Tension test on a given sample of mild steel and draw Stress Strain Curve
2	Determine Young's Modulus of wire of given material
3	Calculate impact value of mild steel using IZOD impact test apparatus
4	Calculate impact value of mild steel using Charpy impact test apparatus
5	Solve at least six problems pertaining to unit-1
6	Solve at least six Problems of unit-2
7	Solve at least Eight Problems of unit-3
8	Solve at Least Eight numerical Problems of unit-4
9	Demonstrate End Conditions of Column using suitable model/example

LIST OF REFERENCES:

Sr.no.	Title	Author & Publication
1	Strength of Materials	R.S.Khurmi , N. Khurmi - S Chand Publishing.
2	Strength of Materials	Dr. R.K.Bansal - Laxmi Publications(P) Ltd. New
3	Theory of Structures	R.S.Khurmi - S Chand Publishing, Delhi (2000)
4	Strength of Material & Mechanics of Structures	B C Punamia

LIST OF OPEN SOURCE SOFTWARE/LEARNING WEBSITE:

- 1) <https://nptel.ac.in/courses/105104160> (NPTEL Course :- Mechanics of Solids by IIT, Kanpur)
- 2) <https://www.youtube.com/watch?v=GkFgysZC4Vc&list=PL27C4A6AEA552F9E6> (NPTEL Video Lectures by IIT, Kharagpur)
- 3) www.vlab.co.in (Virtual Lab by Ministry of Education, Government of India)

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Understand statically determinate structural components.	2 Understanding 1 Remembering
CLO2	To understand the concept of stress and strain.	2 Understanding 3 Applying
CLO3	Determine moment of inertia of a symmetrical and asymmetrical section about a given axis.	5 Evaluate 4 Analyse
CLO4	To calculate shear force, bending moment for different shapes of structural elements.	4 Analyse 5 Evaluate
CLO5	Understand behaviour of the structural components under certain loading conditions	2 Understanding 3 Applying

Course Learning Outcomes	Program Outcomes(Po's)											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CLO1	H											L
CLO2			H									
CLO3				M		M						
CLO4									M			
CLO5			M	L								

H: High, M: Medium, L: Low

