

Subject Code: 1ET4010401	Subject Title: Mechanics Of Structure-II
Pre-Requisite	----

RATIONALE:

Knowledge and understanding of Mechanics of Structure is very important for engineers in order to make Civil Engineering Structures safe and serviceable. The Mechanics of Structure –II subject is taught in 4th sem. to develop the concept of analysis of determinate structures under various types of transverse &/or direct loading. Analysis of structural members under the effect of principal stresses & strains is also incorporated to give an exposure of compound stresses to the students. At diploma level students are expected to study about these aspects of analysis and design of various structures so as to develop their understanding in order to apply their knowledge in construction industry.

COURSE OBJECTIVE:

Following are the objectives of this course:

- To analyze Fixed beams using area moment method
- To analyze beams using various methods like slope & deflection, moment distribution and Theorem of three moments.
- To learn concept of eccentric loading and stresses in vertical members like column, Chimneys, dam.
- To learn concept of Principal Stresses & Principal Plane on a plane in a strained structural Material

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
3	1	2	5	60	40	20	30

DETAILS OF COURSE CONTENTS:

Sr. NO.	TOPIC	Total Hrs.	WEIGHTAGE
1	Fixed Beam 1.1 Different types of Determinate Indeterminate Structures & Structural Components 1.2 Advantages of fixed beam over simply supported beam 1.3 Concept of analysis by Area Moment method 1.4 Numerical for SF&BM diagrams for fixed beam with central point load &/or UDL over Full Span	06	14%

2	Slope & Deflection 2.1 Slope & Deflection 2.2 Formulae of Slope & Deflection for Cantilever Beam subjected to Point Load at free end, point load not at free end and with UDL along full Span 2.3 Formulae of Slope & Deflection for Simply Supported Beam subjected to Central Point Load and with UDL along full Span 2.4 Numerical problems on Slope and Deflection	04	10%
3	Continuous Beam 3.1 Theorem of Three Moment (Clapeyron's Theorem) 3.2 Formula to find B.M of a continuous beam using theorem of Three Moment Method 3.3 Numerical to draw S.F & B.M Diagram for two or three span continuous beams having end supports as overhang, fixed and/or hinge and subjected to Central Point Load and/ or U.D.L over full span using Theorem of Three Moment	08	18%
4	Moment Distribution Method 4.1 Stiffness, flexibility, carry over Factor & Distribution Factor 4.2 Moment Distribution Method 4.3 Numerical to draw S.F & B.M Diagram of two or three span continuous beams having end supports as overhang, fixed and/or hinge and subjected to Central Point Load and/or U.D.L over full span using Moment Distribution Method	06	14%
5	Combined Direct & Bending Stresses 5.1 Eccentricity 5.2 Formula for combined Direct & Bending Stresses 5.3 Limit of Eccentricity & Core of section 5.4 Formulae for combined stresses on sections subjected to eccentric loads considering Uniaxial & Biaxial eccentricity 5.5 Stress distribution diagrams 5.6 Application of concept of combined stresses to find pressure at base of Retaining Wall & Dam (Rectangular & Trapezoidal) 5.7 Stability check of Retaining Wall & Dam (Rectangular & Trapezoidal)	08	18%
6	Principle Stresses & Principal Planes 6.1 Formulae for Normal, Tangential & Resultant Stresses due to Direct Orthogonal Stresses & Shear Stress & Numerical 6.2 Formulae for Principal Stresses and Location of Principal Planes 6.3 Numerical based on principal stresses equations 6.4 Mohr's Circle method and its related Numerical	10	26%

COURSE OUTCOME:

The theory should be taught and practical should be carried out in such a manner that students are able to acquire different learning outcomes:

1. Analyze slope and Deflection in fixed and continuous beams.
2. Analyze continuous beam under different loading conditions using the principles of Three Moments.
3. Analyze continuous beam using Moment Distribution Method under different loading conditions.
4. Calculate Principal Stresses & Principal Plane on a plane in a strained structural Material.

LIST OF PRACTICAL:

SR. No.	Experiment
1	Solve at least five real life problems pertaining to Unit-1
2	Perform Deflection test on a Simply Supported beam with different sectional properties (Material/s dimensions etc.)
3	Perform Deflection test on a cantilever beam with different sectional properties (material/s dimensions etc.)
4	Perform Deflection test on a fixed beam with different sectional properties (material/s dimensions etc.)
5	Solve at least Six real life problems pertaining to Unit – 2
6	Solve at least Six real life problems pertaining to Unit-3
7	Solve at Least four real life numerical Problems of Unit-4
8	Solve at least Eight real life problems pertaining to Unit-5
9	Solve at least Eight real life problems pertaining to Unit-6

LIST OF REFERENCES:

Sr.no.	Title	Author
1	Strength of Material & Mechanics of Structures	B C Punamia
2	Strength of Material	S Ramamurthan
3	Strength of Material	Timo Shanku
4	Theory of Structures	R S Khurmi
5	Theory of Structures – vol I & II	S B Junarkar , H J Shah