



Semester – IV

Subject Name: Mechanics of Structure - II

Subject Code: 09CI1401

Diploma Branches in which this subject is offered: Civil Engineering

Objective:

The objective for introducing this subject in second year of civil engineering is to make students gain different learning out comes in the following topics of basic civil engineering:

- Calculate stresses and deformations of statically determinate beams.
- Analyse different structures under direct and eccentric axial loading for its stability and internal stresses.
- Conduct Analysis of beam for shear & bending stresses and thereby know the selection of section for beam.

Credits Earned: 4

Course Outcomes:

On the completion of the course student will be able to:

- Distinguish between determinate and indeterminate structures
- Draw S.F. and B.M. for fixed and continuous beam using theorem of three moment and moment distribution method
- Compute slope and deflection
- Draw deflection curve for different types of beam
- Calculate direct and bending stress for different structural components
- Conduct stability analysis for retaining wall and dam
- Calculate the length and section of the column for given load without buckling

Teaching and Examination Scheme

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE	IA	CSE	Viva	Term work	
3	0	2	4	50	30	20	25	25	150



Contents:

Unit	Topics	Contact hours	Weightage (%)
1	FIXED BEAM <ul style="list-style-type: none">• Determinate and indeterminate structures• Structural elements• Fixed and simply supported beam comparison• Analysis by area moment method• Introduction to μ and μ' diagram• Shear force and bending moment diagram for fixed beams.• Numerical problems	06	20
2	SLOPE & DEFLECTION <ul style="list-style-type: none">• Introduction to slop and deflection• Formulae to find slop and deflection for cantilever and Simply supported beam subjected to point load and UDL• Numerical problems	05	15
3	CONTINUOUS BEAM <ul style="list-style-type: none">• Statically indeterminate beams - propped cantilever beam and continuous beam with and without overhang• Free moment and fixed end moment diagrams• Clapeyron's theorem• Point of contra-flexure• Shear force and Bending moment diagrams for two and three span continuous beams with end supports as overhang , fixed or hinge and subjected to Central Point Load and U.D.L over full span by the use of Theorem of Three Moment• Stiffness and Flexibility• Carry over factor and distribution factor• Moment Distribution Method• Numerical problems	10	25
4	BENDING & SHEAR STRESSES IN BEAM <ul style="list-style-type: none">• Bending theory equations, bending stresses, sectional modulus, and Neutral axis.• Shear stress equations and shear distribution diagrams	05	10
5	COMBINED DIRECT AND BENDING STRESS <ul style="list-style-type: none">• Eccentricity and limit of eccentricity• Core of the section for rectangular & circular-	08	20



	Hollow/Solid <ul style="list-style-type: none"> • Combined stresses for the sections subjected to eccentric loading by considering eccentricity which may be uniaxial and/or biaxial • Stress distribution diagrams • Application for the concept of combined stresses for finding pressure at base and perform stability analysis of Retaining Wall and Dam • Numerical problems 		
6	COLUMN & STRUT <ul style="list-style-type: none"> • Introduction to column and strut • Long and short column • End condition and effective length of column • Modes of failure of column • Radius of Gyration and slenderness ratio 	06	10

Suggested Theory distribution:

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Analyse	Apply	Evaluate	Create
15%	50%	20%	15%	0%	0%

Suggested List of Experiments:

Sr. No.	Name of Topics	Contact Hours
1	Perform Deflection test on a Simply Supported beam with different sectional properties i.e. material, c/s dimensions etc.	4
2	Perform Deflection test on a cantilever beam with different sectional properties i.e. material, c/s dimensions etc.	2
3	Perform Deflection test on a fixed beam with different sectional properties (material, c/s dimensions etc.)	2
4	Solve at least three real life problems in the form of tutorial:	
	(1) Unit – I	2
	(2) Unit – II	2
	(3) Unit – III	4
	(4) Unit – IV	2
	(5) Unit – V	2
	(6) Unit – VI	2



Tutorials:

Unit No.	Name
1	Fixed Beam
2	Slope & Deflection
3	Continuous Beam
4	Bending & Shear Stresses in Beam
5	Combined Direct & Bending Stress
6	Column & Strut

Instructional Method:

- a. The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.
- b. The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.
- c. Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory.
- d. Students will use supplementary resources such as online videos, videos, e-courses, Virtual Laboratory

Reference Books:

1. Strength of Materials and Mechanics of structure by Dr. B.C.Punamia
2. Strength of Materials by S. Ramurthan
3. Strength of Materials by TimoShanko
4. Theory of Structures by R.S.Khurmi
5. Theory of Structures vol I & II by S.B.Junarkar and H.J.Shah