GUJARAT TECHNOLOGICAL UNIVERSITY

DIPLOMA IN CIVIL ENGINEERING

Semester: 4

Subject Name **MECHANICS OF STRUCTURES - II**

Sr. No.	Course content
1.	**FIXED BEAM** 1.1 Explain determinate and indeterminate beam with examples 1.2 Difference between fixed beam and simply supported beam 1.3 SF diagram for fixed beam subjected to 1.3.1 Central point load 1.3.2 UDL on entire span 1.3.3 Central point load and UDL on entire span 1.4 Fixed End Moment (FEM) by moment area method subjected to 1.4.1 Central point load 1.4.2 UDL on entire span 1.4.3 Central point load and UDL on entire span 1.5 BM diagram for fixed beam subjected to 1.5.1 Central point load 1.5.2 UDL on entire span 1.5.3 Central point load and UDL on entire span
2.	**CONTINUOUS BEAM** 2.1 Explain theorem of three moment (Clayperon's theorem) 2.2 Use theorem of three moment for a continuous beam of two spans and two equations only 2.2.1 With only central point load on each span 2.2.2 With full UDL on each span 2.2.3With central point load on one span and full UDL on other span 2.2.4 With central point load and full UDL combined on each span 2.3 Problems to draw SF and BM diagrams for each case of 2.2
3.	**MOMENT DISTRIBUTION METHOD (MDM)** 3.1 Explain stiffness factor 3.2 Explain distribution of moment 3.3 Explain carryover moment 3.4 FEM for span subjected to central point load and full UDL 3.5 Use of MDM for a continuous beam of not more than three spans 3.5.1 With only central point load on each span

	3.5.2 With full UDL on each span 3.5.3 With central point load on one span and full UDL on other span 3.5.4 With central point load and full UDL combined on each span 3.6 Problems to draw SF and BM diagrams for each case of 3.6
4.	**SLOPE AND DEFELCTION** 4.1 Concept of slope and deflection with relation to each other. 4.2 Location for minimum & maximum slope and deflection for cantilever and simply supported with uniform loading. 4.3 Formula for a maximum slope and deflection for a cantilever beam with 4.3.1 Point load at free end. 4.3.2 U.D.L. on entire span. 4.3.3 Point load including U.D.L. on entire span. 4.3.4 Calculate problems based on 4.3 4.4 Explain formula for maximum slope and deflection for a simply supported beam with 4.4.1 Central point load 4.4.2 U.D.L. on entire span. 4.4.3 Central point load with U.D.L. on entire span. 4.4.4 Calculate problems based on 4.4
5.	**PRINCIPAL PLANES AND PRINCIPAL STRESSES** 5.1 Concept of compound stress 5.2 Concept of complimentary shear stress 5.3 Normal and tangential stress on an inclined plane due to 5.3.1 Normal stresses acting at right angles to each other 5.3.2 Normal stresses acting at right angles to each other along with shear stresses 5.4 Problems based on 4.3 5.5 Define principal plane and principal stress 5.5.1 Formula to find principal planes and principal stresses 5.6 Problems based on 4.5 5.7 Mohr's circle method 5.7.1 Selection of axis for the stresses 5.7.2 Graphical concept of normal and tangential stresses 5.7.3 Position of different planes on space diagram and Mohr's circle diagram 5.7.4 Mohr's circle for different stress conditions 5.7.5 Manipulation of required result in the form of stresses 5.7.6 Determination of normal, tangential and resultant stresses from Mohr's circle 5.7.7 Location of principal plane and value of principal stresses

6.	**COLUMNS AND STRUTS** 6.1 Difference between strut and column 6.2 Distinguish between short, medium and long column 6.3 Effect of end conditions on buckling of column 6.3.1 Define effective length 6.3.2 State the effective length for different end conditions of column 6.4 Safe load for long column 6.4.1 Euler's equation for safe load: PB = $\frac{\pi^2 EI}{l_e^{\,2}}$ 6.4.2 Problems on Euler's load 6.5 Safe load for medium column 6.5.1 Rankine's equation for safe load: PR = $\frac{f_c A}{1+\alpha(\lambda)^2}$ where $\lambda = \frac{l_e}{r}$ and $\alpha = \frac{f_c}{\pi^2 E}$ 6.5.2 Problems on Rankine's load
7.	**DIRECT AND BENDING STRESSES** 7.1 Difference between axial and eccentric load 7.2 Effect of axial and eccentric load on column 7.3 Concept of combined direct and bending stresses 7.4 Formula for maximum and minimum stress 7.5 Stress variation diagram 7.6 Problems based on 6.5 7.7Concept of core of sections for square, rectangular and circular section 7.8 Diagrams for core of sections 7.9 Formula to find pressure intensity at the base of retaining wall or dam 7.10 Problems based on 6.9 7.11 Stability of retaining wall or dam 7.11.1 For level earth without surcharge 7.11.2 Problems based on 6.11.1

Note: Derivation of any formula in the study is not required.

Laboratory Experiments

1. Demonstration on column with different end conditions and their problems
2. Drawing Mohr's circle for different stress conditions
3. Deflection of beam with different end conditions and different cross sections of wood

Reference Books:

Sr. No.	Name of Books	Author
1.	Strength of Materials	R.S. Khurmi
2.	Strength of Materials	S. Ramamrutham
3.	Theory of Structures	S. Ramamrutham
4.	Analysis of Structures (Vol. I & II.)	Vazirani & Ratwani
5.	Theory of Structures	Timoshenko & Young
6.	Strength of Materials & Mechanics of Structures (Vol. I)	Dr. B.C.Punmia
7.	Mechanics of Materials	Beer & Johnston
8.	Mechanics of Structures (Vol. I & II.)	S.B. Junnarkar