GUJARAT TECHNOLOGICAL UNIVERSITY DIPLOMA ENGINEERING – SEMESTER – IV-EXAMINATION – WINTER 2015

Subject Code: 340601Date: 17/12/2015Subject Name: Mechanics of Structure - IITotal Marks: 70Time: 02:30 PM TO 5:00 PMTotal Marks: 70

Instructions:

- 1. Attempt any five questions.
- 2. Make suitable assumptions wherever necessary.
- 3. Figures to the right indicate full marks.
- 4. Each question carry equal marks (14 marks)

Q.1	(a)	(1) Differentiate between simply supported beam and fixed beam.	04
		(2) State advantages and disadvantages of fixed beam.	03

(b) A fixed beam of 6 m span carries u.d.l. of 80 kN/m over its entire span. Using area moment method finds fixed end moments and draw S. F. and B. M. for the beam. Also find point of contraflexure.

Q.2 (a) Explain Clapeyron's theorem of three moments with usual notations. 04

(b) A beam ABC is simply supported at A, B and C. The span AB = 6 m and 10 BC = 4 m, span AB carries an u.d.l. of 20 kN/m and span BC carries an u.d.l. of 30 kN/m. Draw S, F. and B. M. diagram for the beam.

OR

- (b) A continuous beam ABC is simply supported at A and C. The span AB is 4 m and span BC is 5 m. Span AB is subjected to a point load of 20 kN at centre of span BC is subjected to u.d.l. of 5 kN/m over entire span. Draw S. F. and B. M. diagram. Use moment distribution method. EI is same for the both the span.
- Q.3 (a) Explain the terms: Stiffness factor, Carry over factor, Carry over moment, 07 Distribution factor and also explain steps for moment distribution method.
 - (b) A continuous beam ABC is simply supported at A and C. The span AB and BC are 4 m and 5 m respectively. Span AB is subjected to u.d.l. of 80 kN/m and span BC is subjected to u.d.l. of 50 kN/m. Draw S. F. and B. M. diagram. Use Clapeyron's theorem of three moments.

OR

- Q.3 (a) State formulae for maximum slope and deflection for the following cases: 07
 - Cantilever beam with point load at free end and u.d.l. on entire span.
 Simply supported beam with central point load and u.d.l. on entire span.
 - (b) A continuous beam ABC is simply supported at A, B and C such that AB = 3.6 m and BC = 4.8 m. It carries u.d,l, of 60 kN/m over entire length. Using moment distribution method, draw B. M. diagram for the beam. Consider EI = constant.
- Q.4 (a) A simply supported beam of 5 m span is 250 mm x 400 mm in cross section. 07 It carries a central point load of 20 kN and an u.d.l. of 10 kN/m over entire span. Calculate the maximum slope and maximum deflection. Take E = 200 GPa.

(b) Find out normal, tangential and resultant stresses in a plane at 45° with horizontal for a strained material subjected to two tensile stresses 80 MPa and 60 MPa. Use Mohr's Circle Method only.

OR

- Q. 4 (a) State different end conditions of column and effective length with neat 07 sketches.
 - (b) A masonry dam 5.0 m high, 2.5 m wide at base and 1.0 m wide at top, retains water on vertical face for full height. Considering density of masonry as 17 kN/m³ and density of water as 10 kN/m³, calculate max. and min. pressure intensities at the base and draw pressure diagram also.
- Q.5 (a) Derive expressions for maximum and minimum stresses in rectangular 07 section.
 - (b) A concrete column 230 mm x 350 mm size is 5 m long and fixed at both ends. **07** Calculate critical load by using Eular's formula and Rankine's formula. Take $E_c = 0.14 \times 10^5$ MPa, $\alpha = 1/1600$ and $f_c = 330$ MPa.

OR

- Q.5 (a) In a strained material two direct stresses of 860 MPa (tensile) and 440 MPa (compressive) are acting on two mutually perpendicular planes respectively with a shear stress of 300 MPa. Locate principal planes and find principal stresses analytically.
 - (b) A simply supported beam of span 4 m is subjected to an u.d.l., due to which 07 slope at support is 1°, calculate the value of maximum deflection.
