

GUJARAT TECHNOLOGICAL UNIVERSITY**Diploma Engineering - SEMESTER-IV • EXAMINATION – SUMMER • 2015****Subject Code: 340601****Date: 04-05-2015****Subject Name: Mechanics of Structure - II****Time: 10:30 am – 01:00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. English version is considered to be Authentic.

- Q.1** (a) Distinguish between simply supported beam and fixed beam. **07**
 (b) A fixed beam of 5 m span is subjected to a central point load of 40 kN and a u.d.l. 20 kN/m over entire span. Draw S.F. and B.M. diagrams. **07**

- Q.2** (a) What are different methods to find out slope and deflection at a section in a loaded beam? Explain any one of them in detail. **07**
 (b) A simply supported beam 3 m long carries a point load W at its centre. If the slope at the ends of beam is not to exceed 1° , find the deflection at the centre of beam. **07**

OR

- (b) A cantilever beam of span 2 m has an allowable deflection of 2 mm at free end. If $E = 2 \times 10^5 \text{ N/mm}^2$ and size of beam is 230 mm \times 450 mm, find the value of point load which can be placed at free end. **07**
- Q.3** (a) Explain Clapeyron's theorem of three moments with neat sketch. **07**
 (b) A continuous beam ABC is simply supported at A, B, & C. Span AB is 5 m long and carries a central point load of 40 kN. Span BC is 6 m long and carries a u.d.l. of 16 kN/m over entire span of BC. Determine support moments using Theorem of three moments and draw S.F. and B.M. diagrams. **07**

OR

- Q.3** (a) Define stiffness of beam. State factors affecting stiffness of beam. **07**
 (b) A continuous beam ABC is simply supported at A, B, & C. AB is 4 m long and carries a u.d.l. of 30 kN/m on entire span AB. BC is 5 m long and carries a u.d.l. of 40 kN/m on entire span of BC. Draw S.F. and B.M. diagram for the beam by using Clapeyron's theorem of three moments. **07**

- Q.4** (a) Explain Stiffness Factor and Distribution Factor giving equations for different cases. **07**
 (b) A continuous beam ABC is simply supported at A, B and C such that $AB = 3.6 \text{ m}$ and $BC = 4.8 \text{ m}$. It carries a u.d.l. of 60 kN/m over full length. Using moment distribution method, draw B.M. diagram for the beam. Consider $EI = \text{constant}$. **07**

OR

- Q.4** (a) Explain Principle Planes and Principle Stresses. **07**
 (b) At a certain point in a strained material two stresses of intensities of 180 N/mm^2 tensile and 120 N/mm^2 compressive are acting on planes mutually perpendicular to each other. Determine analytically Normal, Tangential and Resultant stresses on a plane inclined at 40° with the plane of major stress. **07**

- Q.5** (a) Explain different end conditions of column and effective length with sketches. **07**
 (b) A hollow C.I. column of 30 mm external and 20 mm internal diameters is used as a column 4 m long with both the ends hinged. Find the Rankine's safe load **07**

with factor of safety 4. Take $\sigma_c = 560 \text{ N/mm}^2$ and Rankine's constant as 1/1600.

OR

- Q.5** (a) Draw 'Core' for the following sections: **07**
(1) Square (2) Rectangular (3) Circular (4) Hollow circular
- (b) A concrete dam of rectangular section is 16 m high, 6.5 m wide, contains water up to a height of 14 m. Find max. and min. intensities of stresses at the base. **07**
Take unit weight of concrete as 25 kN/m^3 .
