

GUJARAT TECHNOLOGICAL UNIVERSITY**B.E. Sem-IV Examination June- 2010****Subject code: 140603****Subject Name : Structural Analysis - II****Date: 19 / 06 / 2010****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.

- Q.1** Answer the following.
- (a) State advantages and disadvantages of a fixed beam **04**
 - (b) Explain the methods of prestressed concrete **04**
 - (c) For a joint 'O' of a plane frame with the members OA, OB, and OC having constant EI and length 2m, 3m and 4m respectively, if end A is free, end B is hinged and end C is fixed, then moment distribution factor for OA, OB and OC will be respectively _____ **02**
 - (d) A fixed beam AB is of span 5 m. If one of the end settles by 10 mm, what will be the reaction developed at each support? $E = 200 \times 10^3 \text{ N/mm}^2$, $I = 3 \times 10^7 \text{ mm}^4$. **02**
 - (e) A beam AB is fixed at A and hinged at B. If the end B sinks by amount ' δ ', What will be the moment developed at end A and at end B? **02**
- Q.2**
- (a) List the points which produces sway in the portal frame. **03**
 - (b) Draw the bending moment diagram for the beam shown in **fig. (i)**. Use any convenient method. **04**
 - (c) Analyse the beam shown in **fig.(ii)** by consistent deformation method. Draw shear force and bending moment diagram. Assume constant EI. **07**
- OR**
- (c) Determine the vertical deflection at free end in the overhanging beam as shown in **fig.(iii)**. Assume constant EI. Use Castigliano's method. **07**
- Q.3**
- (a) Analyse the fixed beam shown in **fig.(iv)** using first and second principle. Draw shear force and bending moment diagram. **07**
 - (b) For a continuous beam ABCD as shown in **fig.(v)**, find the moments at all supports if, end A rotates by 0.002 radian in the clockwise order and the support B settles by 4 mm. $E = 200 \times 10^3 \text{ N/mm}^2$, $I = 9 \times 10^7 \text{ mm}^4$. **07**
- OR**
- Q.3**
- (a) Derive the equation for fixed end moment developed if one of the supports of a fixed beam settles by amount ' δ '. **04**
 - (b) Determine the support moment for a continuous beam as shown in **fig.(vi)** by moment distribution method. Also draw bending moment diagram. **10**
- Q.4**
- (a) Derive the fixed end moment developed due to rotation of support B by amount θ in clockwise direction for a fixed beam AB. **04**
 - (b) Using slope deflection method analyse the continuous beam shown in **fig.(vii)**. Draw bending moment diagram. **10**
- OR**
- Q.4**
- (a) Mention the grade of concrete and grade of steel used in prestressed concrete. **02**
 - (b) Generate the influence line diagram for M_A and R_B . Refer **fig.(viii)** **12**

- Q.5 (a)** State and explain Muller Breslau's principle. State the significance of influence line diagram in structural analysis. **04**
- (b)** A rectangular concrete beam of cross section, 300mm deep and 200mm wide is pre stressed by means of 15 wires of 5 mm diameter located at 65 mm from the bottom of the beam. and 3 wires of 5 mm , 25 mm from the top. Assuming the pre stress in the steel as 840 N/mm^2 , calculate stress at the extreme fiber of the mid span section when the beam is supporting its own weight over a span of 6 m. If a uniformly distributed live load of 6 kN/m is imposed , evaluate the maximum working stress in concrete. The density of concrete is 24 kN/m^3 . Refer **fig.(ix)**. **10**

OR

- Q.5 (a)** Explain about losses in prestressed materials. **04**
- (b)** For the continuous beam shown in **fig.(x)** show one complete iteration cycle by Kani's method. **10**


