

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- IVth SEMESTER-EXAMINATION – MAY/JUNE- 2012****Subject code: 140603****Date: 29/05/2012****Subject Name: Structural Analysis-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.

- Q.1** (a) (i) Explain carry over factor and distribution factor with illustration. **04**
 (ii) Write advantages of fixed beam over simply supported beam. **03**
 (b) Analyze the fixed beam shown in fig.(i) using moment area theorems. **07**

- Q.2** (a) For a continuous beam ABC as shown in fig.(ii), find the moments at all supports, if support A rotates by 0.003 radian in clockwise direction and the support B sinks by 5mm. $E = 2 \times 10^5 \text{ N/mm}^2$. $I = 8 \times 10^7 \text{ mm}^4$. **07**
 (b) Analyze the continuous beam shown in fig.(iii) by Kani's method. **07**

OR

- (b) (i) State and explain Castigliano's first theorem. **03**
 (ii) Explain methods of prestressing. **04**

- Q.3** (a) Determine the support moment for a continuous beam as shown in fig.(iv) by moment distribution method. Also draw bending moment diagram. **10**
 (b) Derive the equation of fixed end moment developed due to U.D.L. of intensity w applied on a fixed beam AB of length l . **04**

OR

- Q.3** (a) Analyze the continuous beam shown in fig.(v) by slope deflection method. Draw shear force diagram and bending moment diagram. **10**
 (b) Derive the equation for fixed end moment developed if support B of a fixed beam AB rotates by angle θ_B clockwise. **04**

- Q.4** (a) (i) Differentiate prestressed concrete from reinforced concrete. **03**
 (ii) Why higher grade concrete and high tensile strength steel wires are used in prestressed concrete? **04**
 (b) A prestressed concrete beam of section $400 \times 600 \text{ mm}$ is subjected to a prestressing force of 2000kN at an eccentricity of 100 mm from bottom. It is subjected to a live load of 30 kN/m over a span of 12 m. Calculate extreme fibre stresses at top and bottom at mid-span at transfer and after the application of live load. Assume total loss of prestress to be 10%. Draw bending stress distribution diagrams. Take unit weight of concrete $= 24 \text{ kN/m}^3$. **07**

OR

- Q.4** (a) What is an influence line diagram? Explain its importance in structural analysis. **04**
 (b) Generate influence line diagram for R_B for a propped cantilever beam as shown in fig.(vi) by first principle. Also draw ILD for M_A and R_A . **10**

- Q.5 (a)** Using method of consistent deformation, analyze the beam shown in fig.(vii). Draw shear force and bending moment diagram. **07**
 $EI = \text{constant}$.
- (b)** Calculate fixed end moments for a beam as shown in fig.(viii) using Castigliano's theorem. Draw shear force diagram and bending moment diagram. **07**

OR

- Q.5 (a)** Determine the vertical deflection of joint C of the truss shown in fig.(ix) by unit load method. The cross-sectional area of each member is 400 mm^2 . $E = 2 \times 10^5 \text{ N/mm}^2$. **10**
- (b)** Draw bending moment diagram for the beam shown in fig.(x). Use any convenient method. **04**

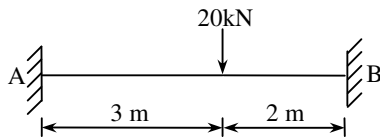


fig.(i) Q-1(b)

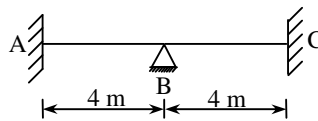


fig.(ii) Q-2(a)

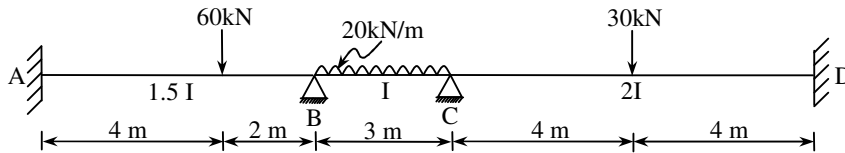


fig.(iii) Q-2(b)

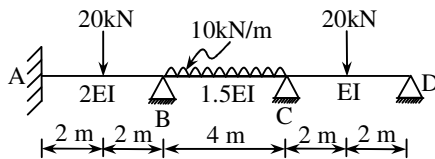


fig.(iv) Q-3(a)

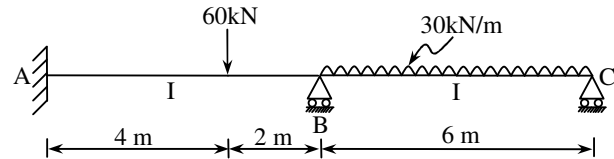


fig.(v) Q-3(a) OR

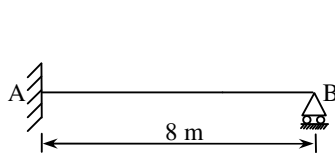


fig.(vi) Q-4(b) OR

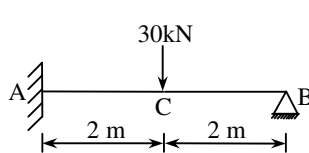


fig.(vii) Q-5(a)

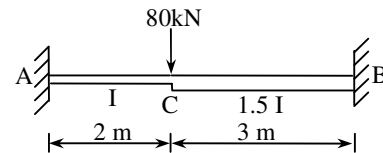


fig.(viii) Q-5(b)

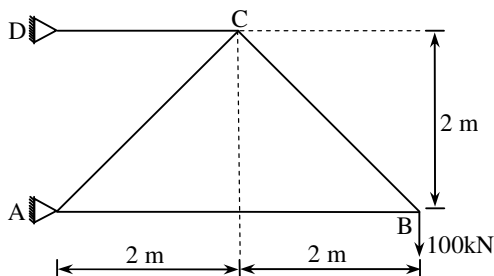


fig.(ix) Q-5(a) OR

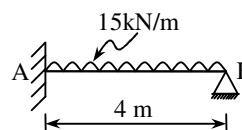


fig.(x) Q-5(b) OR
