Seat No.: _____ *Enrolment No._____*

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. $E = 2 \times 10^5$ N/mm^2. $I = 8 \times 10^7$ 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 × 600 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 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. EI = constant. **07**

(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. $E = 2 \times 10^5$ N/mm^2. **10**

(b) Draw bending moment diagram for the beam shown in fig.(x). Use any convenient method. **04**

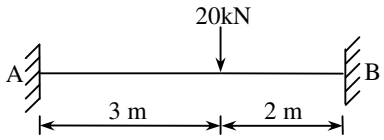

fig.(i) Q-1(b)

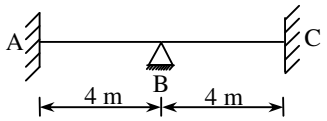

fig.(ii) Q-2(a)

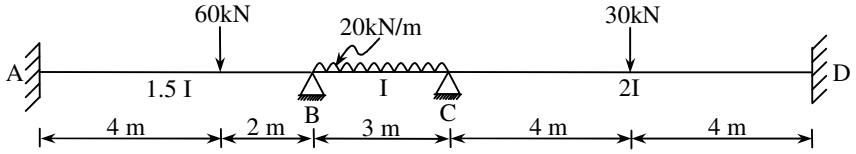

fig.(iii) Q-2(b)

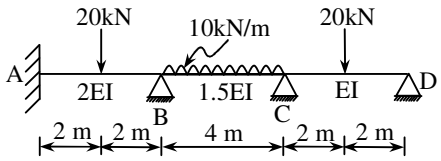

fig.(iv) Q-3(a)

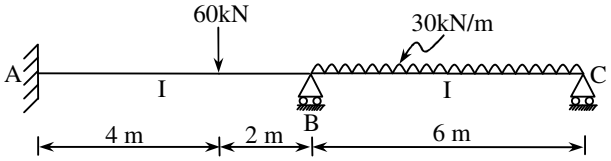

fig.(v) Q-3(a) OR

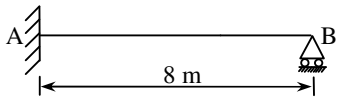

fig.(vi) Q-4(b) OR

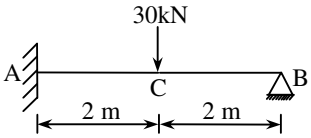

fig.(vii) Q-5(a)

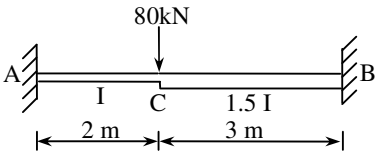

fig.(viii) Q-5(b)

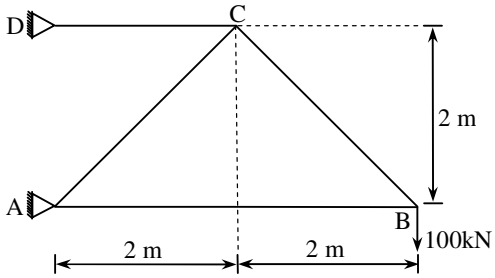

fig.(ix) Q-5(a) OR

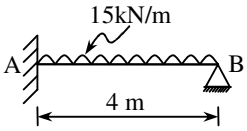

fig.(x) Q-5(b) OR

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