Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC– SEMESTER III– • EXAMINATION –WINTER- 2016

Subject Code: X30603 **Date:04/01/2017**

Subject Name: Structural Analysis-II

Time:10:30 AM to 1:00 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)**	Define & explain the following terms with neat sketch. (i) Stiffness (ii) Relative stiffness (iii) Distribution factor	**07**
	(b)	State and Explain Muller Breaslau's Principle.	**07**
Q.2	**(a)**	Analyze the beam shown in fig. 1 using moment distribution method.	**07**
	(b)	Formulate flexibility matrix for the continuous beam shown in fig. 1.	**07**
		OR	
	(b)	Draw influence lines for vertical reaction at A for the beam shown in fig. 2. Take EI = constant. Plot numerical values every 1 m.	**07**
Q.3	**(a)**	Calculate support rotation at B and C for the beam shown in fig. 1 using slope deflection method.	**07**
	(b)	Calculate support rotation at B and C for the beam shown in fig. 1 using stiffness method.	**07**
		OR	
Q.3	**(a)**	Derive the formula of Euler's buckling load for axially loaded column with both ends hinged.	**07**
	(b)	Calculate Euler's critical load of a strut built-in at both ends, the cross-section being a square 10 mm x 10 mm, and the length 2 m. Take $E = 2 \times 10^5$ N/mm^2.	**07**
Q.4	**(a)**	Determine final moments for the plane frame shown in fig. 3 using moment distribution method.	**07**
	(b)	Formulate stiffness matrix for the plane frame shown in fig. 3. Neglect axial deformation. Take EI = constant.	**07**
		OR	
Q.4	**(a)**	Derive equation of hoop stress in a spherical dome subjected to concentrated load at the crown.	**07**
	(b)	A 100 mm thick conical dome having diameter 20 m at base and 4 m rise. Assume live load = 1.5 kN/m^2. Calculate meridional stress and hoop stress at base due to self weight and live load.	**07**
Q.5	**(a)**	Draw qualitative ILD for R_A, R_B and R_C of the beam shown in fig. 4.	**07**
	(b)	A three-hinged semicircular arch of 15 m radius is loaded with a 40 kN point load at 8 m from left had side hinge. Calculate magnitude of bending moment under point load.	**07**
		OR	
Q.5	**(a)**	A steel bar having a square cross section (50 mm x 50 mm) and length L = 2 m is compressed by axial loads P = 60 kN acting at the midpoint of one side of the cross section. Assuming that the $E = 2.1 \times 10^5$ N/mm^2 and that the ends of the bar are pinned, calculate the maximum bending moment.	**07**

(b) The cable as shown in fig. 5 supports a beam which weighs 12 kN/m. Determine tension in cable at A and B. **07**

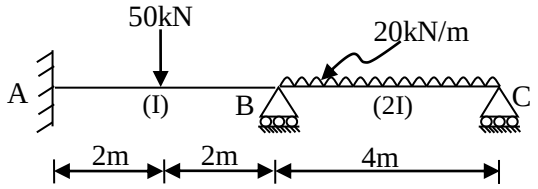

Fig. 1: [Q.2(a)][Q.2(b)][Q.3(a)][Q.3(b)]

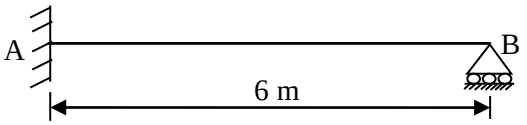

Fig. 2: [Q.2(b) OR]

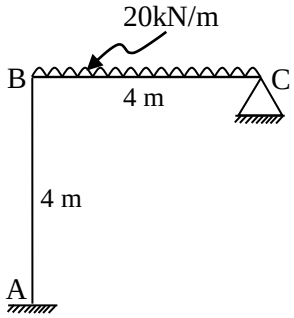

Fig. 3: [Q.4(a)][Q.4(b)]

Fig. 4: [Q.5(a)]

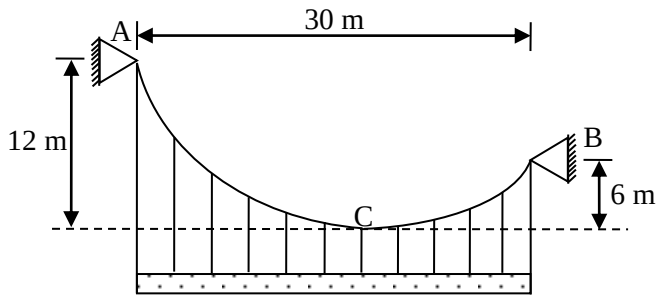

Fig. 5: [Q.5(b) OR]

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