

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-V (NEW) EXAMINATION – WINTER 2021****Subject Code:3150614****Date:20/12/2021****Subject Name:Structural analysis-II****Time:02:30 PM TO 05:00 PM****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

		MARKS
Q.1	(a) Define (a) Distribution Factor (b) Carry over moment (c) Influence line	03
	(b) Explain (a) Castigliano's first Theorem (b) Flexibility	04
	(c) Derive Slope Deflection Equation using fundamentals with usual notations.	07
Q.2	(a) Explain Muller Breslau principle with appropriate sketches.	03
	(b) Write Characteristics of stiffness matrix.	04
	(c) Using Castigliano's first theorem calculate deflection at free end of cantilever beam shown in Figure.1. Take $E = 2 \times 10^5 \text{ N/mm}^2$ and size of beam as 230x300 mm	07
	OR	
	(c) Determine Reaction R_A and R_B for the propped cantilever beam shown in the Figure. 2 using Castigliano's second theorem.	07
Q.3	(a) Write Slope deflection Equation for the beam shown in figure 3.	03
	(b) Analyze the beam shown in figure 3 using slope deflection method and draw bending moment diagram only.	04
	(c) Analyze the frame shown in the figure 4 using slope deflection method and draw bending moment diagram only.	07
	OR	
Q.3	(a) Differentiate between stiffness and flexibility method	03
	(b) Discuss causes of sidesway in analysis of frame.	04
	(c) Analyze the beam shown in the figure 3 using moment distribution method and draw bending moment diagram.	07
Q.4	(a) Four loads of 30 KN, 40 KN, 30 KN and 20 KN are applied on 9 m mt long beam as shown in figure 5. Draw influence line for shear force at point C located at 5 m from left. Also find maximum positive and negative shear force at point C for given loading.	03
	(b) Draw influence line for bending moment at point C for the beam shown in figure 5 and find maximum bending moment at C for given loading on beam.	04
	(c) Four loads of 20 KN, 15 KN, 17 KN and 15 KN as shown in Figure 6 are passing from left to right on simply supported beam of span 22 mt with 15 KN load as leading load. Calculate max S.F. and B.M. at point C located at 10 mt from left end.	07
	OR	
Q.4	(a) Draw influence line for 4 m long beam for reaction at B (R_B) as shown in figure 7. Calculate ordinates at 1 mt. interval.	07
	(b) Draw influence line for reaction at B (R_B) for the 14 mt long two-span beam shown in figure 8. Calculate ordinate at 2 mt interval.	07
Q.5	(a) Find flexibility matrix only for the beam shown in figure 9 considering M_A and M_B as redundant.	07

- (c) Analyze the beam shown in figure 3 by matrix method and draw bending moment diagram only. 07

OR

- Q.5 (a) Write assumptions made in cantilever method of approximate analysis. 03

- (b) Draw only Qualitative influence line diagram for following functions of 2 span continuous beam having support reaction R_A , R_B and R_C . The point D is located at center of right span BC 04

(a) Influence line for R_C

(b) Influence line for R_A

(c) Influence line for shear at D

(d) Influence line for bending moment at D.

- (c) Analyze the frame shown in figure 10 by portal method and draw shear force and axial force diagram only. 07

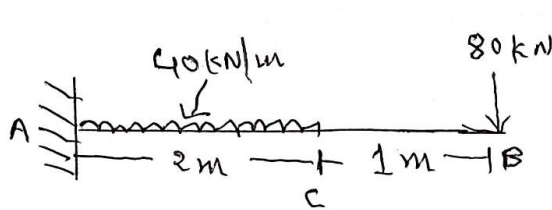


Fig-1 Q-2(c)

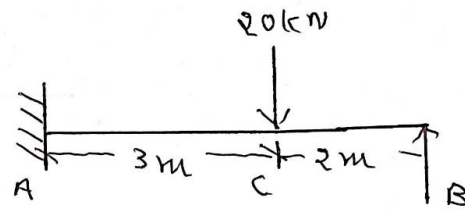


Fig-2 Q-2(c) 08

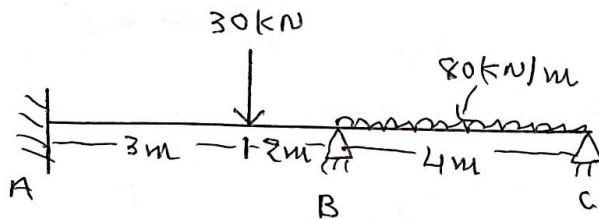


Fig-3

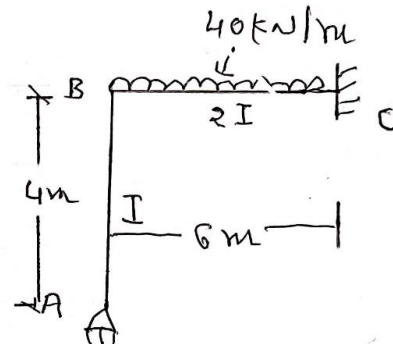


Fig-4 Q-3(c)

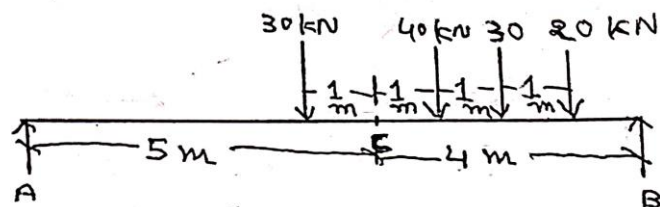


fig-5 Q-4(c)(b)

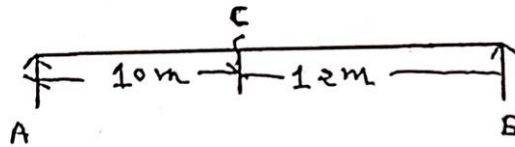
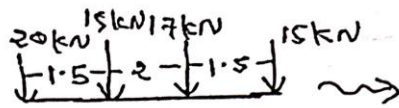


fig-6 Q-4(c)

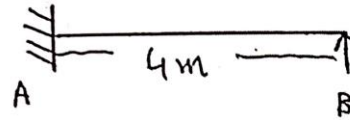


fig-7 Q-4(c) or

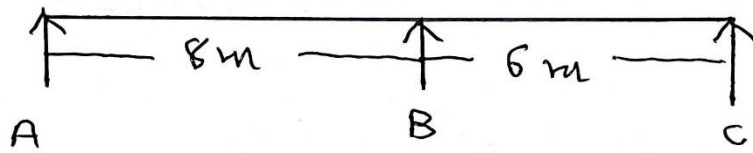


fig-8 Q-4(b) 08

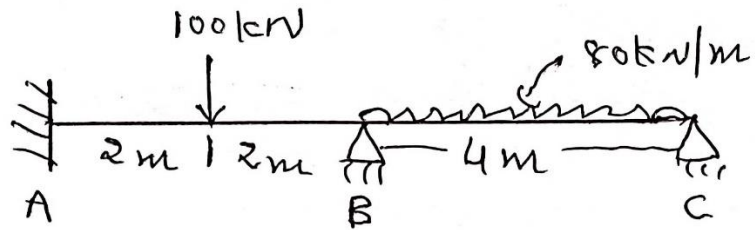


fig-9 Q-5(a)

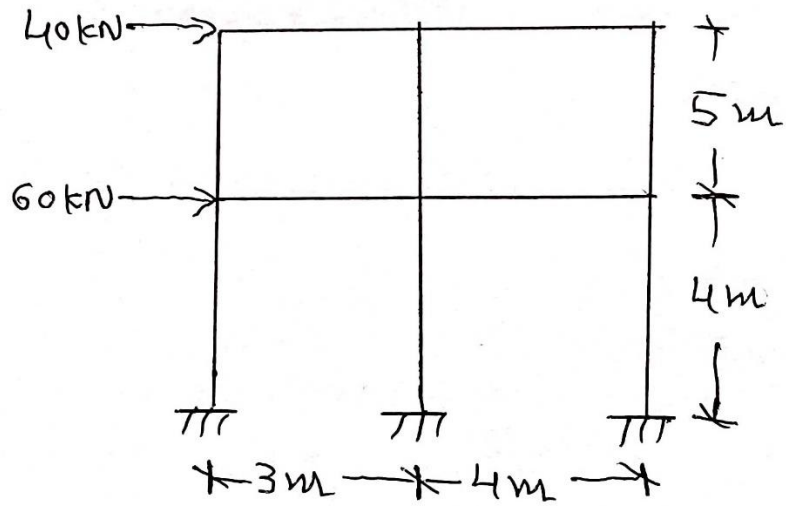


fig-10 Q-5(c) 08