

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- SEMESTER– V EXAMINATION – SUMMER 2026****Subject Code:3150614****Date:30-05-2026****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) Write assumptions made in slope deflection method.	03
	(b) Write the differences between statically determinate and indeterminate structures.	04
	(c) Derive Slope Deflection Equation using fundamentals with usual notations.	07
Q.2	(a) Define portal frame. Discuss the causes of sway in a portal frame.	03
	(b) Explain following terms: Stiffness, Carry over factor, Distribution factor, Carry over moment.	04
	(c) Draw SFD and BMD diagram for a beam shown in Fig: 1 using Moment distribution method	07
OR		
	(c) Draw SFD and BMD diagram for a beam shown in Fig: 1 using Slope and deflection method.	07
Q.3	(a) State and explain Castigliano's second theorem with example.	03
	(b) Using Castigliano's second theorem, determine reaction at the supports as shown in Fig: 2	04
	(c) Using Castigliano's second theorem, determine reaction at prop for a propped cantilever beam as shown in Fig: 3 Also draw S.F. and B.M. diagram.	07
OR		
Q.3	(a) State and prove the Castigliano's 1 st Theorem.	03
	(b) Calculate the central deflection for a simply supported beam of length 'l' subjected to a concentrated load of 'w' at centre on its span using Castigliano's 1 st Theorem.	04
	(c) Using Castigliano's first theorem, find deflection at B and slope at D for a cantilever beam loaded as shown in Fig: 4 , Take $E = 2 \times 10^5 \text{ N/mm}^2$ and $I = 3 \times 10^8 \text{ mm}^4$	07
Q.4	(a) State and explain Muller Breslau principle for influence line.	03
	(b) Explain characteristics of ILD for statically indeterminate structures.	04
	(c) Draw influence line diagrams for V_a and V_b as shown in Fig:5	07
OR		
Q.4	(a) What is an influence line diagram? Explain its importance in structural analysis.	03
	(b) A simply supported beam AB has span 8 m. Draw influence lines for R_A , R_B , V_x and M_x for a section X at 3 m from left hand support.	04

- (c) A simply supported beam has span of 20 m and loaded by a train of wheels as shown in **Fig: 6**, calculate the maximum positive and negative S.F. and B.M induced at 8 m from the left support. 07
- Q.5 (a) State the characteristics of flexibility Metrix. 03
- (b) Differentiate between Flexibility method and Stiffness method. 04
- (c) Using flexibility method analyse the beam ABC fixed at A and supported on rollers at B and C as shown in **Fig: 7** 07
- OR
- Q.5 (a) State the characteristics of stiffness Metrix. 03
- (b) Formulate flexibility matrix for the actions for a beam shown in **Fig: 8** 04
- (c) Analyse the beam shown in **Fig: 9** by stiffness method. 07

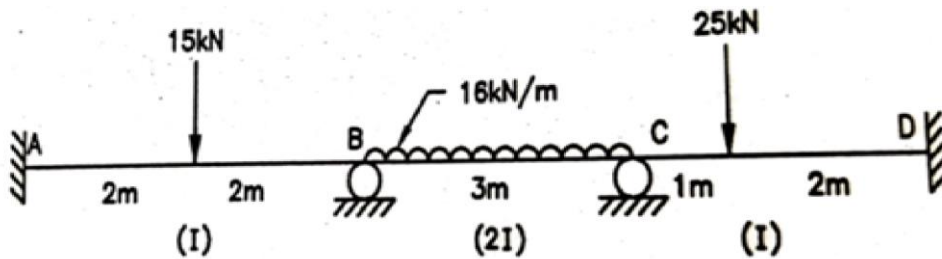


Fig:1

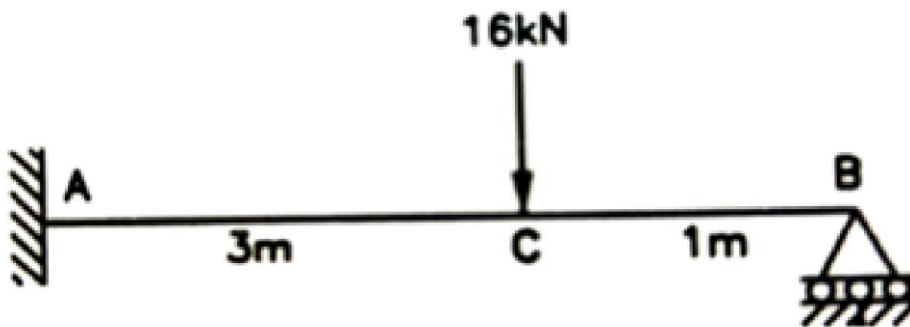


Fig:2

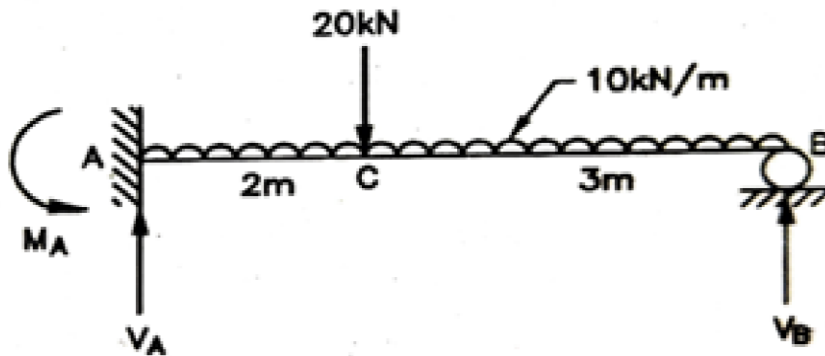


Fig:3

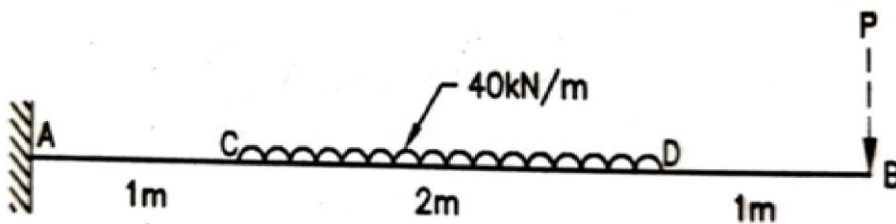


Fig:4

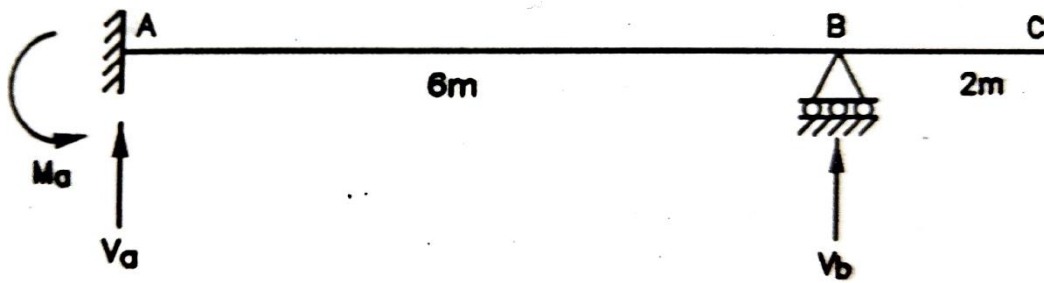


Fig:5

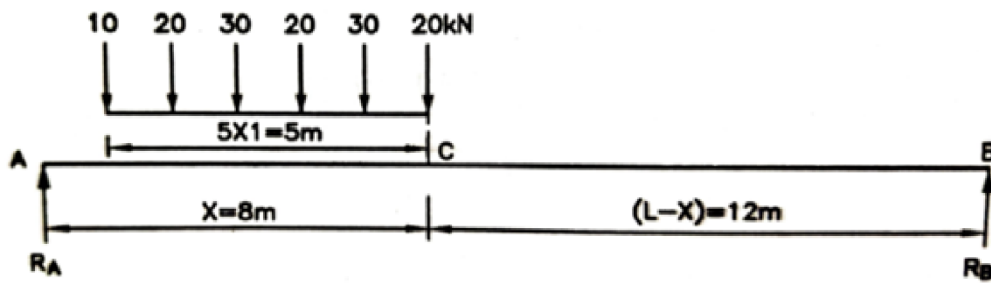


Fig:6

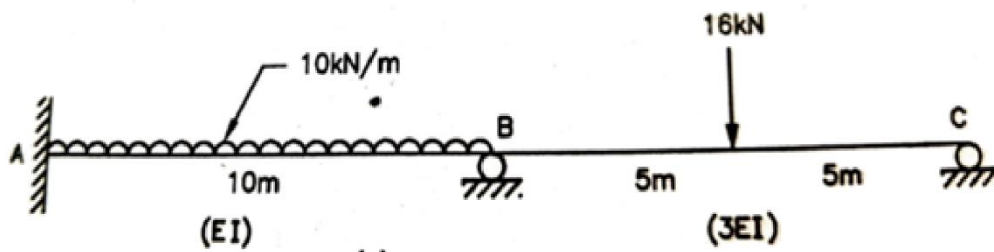


Fig:7

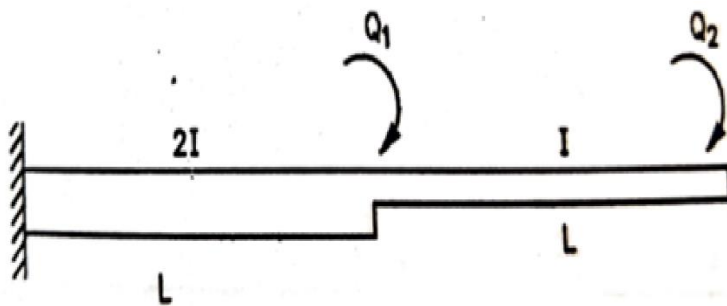


Fig:8

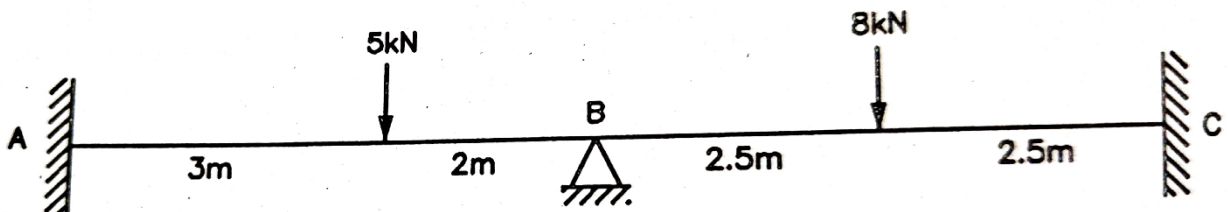


Fig:9