Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE – SEMESTER- V EXAMINATION-SUMMER 2023

Subject Code: 3150614 Date: 28/06/2023

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 the differences between statically determinate and indeterminate structures.	**03**
	(b)	Define: (i) Distribution Factor, (ii) Relative stiffness, (iii) Stiffness, (iv) Carryover factor.	**04**
	(c)	Draw bending moment and shear force diagram for a beam shown in Fig. 1 using slope deflection method.	**07**
Q.2	**(a)**	Explain fictitious load method used to solve deflection problems.	**03**
	(b)	What is a portal frame? Discuss the causes of sway in a portal frame.	**04**
	(c)	Analyze the frame shown in Fig. 2 by moment distribution method and draw bending moment diagram.	**07**
		OR	
	(c)	Analyze the beam shown in Fig. 3 by flexibility method.	**07**
Q.3	**(a)**	Explain Muller Breslau principle with appropriate sketches.	**03**
	(b)	Write the differences between stiffness and flexibility matrix methods.	**04**
	(c)	Draw the influence line for shear force and bending moment for a point 3 m from left support and find maximum values of shear force and bending moment for a beam shown in Fig. 4.	**07**
		OR	
Q.3	**(a)**	For a cantilever beam, show that stiffness and flexibility matrices are reciprocal to each other.	**03**
	(b)	Write the characteristics of ILD for statically indeterminate structures.	**04**
	(c)	Determine deflection under 60 kN load for a simply supported beam shown in Fig. 5. Take $E = 2\times10^5$ N/mm^2, $I = 2\times10^8$ mm^4.	**07**
Q.4	**(a)**	What is influence line diagram? What is the significance of influence line diagram?	**03**
	(b)	Draw influence line diagrams for support reactions of a simply supported beam.	**04**
	(c)	Analyze the portal frame shown in Fig. 6 by Castingliano's 2nd theorem and draw bending moment diagram.	**07**
		OR	
Q.4	**(a)**	Discuss limitations of Castingliano's 1st theorem.	**03**

(b) Write assumptions made in cantilever method of approximate analysis. **04**

(c) Using slope deflection method analyze the frame shown in Fig. 7 and draw bending moment diagram. **07**

Q.5 **(a)** Explain various types of skeletal structures. **03**

(b) Derive relation between stiffness and flexibility. **04**

(c) For a beam shown in Fig. 8 find the moments and the reactions at the supports. Draw bending moment and shear force diagram for the beam. **07**

OR

Q.5 **(a)** Discuss the uses of slope deflection method. **03**

(b) Derive shear equations for portal frames with side sway. **04**

(c) A distributed load of 80 kN per metre run away occupy any position on the girder as shown in Fig. 9. Find the maximum positive and negative shear force at the section marked C. **07**

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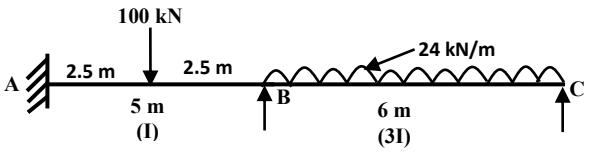

Fig. 1

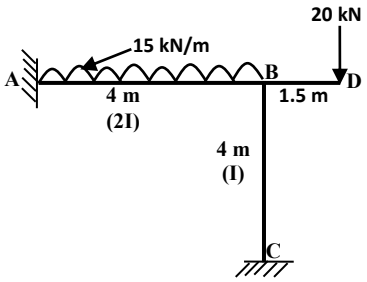

Fig. 2

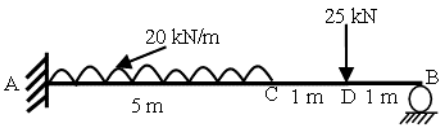

Fig. 3

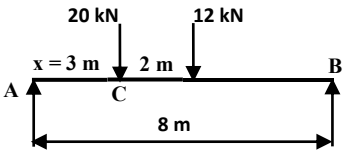

Fig. 4

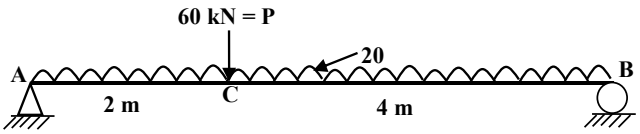

Fig. 5

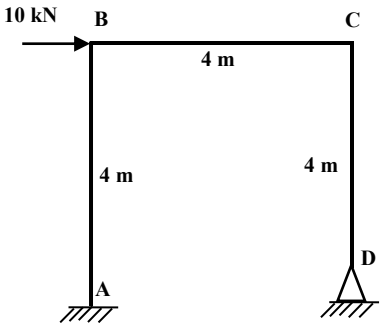

Fig. 6

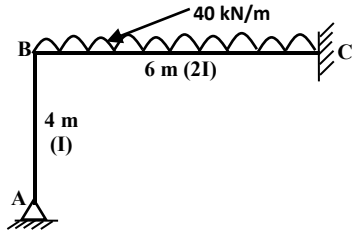

Fig. 7

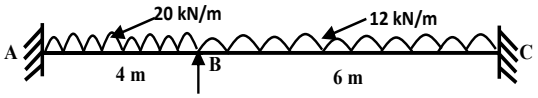

Fig. 8

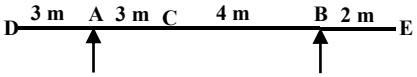

Fig. 9