Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V (NEW) EXAMINATION – WINTER 2023

Subject Code:3150614 Date:13-12-2023

Subject Name:Structural analysis-II

Time:10:30 AM TO 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.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	Explain the terms degree of static and kinematic indeterminacy.	**03**
	(b)	Write characteristics of stiffness matrix.	**04**
	(c)	Analyze the continuous beam shown in **Figure 1** by slope deflection method and draw bending moment diagram.	**07**
Q.2	**(a)**	What is influence line diagram? What is the use of influence line diagram?	**03**
	(b)	Derive shear equation in the case of analyzing the portal frame with side sway.	**04**
	(c)	Analyze the frame shown in **Figure 2** by slope deflection method and draw bending moment diagram. EI is same for all members.	**07**
		OR	
	(c)	Draw the influence line diagram for reaction at B in the continuous beam shown in **Figure 3**. EI is constant throughout.	**07**
Q.3	**(a)**	State the assumptions made in deriving slope-deflection equations.	**03**
	(b)	Calculate the central deflection for a simply supported beam of length 'l' subjected to a udl 'w' throughout its span using Castingliano's 1st theorem.	**04**
	(c)	Analyze the rigid frame shown in **Figure 4** by moment distribution method.	**07**
		OR	
Q.3	**(a)**	Differentiate: Stiffness method and Flexibility method. Which method is suitable for general computer programming?	**03**
	(b)	Derive slope and deflection method equations from first fundamentals.	**04**
	(c)	Calculate the fixed end moment for the beam shown in **Figure 5** using Castigliano's 2nd theorem.	**07**
Q.4	**(a)**	Define: Sway. What are the causes for sway in portal frames?	**03**
	(b)	Enlist steps of unit load method to analyze indeterminate structures.	**04**
	(c)	For a mild steel bent of 200 mm diameter as shown in **Figure 6**, find the vertical deflection at D. $E = 2\times10^5$ N/mm^2.	**07**
		OR	
Q.4	**(a)**	Write assumptions made in slope deflection method.	**03**
	(b)	Explain characteristics of influence line diagram for statically indeterminate structures.	**04**
	(c)	A steel bar bent to the shape as shown in **Figure 7** is fixed as A and carries a vertical load W at C. Calculate the vertical deflection of C. EI is constant throughout.	**07**
Q.5	**(a)**	Enlist various categories of framed structures.	**03**
	(b)	State and explain Muller-Breslau principle.	**04**

(c) Analyze the continuous beam shown in **Figure 8** by moment distribution method and draw bending moment diagram. **07**

OR

Q.5 **(a)** Draw restrained structure and released structure for a propped cantilever beam. **03**

(b) Explain the terms: **04**
(a) Carryover moment, (b) Carryover factor, (c) Flexural stiffness of a member, (d) Distribution factor

(c) Analyze the propped cantilever beam shown in **Figure 9** by flexibility method. **07**

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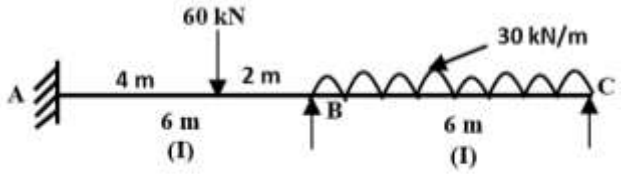

Figure 1

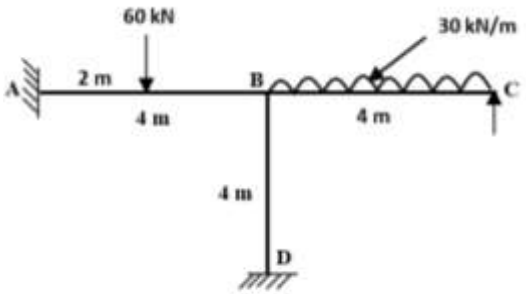

Figure 2

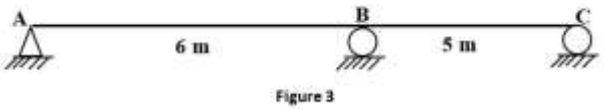

Figure 3

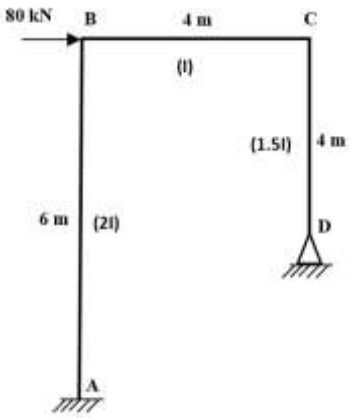

Figure 4

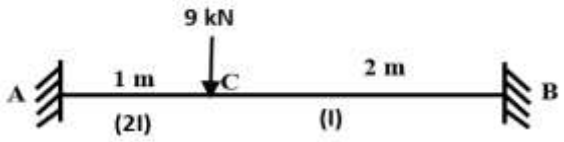

Figure 5

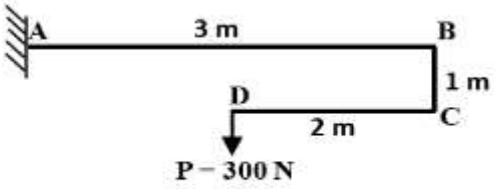

Figure 6

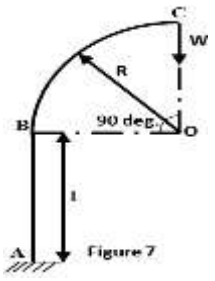

Figure 7

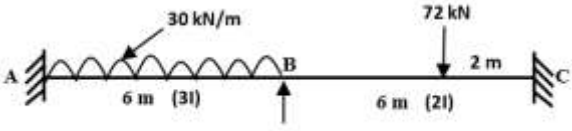

Figure 8

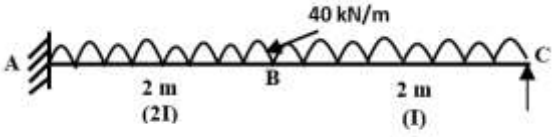

Figure 9