Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE – SEMESTER- V EXAMINATION-SUMMER 2023

Subject Code: 2150608 Date: 22/06/2023

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)**	Define: Stiffness, Distribution factor, Carry over factor	**03**
	(b)	For two span continuous beam having span AB = 3m and BC = 2m,draw qualitative ILD for support reactions. (all supports are simply support)	**04**
	(c)	Find the matrices: [DQ], [DQL], [F] and [Q] with usual notations for the beam shown in fig.1. Use Flexibility method assuming vertical support reaction at B (RB) and vertical support reaction C (RC) as redundant.	**07**
Q.2	**(a)**	State and explain Castigliano's second theorem with example.	**03**
	(b)	Define: Sway. What are the causes for Sway in portal frames?	**04**
	(c)	Draw the shear force and bending moment diagrams for the beam shown in fig. 1. Use Slope Deflection Method OR Moment Distribution Method.	**07**
		OR	
	(c)	Differentiate: Stiffness method and Flexibility method. Which method is suitable for general computer programming? Why?	**07**
Q.3	**(a)**	Calculate slope-deflection equations for the portal frame as shown in figure – 2.	**03**
	(b)	Analyze the beam shown in Figure – 3 by Moment Distribution method. Also draw the Bending Moment Diagram.	**04**
	(c)	Find the fixed end moment and distribution factors for the beam shown in figure 4.	**07**
		OR	
Q.3	**(a)**	Give importance of ILD.	**03**
	(b)	For cantilever of span L draw ILD for support reactions and shear force and bending moment at center.	**04**
	(c)	Find the matrices: [AD], [ADL], [S] and [D] with usual notations for the beam shown in figure - 4 using Stiffness method.	**07**
Q.4	**(a)**	Enlist the properties of Stiffness matrix.	**03**
	(b)	For cantilever of span 'l' draw ILD for support reactions and shearforce and bending moment at center.	**04**
	(c)	Find member end actions for the beam shown in fig.4 using Flexibility method.	**07**
		OR	
Q.4	**(a)**	State and explain the Muller-Breslau's Principle	**03**

(b) Write only the Stiffness matrix [S] for the beam shown in Figure – 4.(Take AE and EI = Constant). **04**

(c) Three point loads 70 kN, 60 kN and 50 kN equally spaced 3m respectively, cross a girder of 12 m span from left to right, with the 50 kN load as leading load. Calculate maximum shear force (positive and negative), and bending moment at a section 5m from left end. **07**

Q.5 **(a)** Draw "Restrained Structure" and "Released structure" for a propped cantilever beam. **03**

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

(c) Give importance of ILD. For one side overhanging beam ABC is having span AB = 5m and overhang part BC = 2m. Draw qualitative ILD for support reactions, shear force and bending moment at 2 m from support A. **07**

OR

Q.5 **(a)** Write slope deflection equations for the beam shown in fig. 3, if middle support sink by 3 mm. **03**

(b) For a 10 m span propped cantilever beam AB, fixed at A and having roller support at B, Draw ILD for RB showing ordinates of ILD at every 1m interval. **04**

(c) Find support reactions of the frame shown in fig. 5 using Castigliano's theorem. **07**

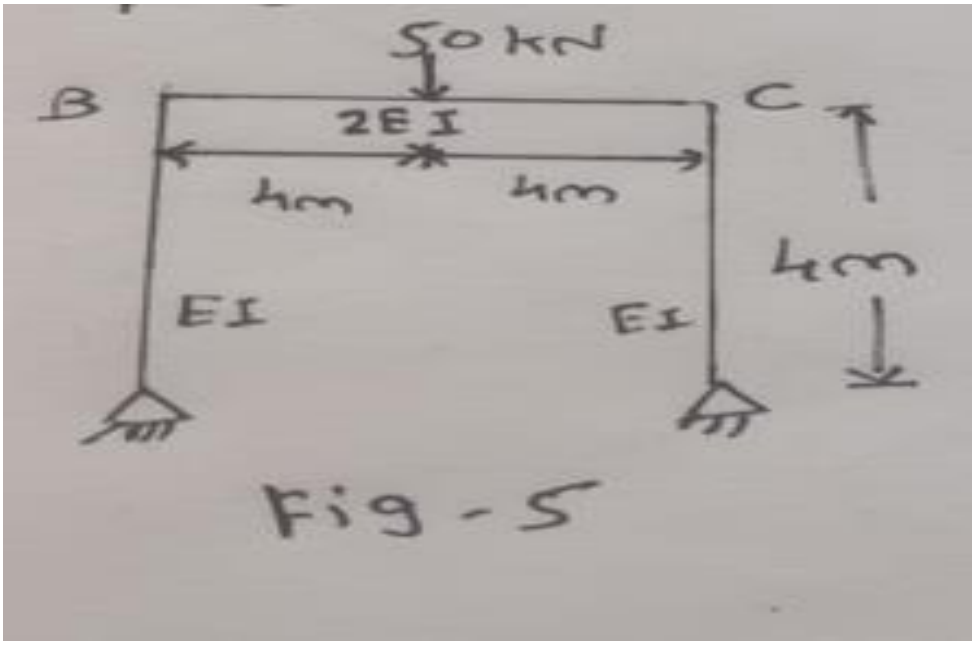

Fig - 5

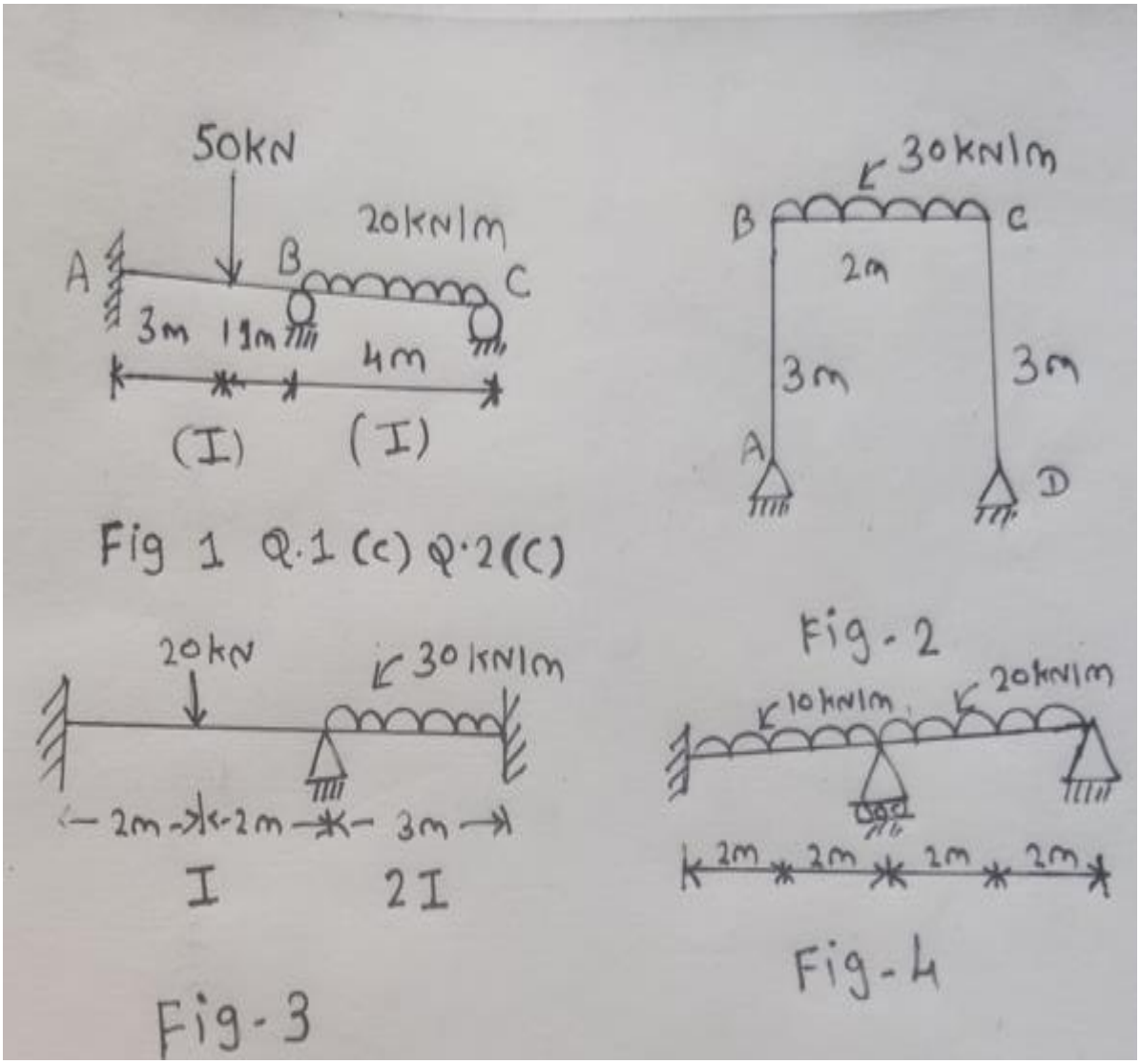

Fig 1 Q.1 (c) Q.2 (C)

Fig - 2

Fig - 3

Fig - 4

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