Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–IV (NEW) EXAMINATION – SUMMER 2022

Subject Code:3144002 Date:23-06-2022

Subject Name:Fundamentals of Structural Analysis

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)**	State Castigliano's theorems.	**03**
	(b)	Explain principle of super position.	**04**
	(c)	Determine the maximum slope and deflection for the beam shown in fig. 3. Use Macaulay's method.	**07**
Q.2	**(a)**	What are the differences between the determinate structures and indeterminate structures?	**03**
	(b)	Using method of section, find the forces in members AB, BD & BC of the truss shown in fig. 1.	**04**
	(c)	Using Castigliano's theorem determine the deflection at the mid span of the beam shown in fig. 4.	**07**
		OR	
	(c)	Using method of joints, find the forces in all the members of the truss shown in fig. 1.	**07**
Q.3	**(a)**	Calculate the kinetic indeterminacy of the truss shown in fig. 7.	**03**
	(b)	Explain principle of virtual work.	**04**
	(c)	A parabolic arch having a constant arch rib has a span 64m, and rise 12.8m, and is hinged at two supports. Two concentrated loads, each 30 kN, are acting at 8m and 16m from the center measured horizontally on the left half of span. Determine horizontal thrust at the supports.	**07**
		OR	
Q.3	**(a)**	Calculate the static indeterminacy of the truss shown in fig. 7.	**03**
	(b)	For the beam shown in fig. 2, find the slope and deflection at center of beam using Moment Area method.	**04**
	(c)	The load system shown in fig.10 crosses a girder 25 m span with the 130 N load leading. Determine the values of (i) Maximum B.M. at a section 8m from the left end of the girder and (ii) Absolute maximum B.M. on the girder.	**07**
Q.4	**(a)**	Explain the significance of Influence Line Diagram	**03**
	(b)	Differentiate: Two hinged arch and three hinged arch.	**04**
	(c)	Using Moment Distribution Method, determine the support moments for the continuous beam shown in fig.8. E is constant and values of I are as shown in the beam. Also draw bending moment diagram.	**07**
		OR	
Q.4	**(a)**	Explain the difference between a structure and a mechanism.	**03**
	(b)	Differentiate between frame and truss.	**04**
	(c)	Using Moment Distribution Method, determine the support moments for the continuous beam shown in fig.8. E is constant and values of I are as shown in the beam. Also draw bending moment diagram.	**07**

Q.5	**(a)**	What are the impacts of axial loading and eccentric loading?	**03**
	(b)	Enlist the methods of strain energy for the analysis of a structure.	**04**
	(c)	Determine the support moments for the continuous beam shown in the fig. 5. Use the slope-deflection method. The relative values of moments of area are shown in the fig. 5. Where E (modulus of elasticity) is constant.	**07**

OR

Q.5	**(a)**	Write the slope deflection equation for the left end of the beam shown in fig.3.	**03**
	(b)	Explain the significance of the pin connection that is assumed in the truss.	**04**
	(c)	Determine the support moments for the continuous beam shown in the fig. 6. Use the slope-deflection method.	**07**

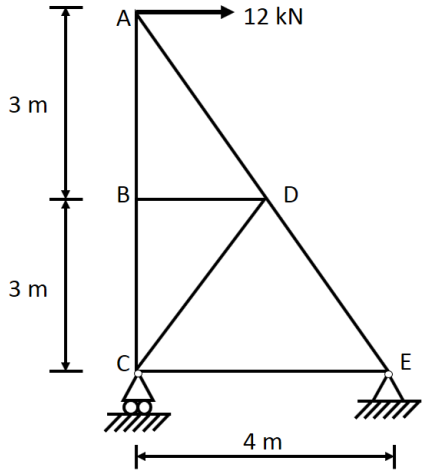

Fig. 1

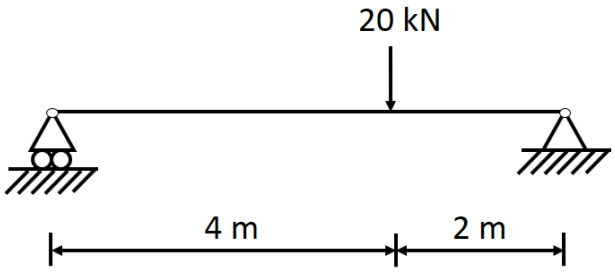

Fig. 2

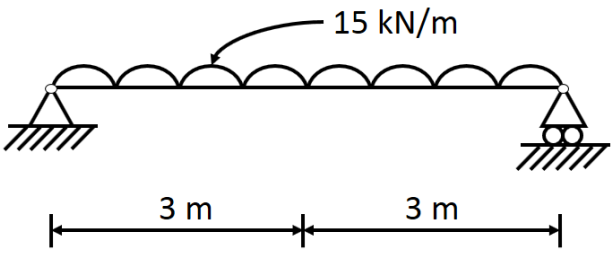

Fig. 3

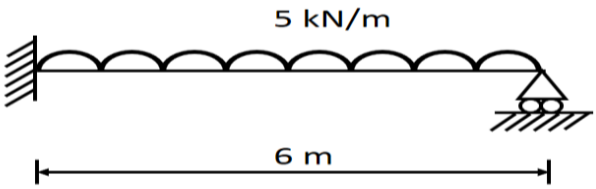

Fig. 4

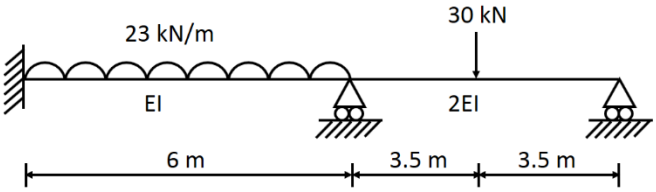

Fig. 5

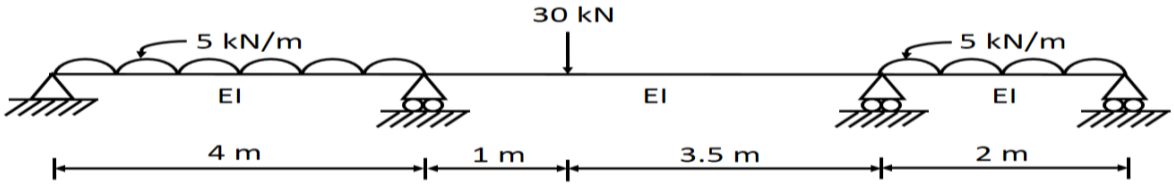

Fig. 6

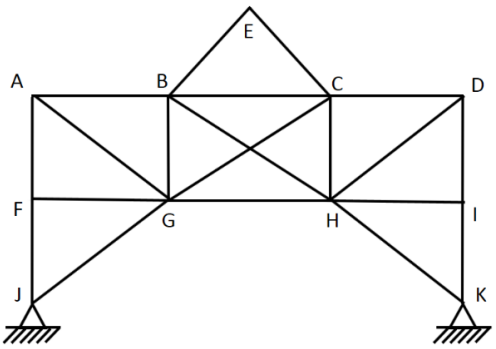

Fig. 7

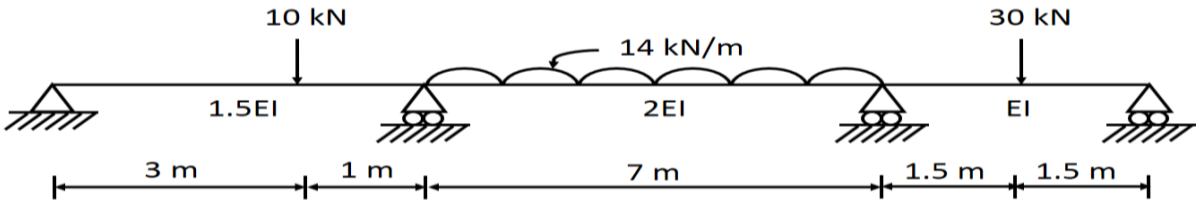

Fig. 8

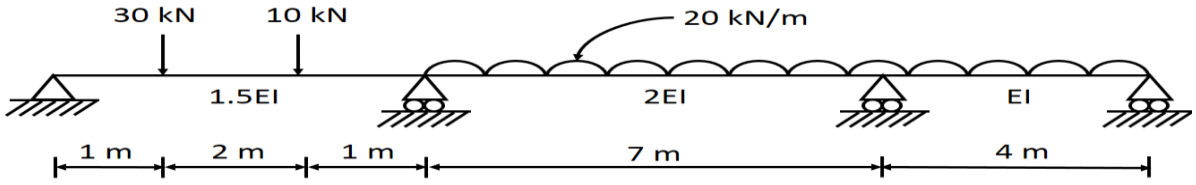

Fig. 9

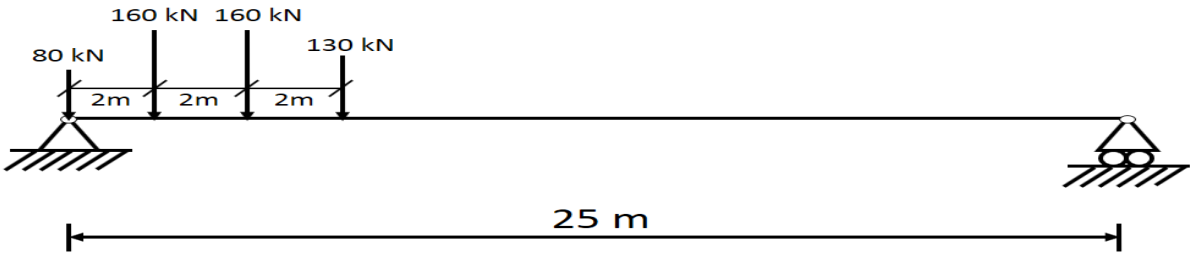

Fig. 10

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