

## **GUJARAT TECHNOLOGICAL UNIVERSITY**

**BE - SEMESTER-V (NEW) EXAMINATION – SUMMER 2019**

**Subject Code: 2150608**

**Date: 03/06/2019**

**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.**

- Q-1. (a)** State and explain Castigliano's first theorem. **03**
- (b)** Using Castigliano's first theorem find deflection at free end of cantilever beam subjected to point load at free end. **04**
- (c)** Compute support reactions of beam shown in fig. 1 applying Castigliano's theorem. **07**
- Q-2. (a)** Enlist steps of unit load method to analyse indeterminate structures. **03**
- (b)** Find the joint displacements at C of plane frame shown in fig.2 using unit load method. **04**
- (c)** Analyse plane frame shown fig.3 by unit load method. **07**
- OR**
- (c)** Find the joint displacement of a plane truss shown in fig.4 using unit load method. **07**
- Q-3. (a)** Write assumptions made in slope deflection method. **03**
- (b)** Determine the support moments using slope deflection method for the continuous girder shown in fig. 5. **04**
- (c)** Determine the support moments using moment distribution method for the beam as shown in fig. 6. Also draw Bending Moment diagram. **07**
- OR**
- Q-3. (a)** Explain stiffness factor and Distribution factor in Moment distribution method. **03**
- (b)** Determine the support moments using moment distribution method for the continuous girder shown in fig. 5. **04**
- (c)** Determine the support moments using slope deflection method for the beam as shown in fig. 6. Also draw Bending Moment diagram. **07**
- Q-4. (a)** State and explain Muller Breslau principle for influence line. **03**
- (b)** Draw qualitative shapes of influence lines for reactions in two bay- two storeyed fixed based portal frame. **04**
- (c)** Draw influence line diagram for all reactions of propped cantilever having span 12m. Take interval of ordinate 2m. **07**

**OR**

- Q-4. (a)** Explain the use of influence line diagram with a example. **03**
- (b)** A simply supported beam of span 32 m is loaded by train of six wheel loads each of equal magnitude 6 kN and separated by 2m distance. Calculate the maximum positive and negative shear force. **04**
- (c)** Draw influence line diagrams of reaction at B ( $R_B$ ) and reaction at C ( $R_C$ ) for a continuous beam ABC with both span length of 8 m having interval of 2 m using Muller Breslau principle. **07**
- Q-5. (a)** How size of flexibility matrix is decided? **03**
- (b)** Explain  $D_Q$ ,  $D_{QL}$ , F, and Q in flexibility method. **04**
- (c)** Solve beam shown in fig.7 by flexibility matrix method. **07**
- OR**
- Q-5. (a)** Write assumptions made in matrix method of structural analysis. **03**
- (b)** Explain  $A_D$ ,  $A_{DL}$ , S, and D in stiffness method. **04**
- (c)** Solve plane truss shown in fig.4 by stiffness method. **07**

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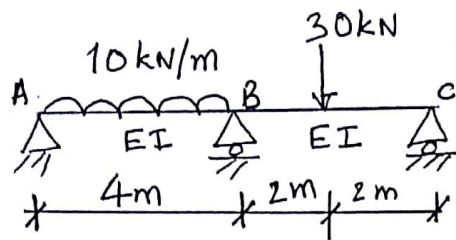


fig. 1

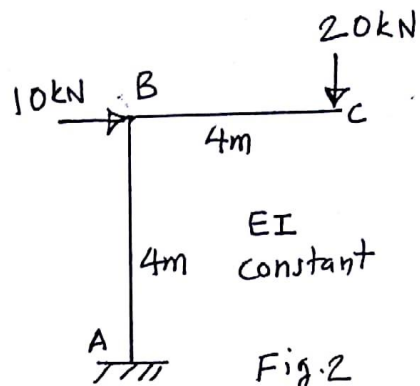


Fig. 2

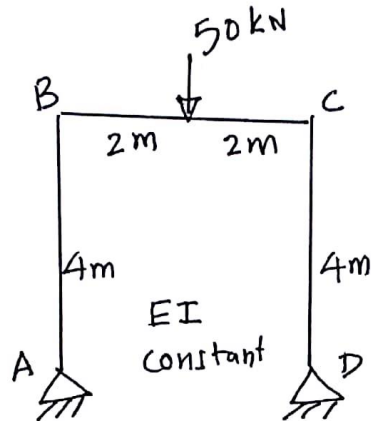


Fig. 3

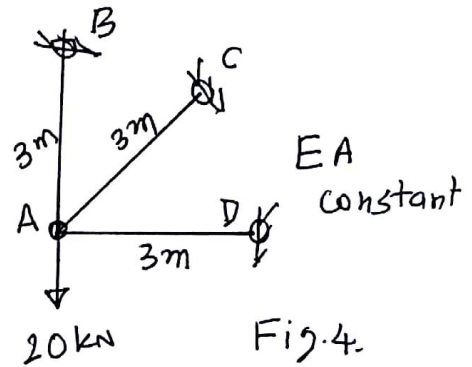


Fig. 4

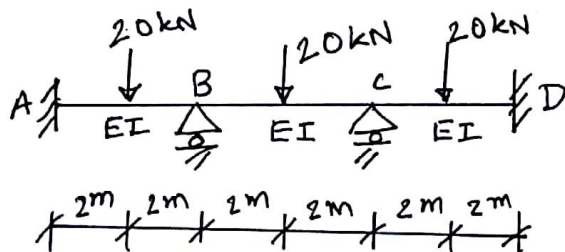


Fig. 5

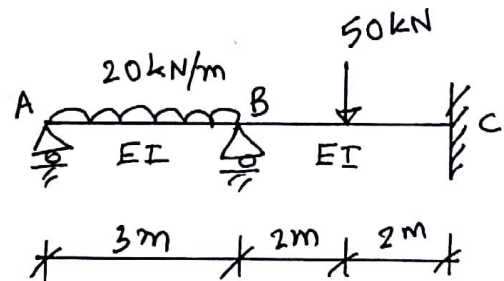


Fig. 6

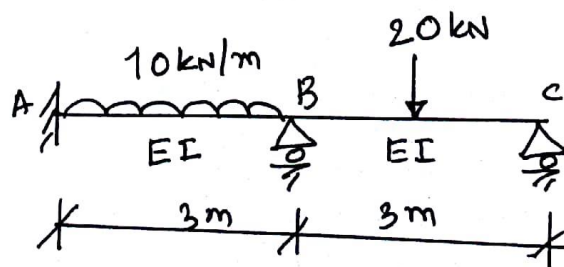


Fig. 7