

B.Tech. CIVIL ENGINEERING (BTCLEVI)

Term-End Examination

December, 2014

00435

BICEE-017 : ADVANCED STRUCTURAL ANALYSIS

Time : 3 hours

Maximum Marks : 70

*Note : Attempt any **five** questions. All questions carry equal marks. Assume any missing data suitably. Use of scientific calculator is permitted.*

1. Write short notes on the following : $4 \times 3 \frac{1}{2} = 14$
- (a) Portal Method
 - (b) Cantilever Method
 - (c) Force Method
 - (d) Stiffness Matrix Method
2. (a) Prove that stiffness and flexibility matrices are reciprocal to each other. 7
- (b) Explain briefly the static and kinematic indeterminacy of structures. 7

3. Analyse the rigid frame shown in Figure 1 by direct Stiffness Matrix Method. Assume $E = 200 \text{ GPa}$. $I_{zz} = 1.33 \times 10^{-5} \text{ m}^4$. $A = 0.01 \text{ m}^2$. The flexural rigidity EI and the axial rigidity EA are same for all beams.

14

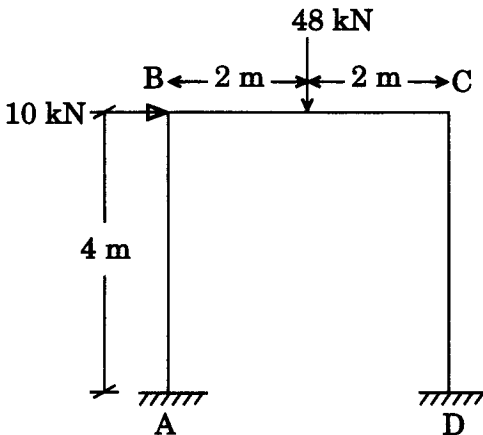


Figure 1

4. Analyse the continuous beam shown in Figure 2. The downward settlements of supports B and C in t-m units are $\frac{150}{EI}$ and $\frac{75}{EI}$ respectively.

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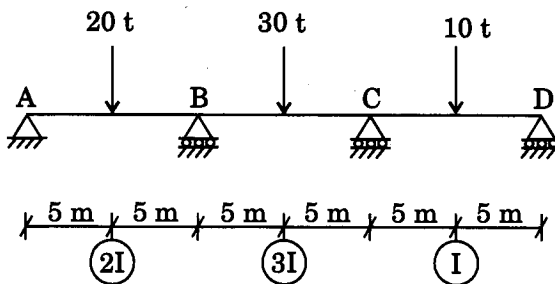


Figure 2

5. Develop the flexibility and stiffness matrices for prismatic member AB with reference to the coordinates shown in Figure 3 for the following support condition :

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- (a) Hinged support at A and roller support at B.
- (b) Fixed support at A and B.

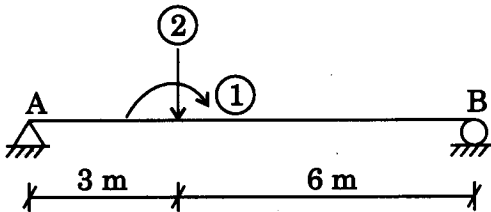


Figure 3 (a)

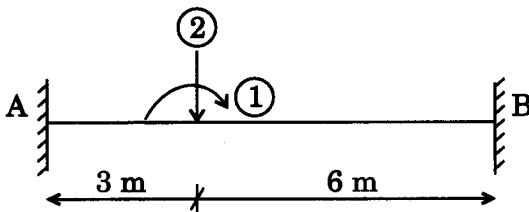


Figure 3 (b)

6. Develop the Stiffness Matrix for the portal frame with reference to the coordinates shown in Figure 4. 14

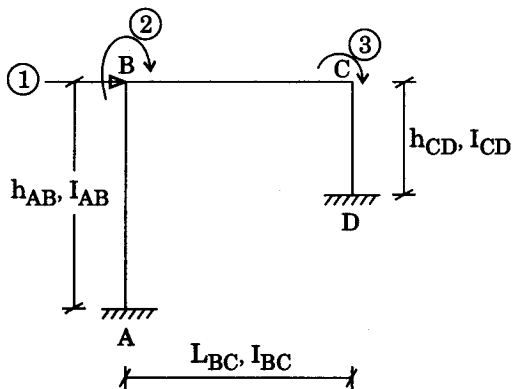


Figure 4

7. Determine the approximate values of moment, shear and axial force in each member of the frame shown in Figure 5 by using Cantilever Method. The cross-sectional area of all columns are same. 14

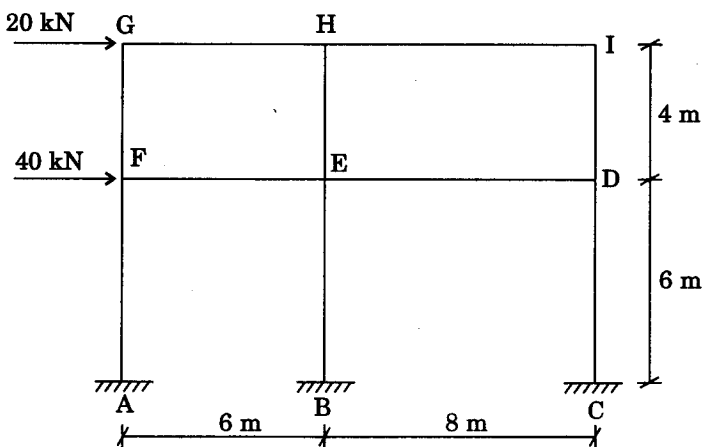


Figure 5