No. of Printed Pages : 5

BICEE-017

B.Tech. CIVIL ENGINEERING (BTCLEVI)

Term-End Examination

00625

June, 2014

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 calculator is permitted.*

1. (a) Differentiate between stiffness and flexibility method. 7

   (b) Prove that stiffness and flexibility matrices are reciprocal of each other. 7

2. Analyze the rigid frame shown in Figure 1 by direct stiffness matrix method. Assume $E = 200$ GPa, $I_{ZZ} = 1{\cdot}33 \times 10^{-4} m^4$, $A = 0{\cdot}04\ m^2$. The flexural rigidity EI and axial rigidity EA are the same for both beams. *14*

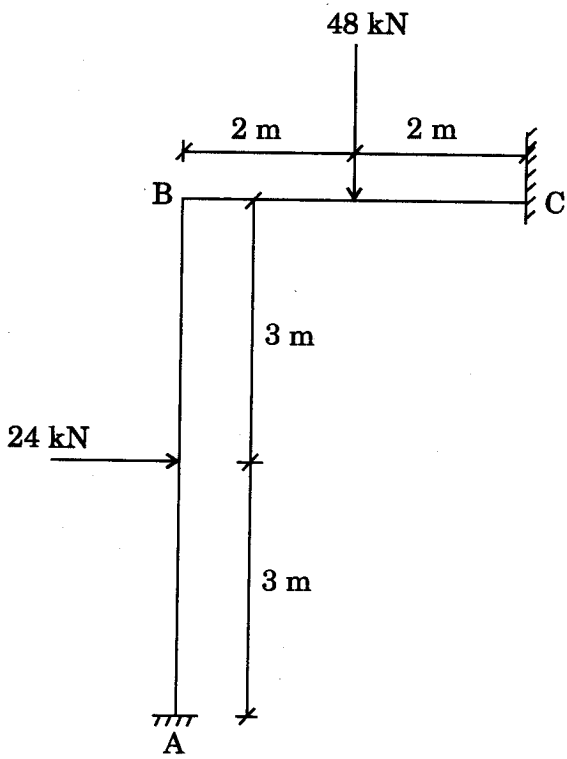

Figure 1

3. Analyse the beam shown in Figure 2 if the downward settlements of supports B and C in t-m units are $\frac{200}{EI}$ and $\frac{100}{EI}$ respectively. *14*

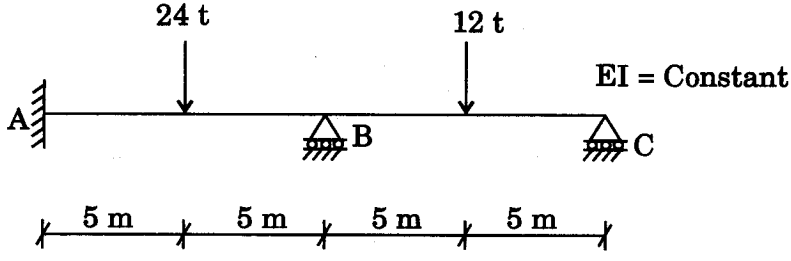

Figure 2

4. Develop the flexibility and stiffness matrices for beam AB with reference to the co-ordinates shown in Figure 3. *14*

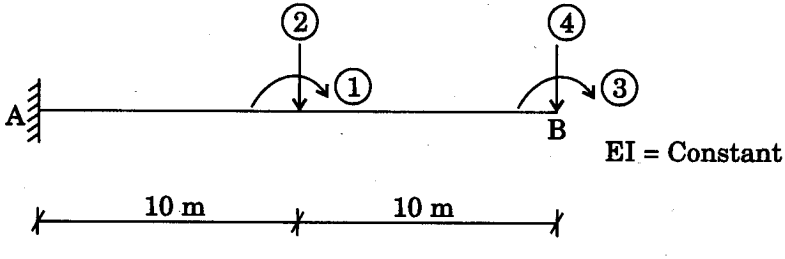

Figure 3

5. Analyse the portal frame ABCD shown in Figure 4 using (i) Force method and (ii) Displacement method. *14*

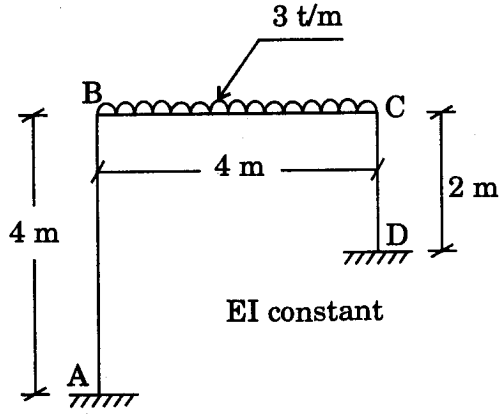

Figure 4

6. Construct the direct stiffness matrix K for the truss shown in Figure 5.

E = 200000 MPa, A = 2500 mm^2. *14*

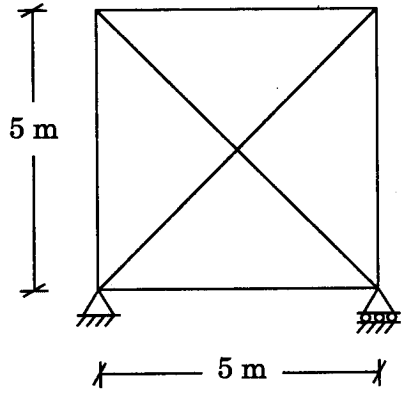

Figure 5

7. Determine the approximate values of moment, shear force and axial force in each member of frame shown in Figure 6, using Portal method. *14*

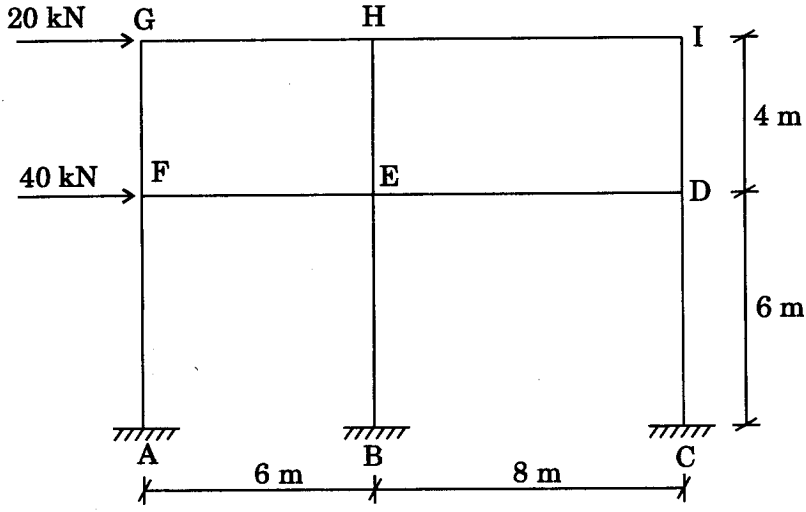

Figure 6