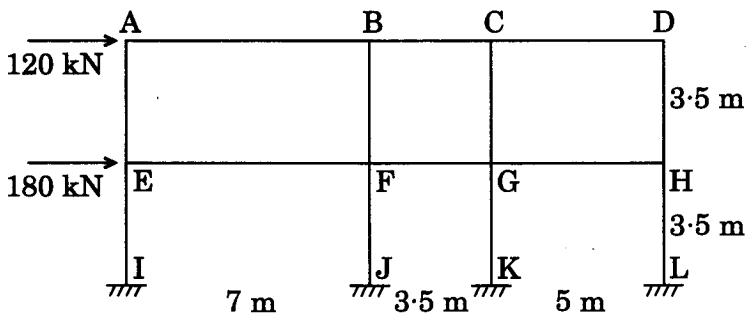OO561

BICEE-017

B.Tech. CIVIL ENGINEERING (BTCLEVI)
Term-End Examination
December, 2015

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.

1. Analyse the building frame subjected to horizontal forces by portal frame method as shown in Figure 1.   *14*

Figure 1

2. Analyse the continuous beam as shown in Figure 2 by stiffness method. The downward settlements of supports B and C in kN-m units are $\dfrac{1500}{EI}$ and $\dfrac{750}{EI}$ respectively. *14*
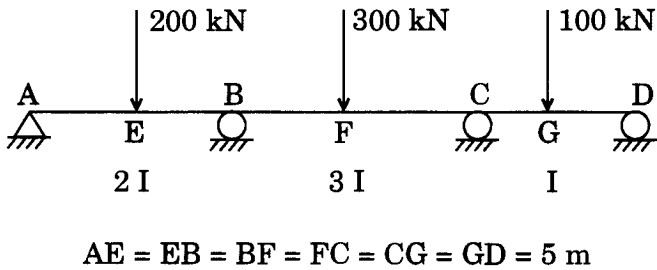

AE = EB = BF = FC = CG = GD = 5 m

Figure 2

3. Analyse the continuous beam as shown in Figure 3 by flexibility method. *14*
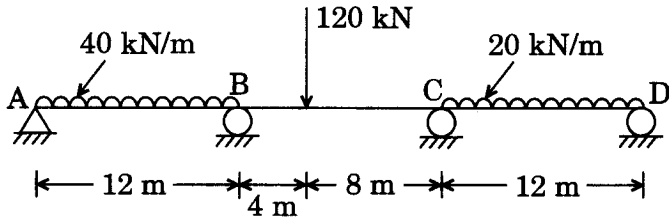
Figure 3

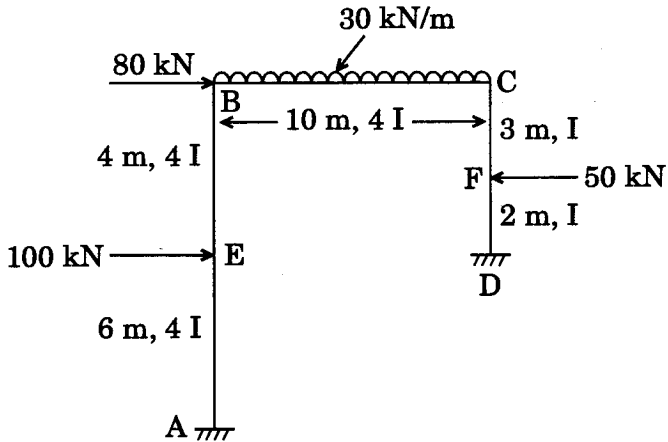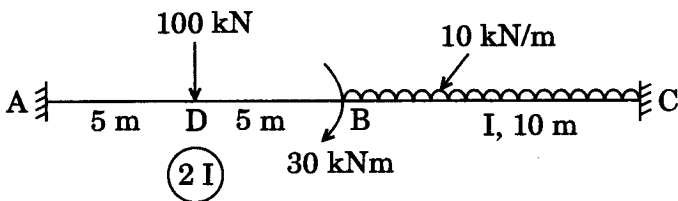**4.** Analyse the portal frame by stiffness method for the frame shown in Figure 4. *14*

30 kN/m

80 kN

B

C

← 10 m, 4 I →

3 m, I

4 m, 4 I

F ← 50 kN

2 m, I

100 kN → E

D

6 m, 4 I

A

Figure 4

5. Analyse the non-prismatic beam as shown in Figure 5 by direct stiffness method. *14*

100 kN

10 kN/m

A

5 m   D   5 m   B   I, 10 m   C

2 I   30 kNm

Take EI = 80,000 kNm^2

Figure 5

6. Analyse the pin jointed plane frame as shown in Figure 6. The flexibility of each member is 0.025 mm/kN. If the member L_1U_2 of the frame is too long by 2 mm, determine the forces in the members of the frame by self-straining only. *14*
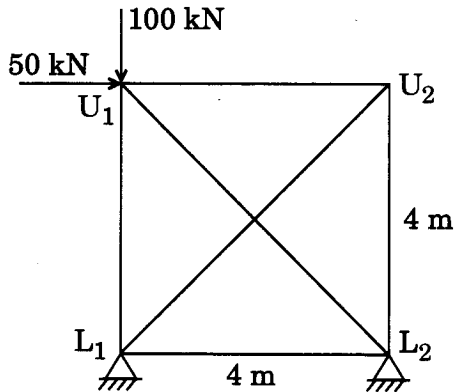

100 kN

50 kN

U_1 U_2

4 m

L_1 L_2

4 m

Figure 6

7. (a) Differentiate between stiffness and flexibility methods. *7*

(b) Prove that stiffness matrix is inverse of flexibility matrix. *7*