B.E/B.TECH. Degree Examination, December 2020

Fifth Semester

CE18503 – Structural Analysis

(Regulation 2018)

Time: Three hours Maximum : 80 Marks

Answer **ALL** questions

PART A - (8 X 2 = 16 marks)

1. The fixed end moments for the member BC of the continuous beam shown in **Fig.1** are

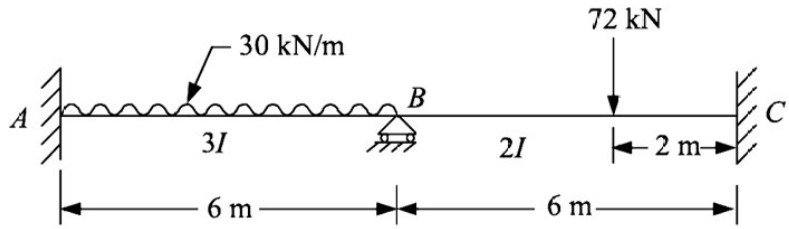

Fig.1

a) MF_{BC} = 32 kN.m and MF_{CB} = - 64 kN.m
b) MF_{BC} = - 32 kN.m and MF_{CB} = 64 kN.m
c) MF_{BC} = - 32 kN.m and MF_{CB} = - 64 kN.m
d) MF_{BC} = 32 kN.m and MF_{CB} = 64 kN.m

2. The ratio of the stiffness of the beam at near end when far end is hinged to the stiffness when far end is fixed is
   a) 4/3
   b) 3/4
   c) 1/2
   d) 1
3. The element kij of a stiffness matrix is
   a) The displacement at coordinate j due to a unit force at coordinate i
   b) The displacement at coordinate i due to a unit force at coordinate j
   c) The force at coordinate j due to a unit displacement at coordinate i
   d) The force at coordinate i due to a unit displacement at coordinate j
4. The element δij of a flexibility matrix is
   a) The displacement at coordinate j due to a unit force at coordinate i
   b) The displacement at coordinate i due to a unit force at coordinate j
   c) The force at coordinate j due to a unit displacement at coordinate i
   d) The force at coordinate i due to a unit displacement at coordinate j
5. The beam shown in **Fig.2** is to be analyzed by slope deflection method. What are the unknowns and to determine them, what are the equilibrium conditions used?

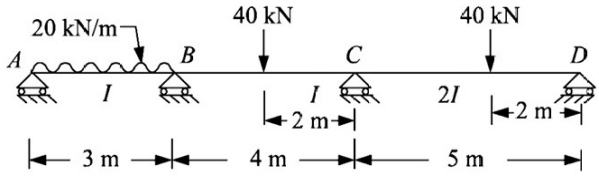

Fig.2

6. For the continuous beam shown in **Fig.1**, find the distribution factors for the member BA and BC.

7. List the methods of matrix analysis of structures. Explain the suitability of use of these methods based on static and kinematic indeterminacies of the structure.

8. Find the degree of static indeterminacy for the beam shown in **Fig.3**.

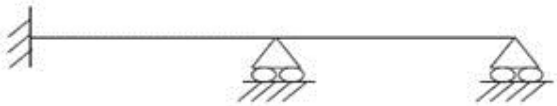

Fig.3

PART B - (4 X16 = 64 marks)

09. (a) Analyse the continuous beam shown in **Fig.4** using Slope Deflection method and draw the bending moment diagram. Flexural rigidity EI is same for all the members. **(16)**

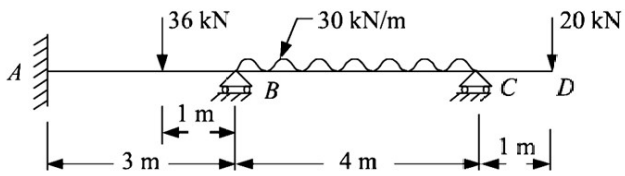

Fig.4

(OR)

(b) Analyse the frame shown in **Fig.5** using Slope Deflection method and draw the bending moment diagram. **(16)**

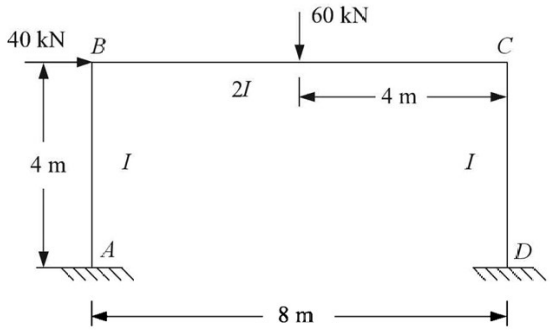

Fig.5

10. (a) Analyse the continuous beam shown in **Fig.4** using Moment Distribution method and draw the bending moment diagram. Flexural rigidity EI is same for all the members. **(16)**

(OR)

(b) Analyse the frame shown in **Fig.6** using Moment Distribution method and draw the bending moment diagram. Flexural rigidity EI is same for all the members. **(16)**

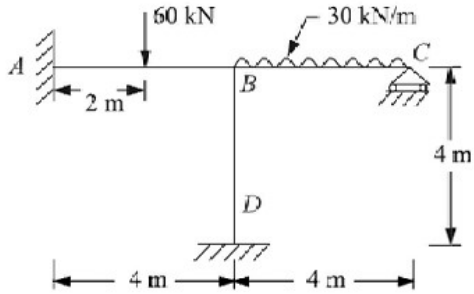

Fig.6

11. (a) Analyse the continuous beam shown in **Fig.7** using Stiffness matrix method and draw the bending moment diagram. Flexural rigidity EI is same for all the members. **(16)**

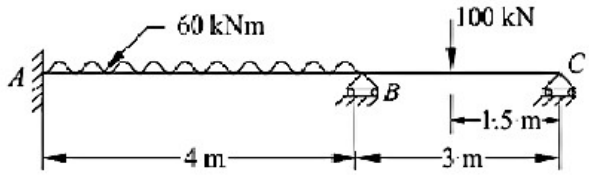

Fig.7

(OR)

(b) Analyse the frame shown in **Fig.8** using Stiffness matrix method and draw the bending moment diagram. **(16)**

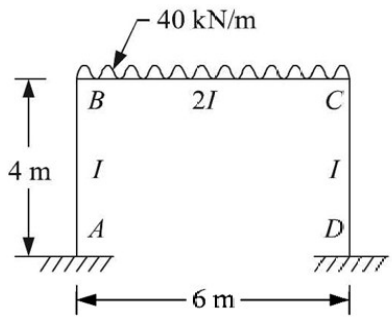

Fig.8

12. (a) Analyse the continuous beam shown in **Fig.7** using Flexibility matrix method and draw the bending moment diagram. Flexural rigidity EI is same for all the members. **(16)**

(OR)

(b) Three wires AO, BO and CO support a load of 40 kN as shown in **Fig.9**. The Cross-sectional area of all the wires is the same. Determine the forces in all the wires using Flexibility matrix method. **(16)**

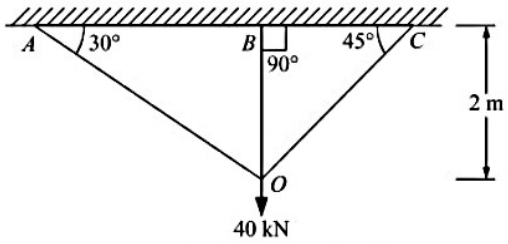

Fig.9