B.Tech. V Semester (Civil Engineering)
Structural Analysis – II
(End Semester Examination-2013)

Time: 3.00 Hours **Max. Marks: 50**

Note: Assume missing data suitably, if any.

1. Please attempt any two parts. **(2×3=6)**

(a) A fixed ended beam of uniform cross-section, full plastic moment Mp, and length 2L rests on a central prop. Equal concentrated loads are applied at a distance αL from each of the fixed ends. What would be their values at collapse?

(b) A uniform cross-section two span continuous beam is shown in Fig. 1. If the rotations at B and C are same then find the ratio of M_B / M_C.

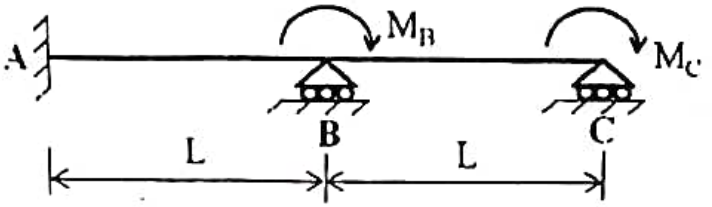
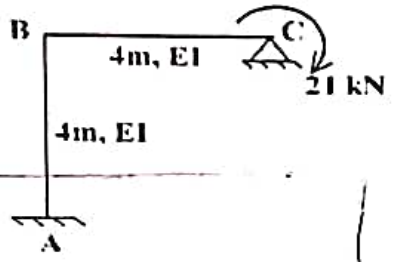


Fig. 1

(c) Draw bending moment diagram of the frame shown in Fig. 2



$M_{CB} + 21 = 0$

Fig. 2

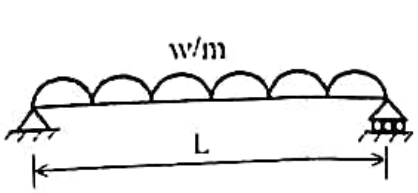
2. Please attempt any two parts. **(2×2=4)**

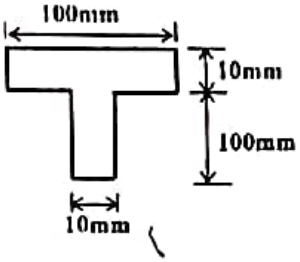
(a) Why is that computer aided analysis procedures are based on stiffness approach rather than flexibility approach?

(b) What is meant by equivalent joint load? Why is this concept needed in the stiffness method of analysis?

(c) Show how the moment distribution method can be applied to derive a formula for the fixed end moment in a prismatic propped cantilever beam in terms of the fixed end moments in a corresponding fixed beam having the same span, flexural rigidity and loading.

3. Please calculate the hinge length of the plasticity zone for a simply supported beam having T-Section and subjected to uniformly distributed load 'w' per m length (Fig. 3). **(5)**

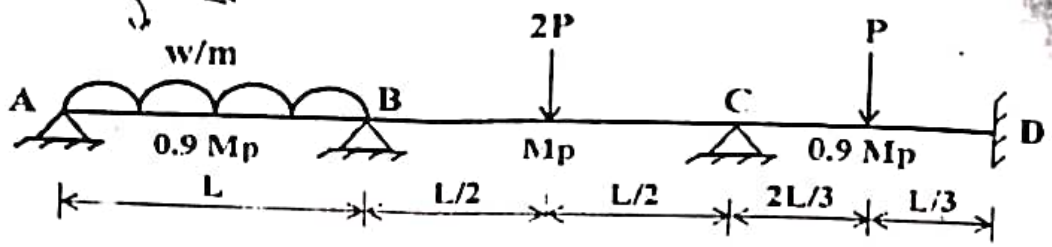




Hinge length

Fig. 3

4. Please find out the collapse load for the continuous beam shown in Fig. 4.



Take w L=P

Fig. 4

OR

Please find the fully plastic moment required for the frame shown in Fig. 5. if all the members have the same value of Mp. Take load factor equal to 1.5. (7)

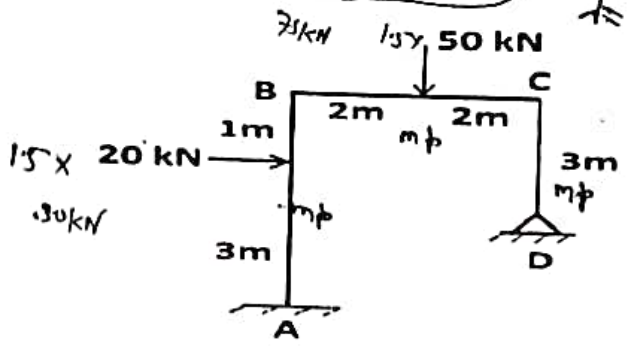


Fig. 5

5. Please derive the member stiffness matrix and rotation transformation matrix for a plane frame member (6)

OR

Please derive the relationship between global stiffness matrix and local stiffness matrix for plane truss member. (6)

6. Please analyze the continuous beam shown in Fig. 6 and obtain unknown joint displacements and support reactions. Use computer oriented stiffness method. (8)

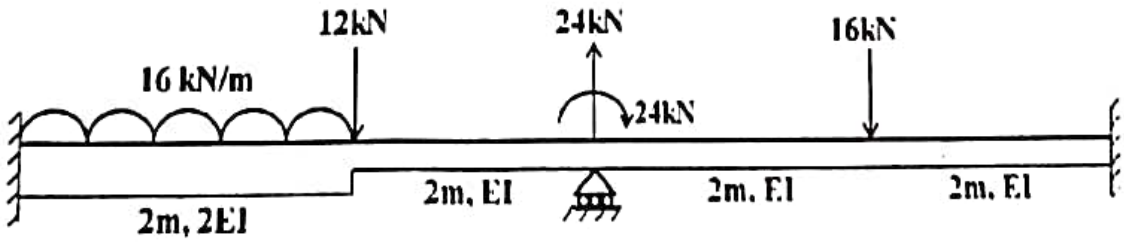


Fig. 6

7. Please analyze the frame shown in Fig. 7 using moment distribution method. Draws shear force and bending moment diagrams. Also sketch the deflected shape. (7)

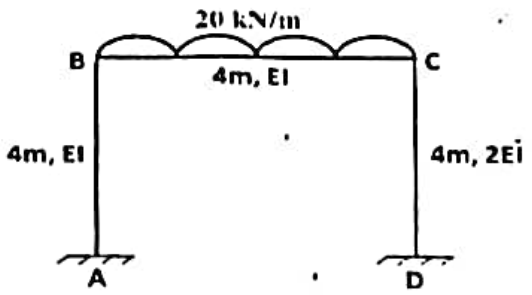


Fig. 7

OR

Please analyze the frame shown in Fig. 8 using slope-deflection method. Draw shear-force and bending moment diagrams. Also sketch the deflected shape. (7)

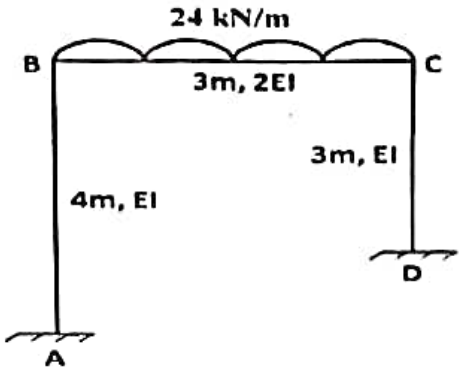


Fig. 8

8. Please analyze the two span continuous beams shown in Fig. 9 using flexibility method of analysis. Draws shear force and bending moment diagrams. Also sketch the deflected shape. (7)

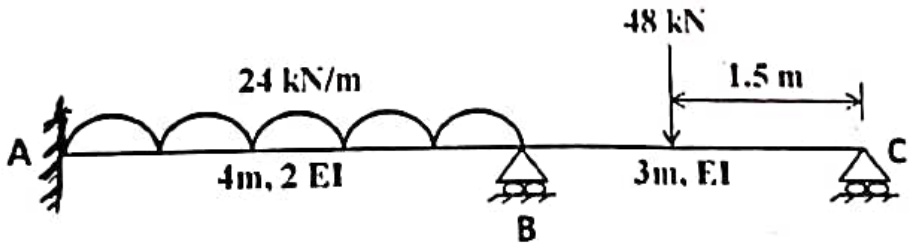


Fig. 9

OR

Please analyze the plane truss shown in Fig. 10 by method of your choice. Axial rigidity of all the members is same. (7)

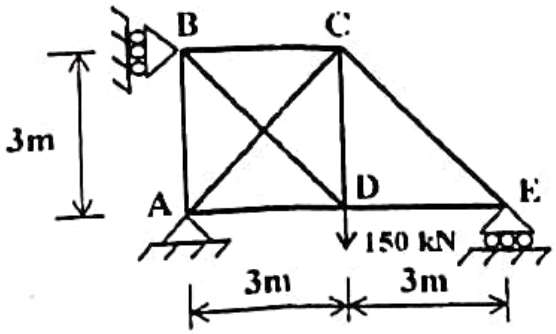


Fig. 10