

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 2133

Roll No.

**B. Tech.**

(SEM. V) ODD SEMESTER THEORY

EXAMINATION 2012-13

**STRUCTURAL ANALYSIS—II**

Time : 3 Hours

Total Marks : 100

- Note :- (i) Attempt all questions.  
(ii) Each question carries equal marks.  
(iii) Assume any missing data suitably.

1. Attempt any **two** parts of the following : (10×2=20)

- (a) Analyze the frame shown in fig. 1 by slope deflection method and draw the bending moment diagram. Assume constant flexural rigidity for all members of the frame.

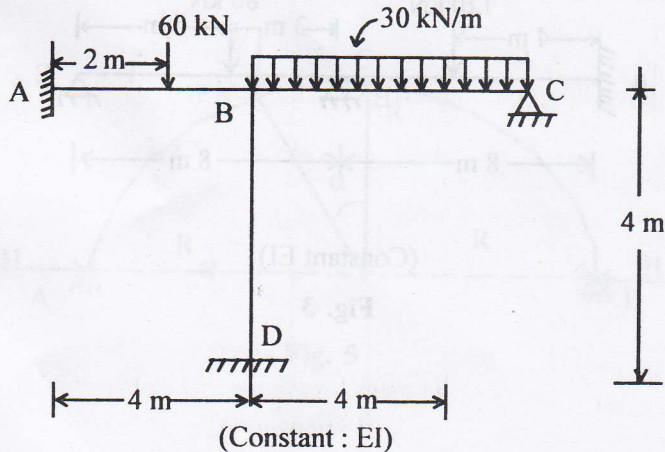


Fig. 1

- (b) Using moment distribution method analyze the frame shown in Fig. 2. Draw the bending moment diagram. The comparative moment of inertia is mentioned against each member of the frame.

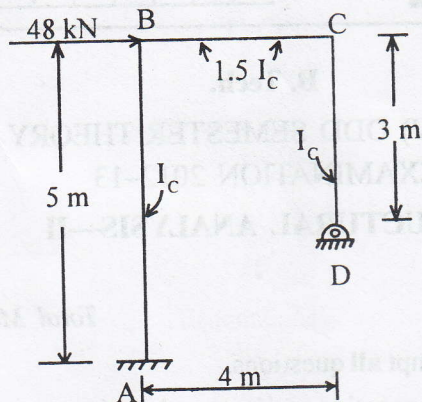
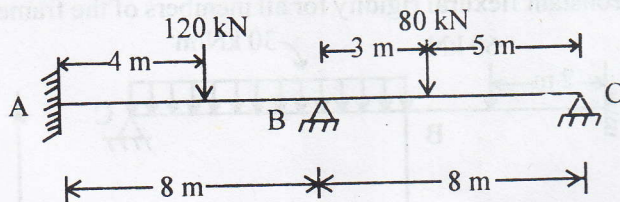


Fig. 2

- (c) Analyze the following continuous beam using the strain energy method. Draw the bending moment diagram (Fig.3).

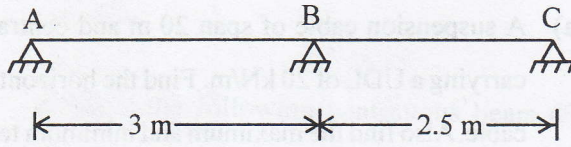


(Constant EI)

Fig. 3

2. Attempt any two parts of the following : (10×2=20)

- (a) Explain Müller Breslau principle. Using the principle draw the influence line diagram for Reaction  $R_A$  for the beam shown in the following figure, Fig. 4. Compute the ordinate at 1 m interval. The flexural rigidity is constant throughout.



(Constant EI)

Fig. 4

- (b) Determine the horizontal reaction 'H' in a semi-circular two-hinged arch when a vertical load  $W$  acts at a point P as shown in fig. 5. Assume flexural rigidity constant throughout.

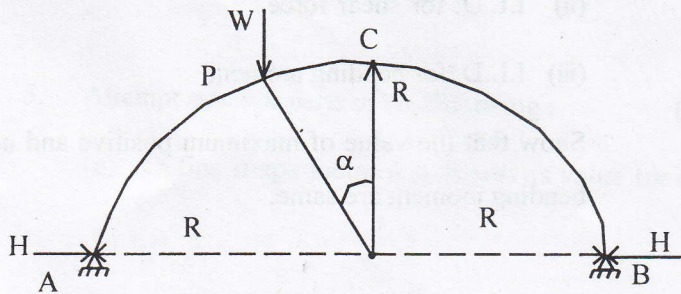


Fig. 5

(c) Draw the schematic diagrams for horizontal thrust, bending moment at any section, radial shear and normal thrust at any given section for a typical two-hinged symmetrical parabolic arch.

3. Attempt any two parts of the following : (10×2=20)

(a) A suspension cable of span 20 m and central dip 2 m is carrying a UDL of 20 kN/m. Find the horizontal pull in the cable. Also find the maximum and minimum tensions in the cable.

(b) Consider a suspension bridge of span 'l' and central dip 'dc' with two-hinged stiffening girder. Draw the influence line diagram (ILD) for the following when a single concentrated unit load rolling over the suspension bridge :

(i) I.L.D. for horizontal thrust

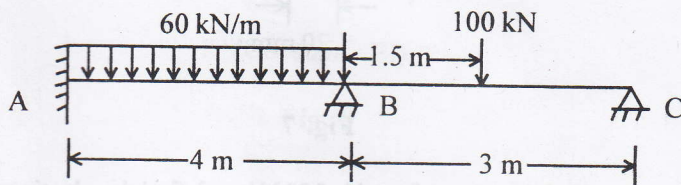
(ii) I.L.D. for shear force

(iii) I.L.D. for bending moment.

Show that the value of maximum positive and negative bending moment are same.

(c) A foot bridge is carried over a river of span 90 m. The supports are 3 m and 12 m higher than the lowest point of the cable. Determine the length of the cable. If the horizontal deck is loaded by a uniformly distributed load of 20 kN/m, find the tension in the cable.

4. Analyze the following continuous beam (fig. 6) using the flexibility of stiffness method of matrix analysis. (20)



(Constant : EI)

Fig. 6

5. Attempt any **two** parts of the following : (10×2=20)
- (a) Define shape factor and obtain its value for a T-Section

with the following dimensions shown in fig. 7.

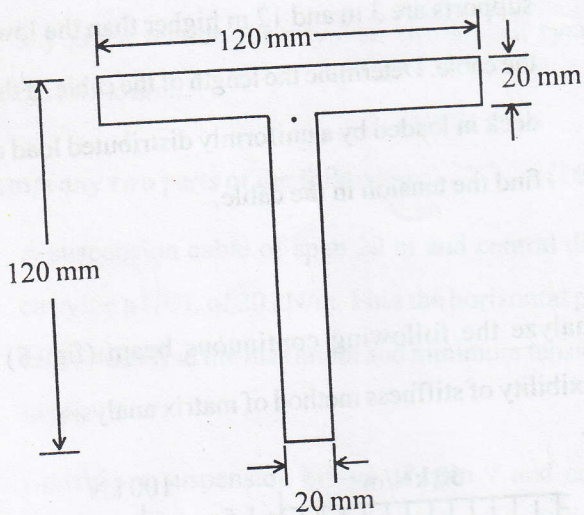


Fig. 7

If yield stress of steel is  $250 \text{ N/mm}^2$ , find the plastic moment capacity of the section.

- (b) Determine the plastic moment capacity  $M_p$ , required for the continuous beam shown in Fig. 8. Assume the same flexural rigidity throughout the beam.

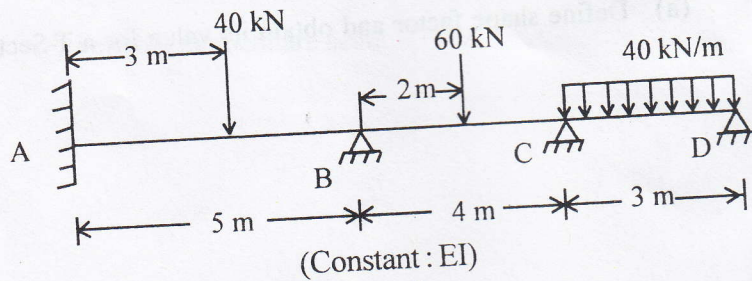


Fig. 8

- (c) Determine the plastic moment capacity  $M_p$  for the frame shown in fig. 9 given below :

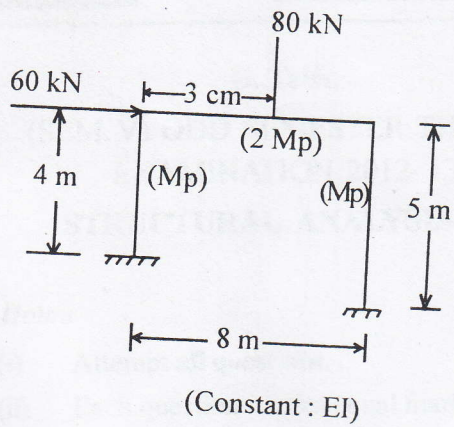


Fig. 9