5E3151

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B.Tech. (Sem.V) (Main/Back) Examination- Dec. 2012
Civil Engineering
5CE1 Theory of Structures-I

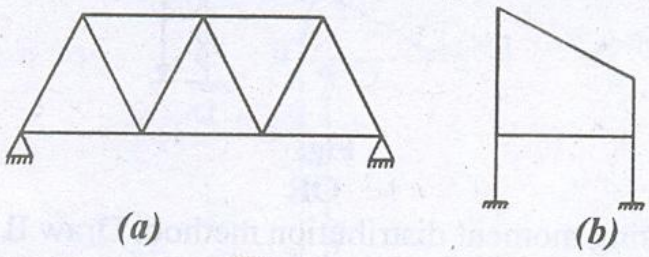
Time : 3 Hours] [Total Marks : 80
[Min. Passing Marks : 24

Instructions to Candidates :
Attempt any five questions, selecting one question from each unit. All questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

UNIT-I

1. (a) Explain Moment-Area Theorems. (4)

(b) Define static indeterminancy. Compute the static indeterminancy for the following structure shown in Fig. (a) & Fig. (b)



(a) (b)

Fig.

(c) Refer Fig. Find out deflection at point F. Two sets of loads and displacements for points D,E and F are given as follows : (4)

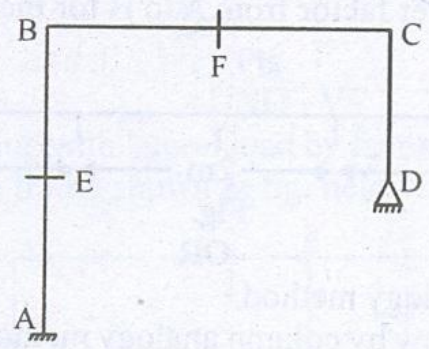


Fig.

		D	E	F
Set - I	Load at	—	—	20 kN downward
	Displacement at	clockwise rotation of 0.1 radian	1 mm towards left	—
Set - II	Load at	anticlockwise movement of 1.6 kN-m	20 kN towards right	—
	Displacement at	—	—	??

(8)

OR

1. (a) Explain Maxwell's reciprocal theorem. (4)

(b) Define kinematic indeterminancy. Compute the kinematic indeterminancy for the structures shown in fig. (a) and fig.(b).

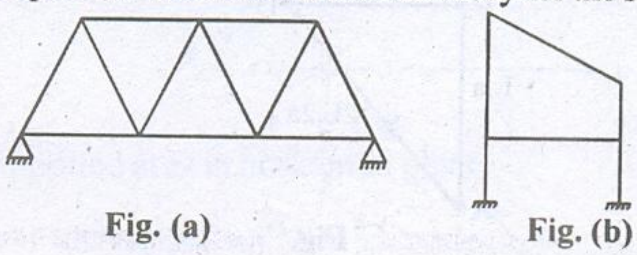


Fig. (a) **Fig. (b)** (4)

(c) Compute the reaction at point C of the propped cantilever beam in Fig. using moment area method.

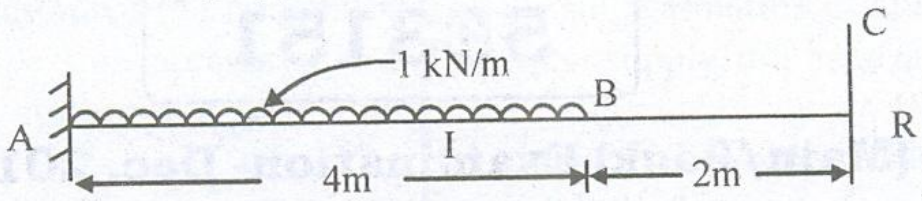


Fig. (8)

UNIT - II

2. Analyze the frame shown in fig. below using slope deflection method. Draw BMD and deflected shape.

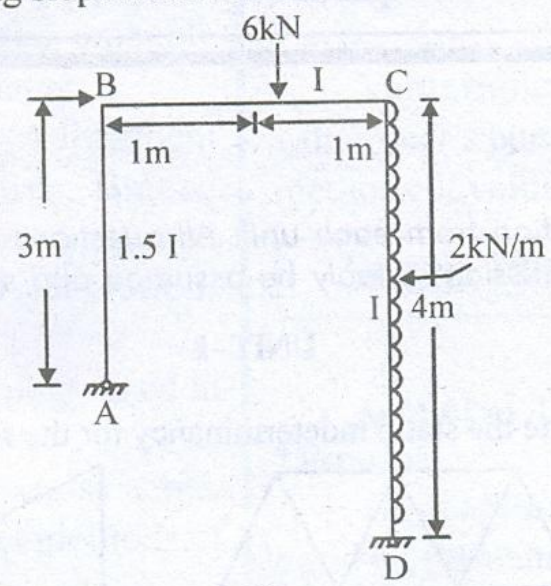


Fig. (16)

OR

2. Analyze the frame shown fig. above. Using moment distribution method. Draw B.M.D. and deflected shape. (16)

UNIT - III

3. (a) Explain the basic concept of conjugate beam method. (4)
   (b) Determine the stiffness at A and carry over factor from A to B for the beam shown in fig. below.

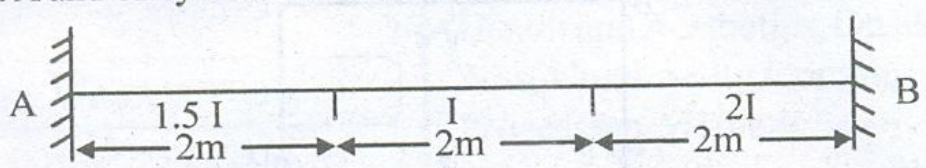


Fig. (12)

OR

3. (a) Explain the basic concept of column analogy method. (4)
   (b) Solve the portal frame shown in Fig. below by column analogy method & draw BMD.

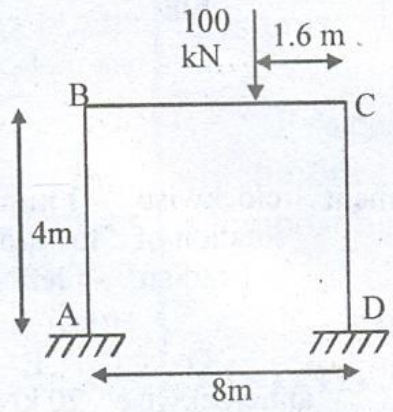


Fig. (12

UNIT - IV

4. (a) A crane structure is shown in fig. below.The length of member AD is '2L' and all other members are of length 'L'. The cros sectional area of member AD is '2a' and that of all other members is 'a'. Find out vertical and horizontal deflection of F.

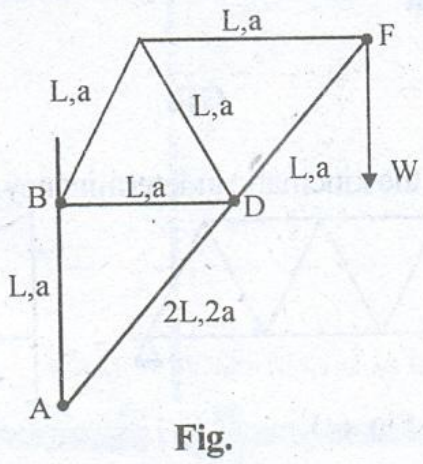


Fig. (1

(b) Determine the arial focus in the members of frame shown in fig. below. Take AE constant.

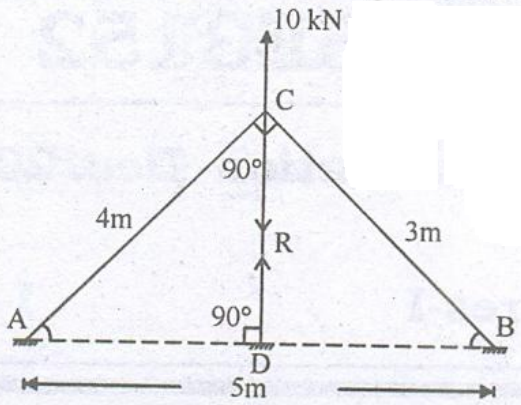


Fig. (6)

OR

4. (a) A trussed timber beam, 120mm wide and 160mm deep, is 4m long and has a central C.I strut 1m long and 100mm² area of cross section. The tie nodes are of steel and 500mm² area of cross section. Calculate the thrust in the strut if the beam carries a u.d.l. of 10 kN/m. Take $E_{wood} = 1 \times 10^4$ N/mm², $E_{CI} = 1 \times 10^5$ N/mm² and $E_{steel} = 2 \times 10^5$ N/mm². (10)

(b) A steel bar bent to the shape shown in fig. below is fixed at A and carries a vertical load W at C. Calculate vertical deflection of C. EI constant throughout.

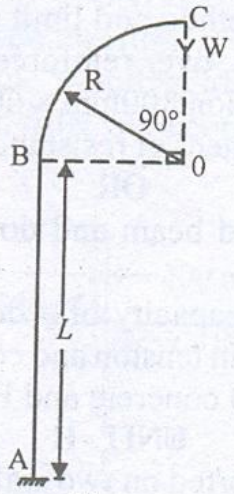


Fig. (6)

UNIT - V

5. (a) Write procedure to solve building frame with lateral load by factor method. (4)

(b) Using cantilever method, analyze the frame shown in fig. below. Assume that all columns have equal area of cross section.

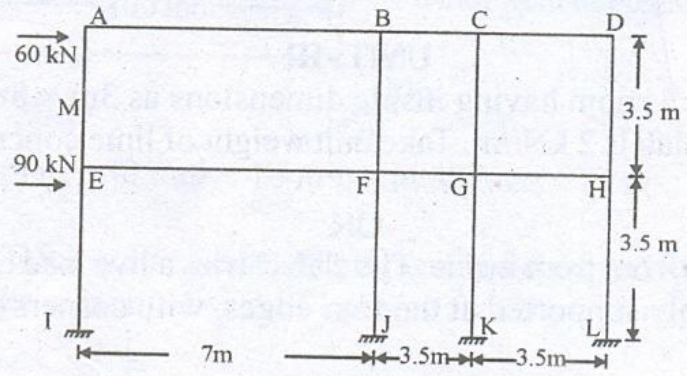


Fig. (12)

OR

5. (a) What do you understand by tension coefficient? Derive the equations used in tension coefficient method applied to plane frame. (4)

(b) Plan of a tripod is shown in fig. below. The feet A, B & C are in same plane and apex D is 3.7m above the plane. Find the focus in the members assuming joints are pin joints.

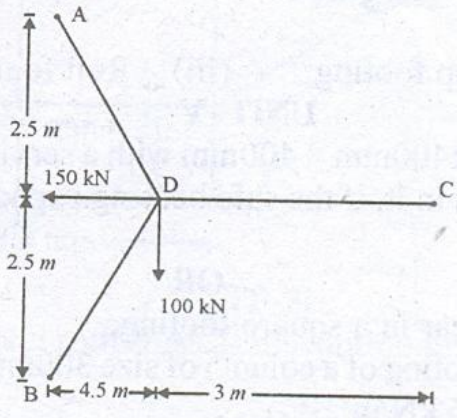


Fig.

Forces 150 kN and 100 kN are applied at D in horizontal plane. (12)