5E5061

# 5E5061

**B.Tech. (Sem.V) (Main/Back) Examination- 2014**
**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) Find out the degree of static indeterminacy and kinematic indeterminacy for the frame shown in fig. (assume members to be inextensible)

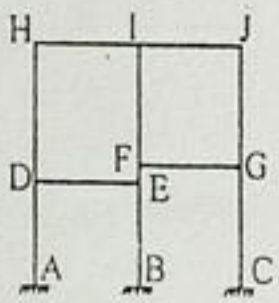
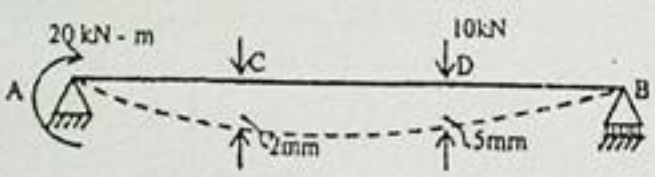



*Fig.*

(3)

(b) Two systems of forces and displacements for a simply supported beam are shown in fig. Determine the unknown displacement $\Delta_D$.



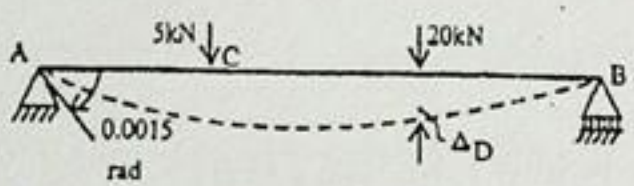
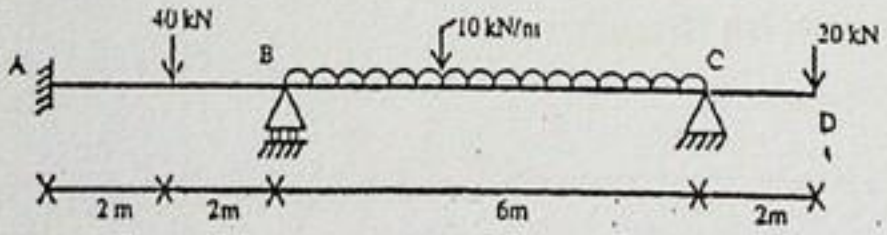




*Fig.*

(3)

(c) A continuous beam is supported and loaded as shown in fig. During loading support B sinks by 10mm. Analyse the beam for support moments and draw BMD. Use $E = 200 \times 10^6$ kN/m², $I = 100 \times 10^{-6}$m⁴.




(10)

**OR**

1. Using slope deflection method, determine the end moments of the members of frame shown in fig. EI is constant throughout. Draw BMD and deflected shape.

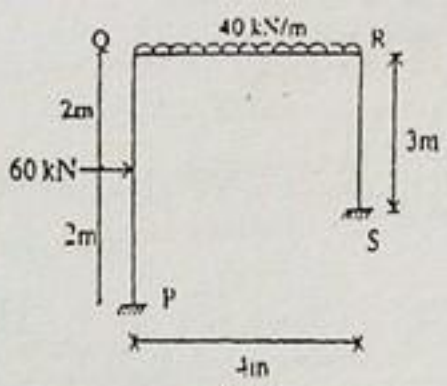



*Fig.* (16)

UNIT - II

2. (a) Define the following terms for a prismatic member in moment distribution method :
   (i) Stiffness of a member
   (ii) Carry over factor
   (iii) Distribution factor (6)

   (b) Solve the continuous beam ABCD shown in fig.(Q.1(c)) if support B sinks by 10 mm. Use moment distribution method. $E = 200 \times 10^6$ kN/m$^2$, $I = 100 \times 10^{-6}$m$^4$. (10)

OR

2. Using Moment Distribution method, find out end moments of members of frame shown in fig. Draw BMD and deflected shape.

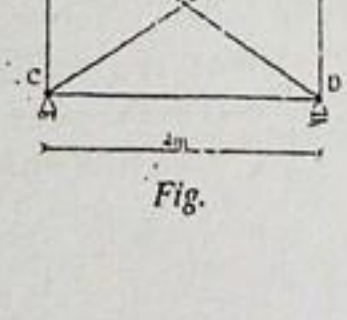



*Fig.* (16)

UNIT - III

3. Using the principle of least work, analyse the portal frame shown in fig.

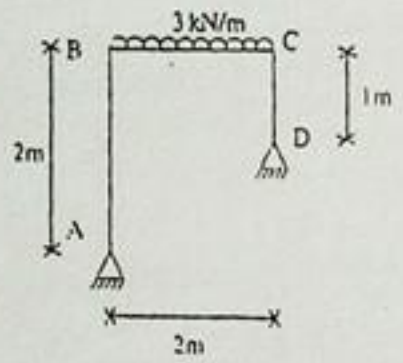



*Fig.* (16)

OR

3. (a) What do you understand by strain energy? What is strain energy due to axial force, bending moment and torsion? Write Castigliano's strain energy theorems. (6)

   (b) Find the force in the member BC (shown in fig.) using strain energy or unit load method. All members have same cross-sectional area.




*Fig.* (10)

UNIT - IV

4. (a) Using column analogy method, determine the end moments of the portal frame hinged at P & S shown in fig. (8)

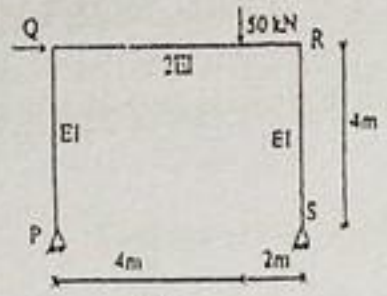



*Fig.*

(b) Determine the stiffness at A and carry over factor from A to B for the beam shown in fig. (8)

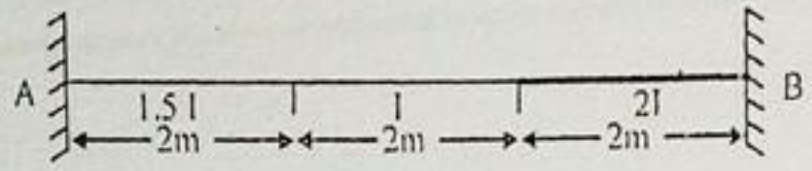



*Fig.*

OR

4. (a) Solve the continuous beam shown in fig. using Kani's method. (12)

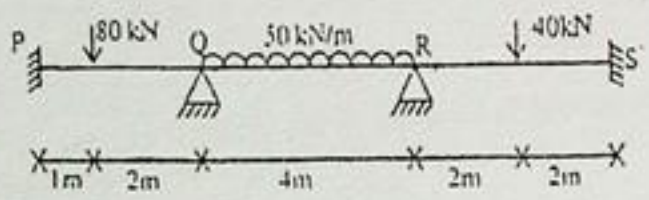



*Fig.*

(b) Define the terms rotational contribution and rotational factor used in Kani's method. (4)

UNIT - V

5. Solve the building frame in fig. using cantilever method.

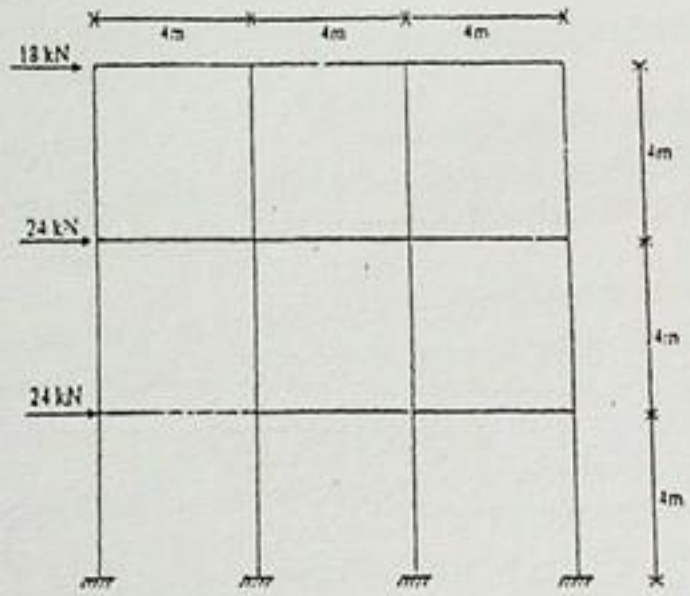
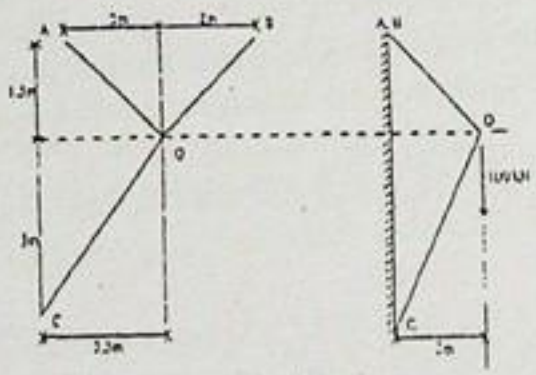



*Fig.* (16)

OR

5. Using Tension coefficient method, solve the space truss shown in fig. Two views are shown in fig. All three members AO, BO and CO are connected at O, where a vertical load of 100 kN is applied vertically.



(16)

*Fig.*