5E5061

Roll No. _____ Total No of Pages: 7

5E5061

B. Tech. V Sem. (Main / Back) Exam., Dec. 2014

Civil Engineering

5CE1A Theory of Structures – I

Time: 3 Hours **Maximum 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.

Use of following supporting material is permitted during examination.

(Mentioned in form No. 205)

1. NIL 2. NIL

UNIT – I

Q. 1 (a) Find out the degree of static indeterminacy and kinematic indeterminacy for the frame shown in Fig 1 (assume members to be inextensible) [3]

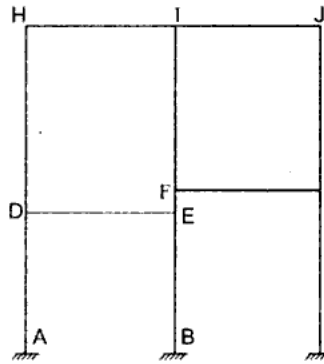


Fig 1

(b) Two systems of forces and displacements for a simply supported beam are shown in Fig 2. Determine the unknown displacement Δ_D. [3]

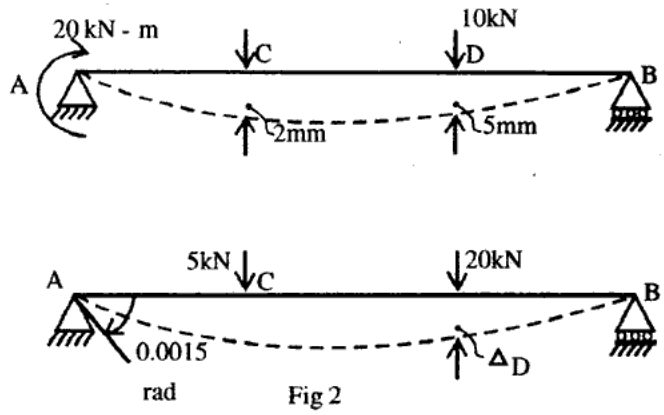


Fig 2

(c) A continuous beam is supported and loaded as shown in Fig 3. During loading support B sinks by 10mm. Analyse the beam for support moments and draw BMD. Use $E = 200 \times 10^6$ KN/m^2, $I = 100 \times 10^{-6}$m^4 [10]

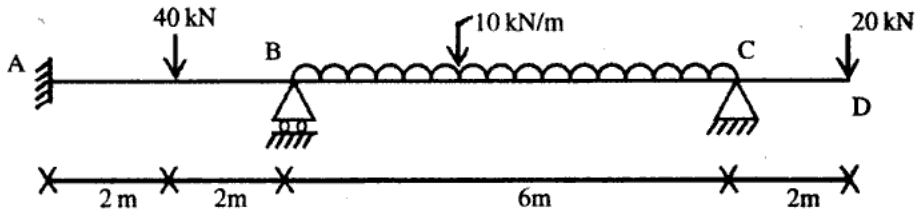


Fig 3

OR

Using slope deflection method, determine the end moments of the members of frame shown in Fig 4. EI is constant throughout. Draw BMD and deflected shape. [16]

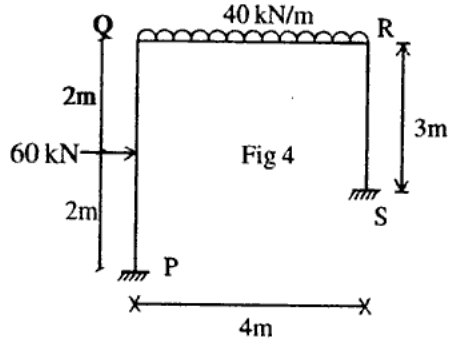


Fig 4

UNIT – II

Q. 2 (a) Define the following terms for a prismatic member in moment distribution method - [6]

(a) Stiffness of a member

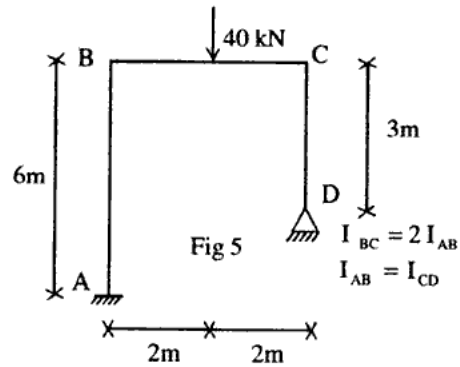
(b) Carry over factor

(c) Distribution factor

(b) Solve the continuous beam ABCD shown in Fig 3 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

Using Moment Distribution method, find out end moments of members of frame shown in Fig 5. Draw BMD and deflected shape. [16]



UNIT – III

Q. 3 Using the principle of least work, analyse the portal fame shown in Fig 6. [16]

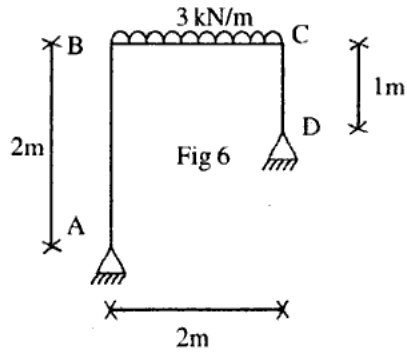


Fig 6

OR

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

(b) Find the force in the member BC (shown in Fig 7) using strain energy or unit load method. All members have some cross-sectional area. [10]

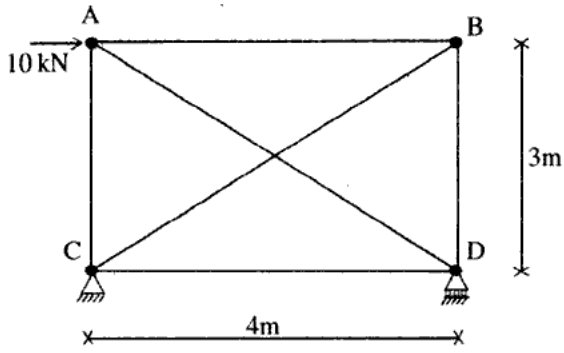


Fig 7

UNIT – IV

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

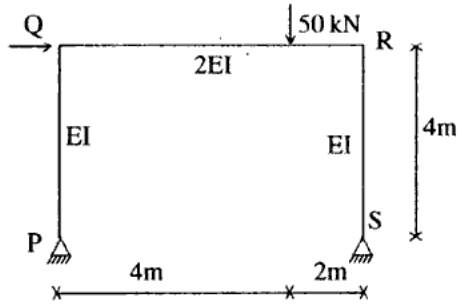


Fig 8

(b) Determine the stiffness at A and carry over factor from A to B for the beam shown in Fig 9. [8]

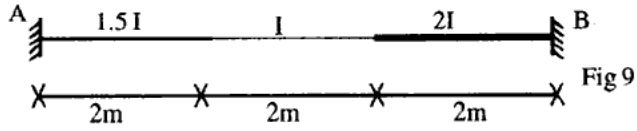


Fig 9

OR

Solve the continuous beam shown in Fig 10using Kani's method. [12]

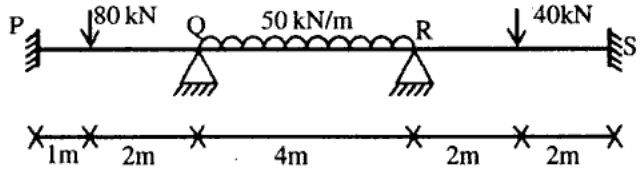


Fig 10

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

UNIT – V

Q. 5 Solve the building frame in fig 11 using cantilever method - [16]

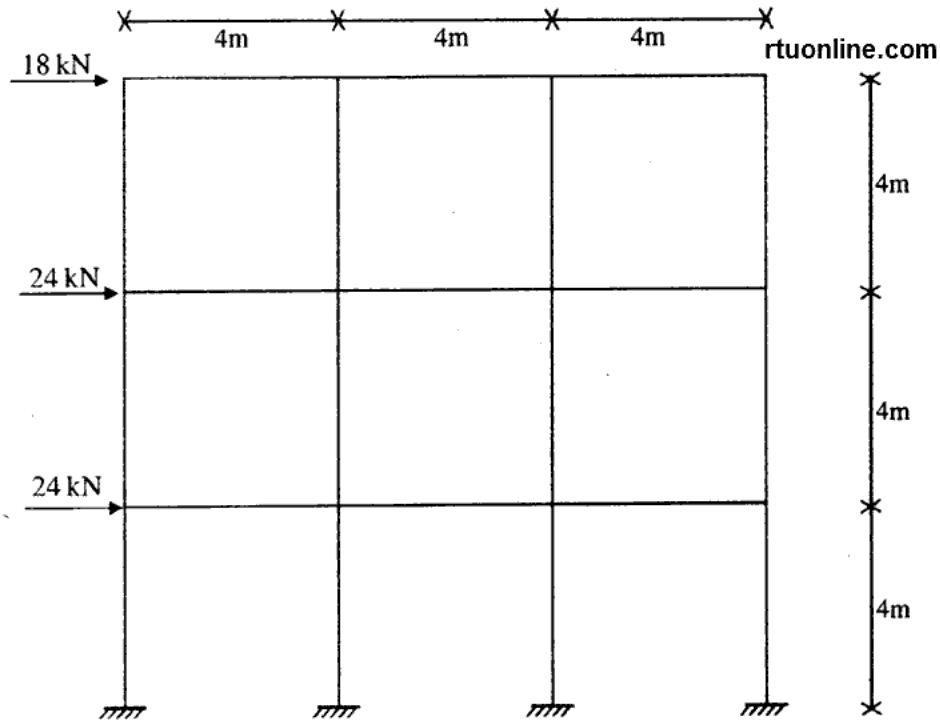


Fig. - 11

OR

Using Tension coefficient method, solve the space truss shown in Fig 12. 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]