

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.

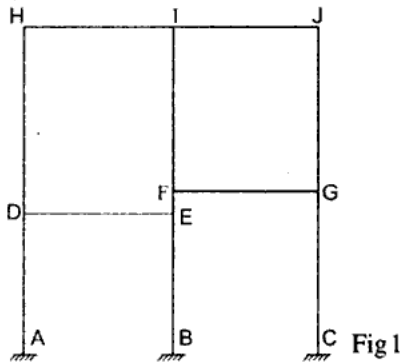
(Mentioned in form No. 205)

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]



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

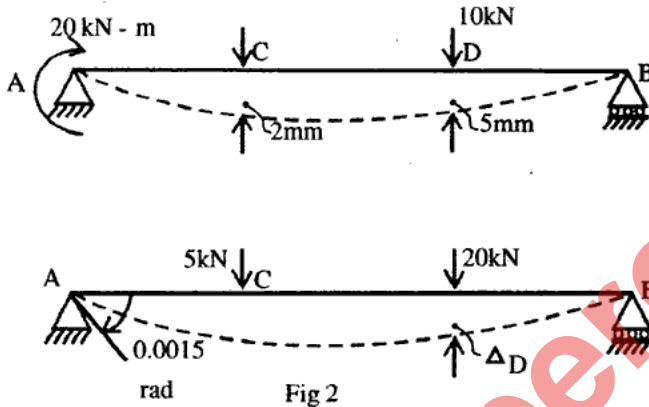


Fig 2
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- (c) A continuous beam is supported and loaded as shown in Fig 3. During loading support B sinks by 10mm. Analyse the beam for support moments and draw BMD. Use $E = 200 \times 10^6 \text{ KN/m}^2$, $I = 100 \times 10^{-6} \text{ m}^4$ [10]

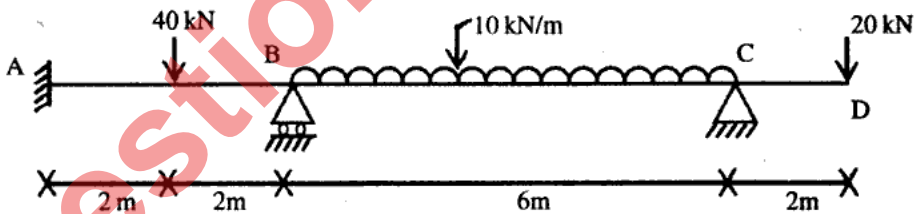


Fig 3

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]

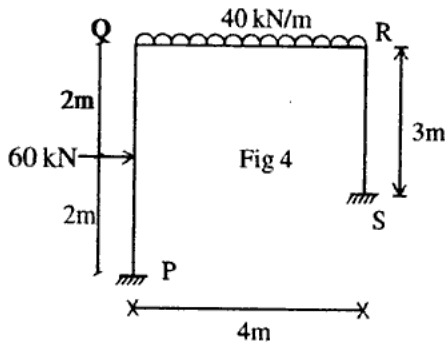


Fig 4

UNIT - II

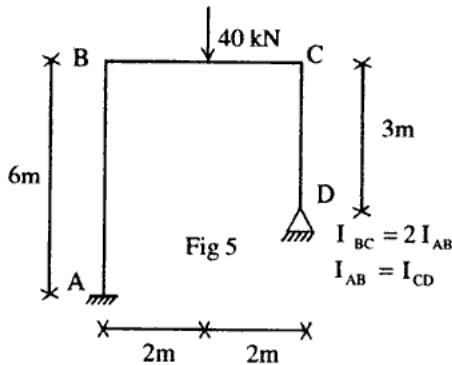
Q.2 (a) Define the following terms for a prismatic member in moment distribution method - [6]

- (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. $E = 200 \times 10^6 \text{ KN/m}^2$, $I = 100 \times 10^{-6} \text{ m}^4$ [10]

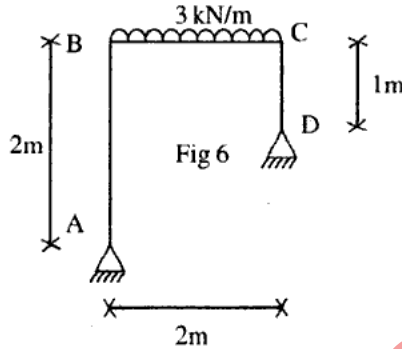
OR

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



UNIT - III

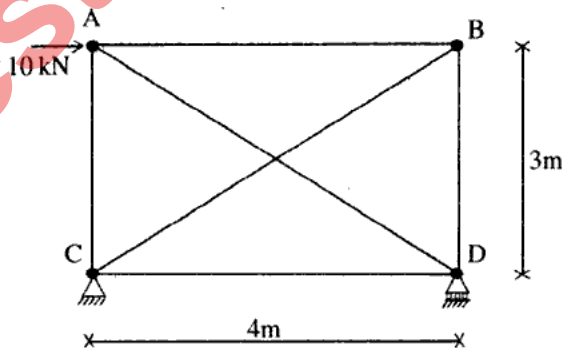
Q. 3 Using the principle of least work, analyse the portal frame shown in Fig 6. [16]



OR

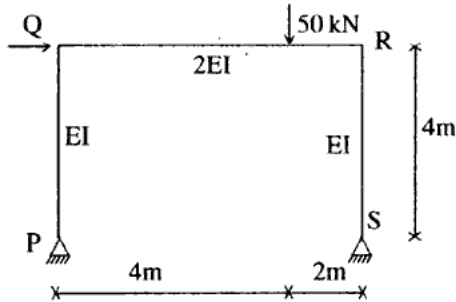
(a) What do you understand by strain energy? What is strain energy due to axial force, bending moment and torsion? Write Castiglione's strain energy theorems. [6]

(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]

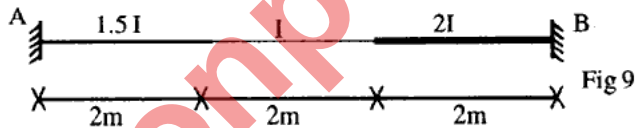


UNIT - IV

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

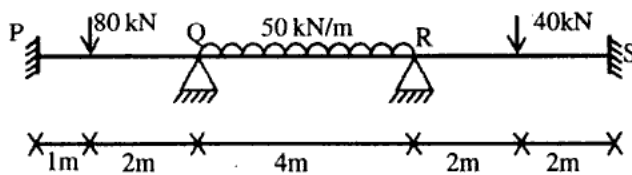


- (b) Determine the stiffness at A and carry over factor from A to B for the beam shown in Fig 9. [8]



OR

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



- (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]

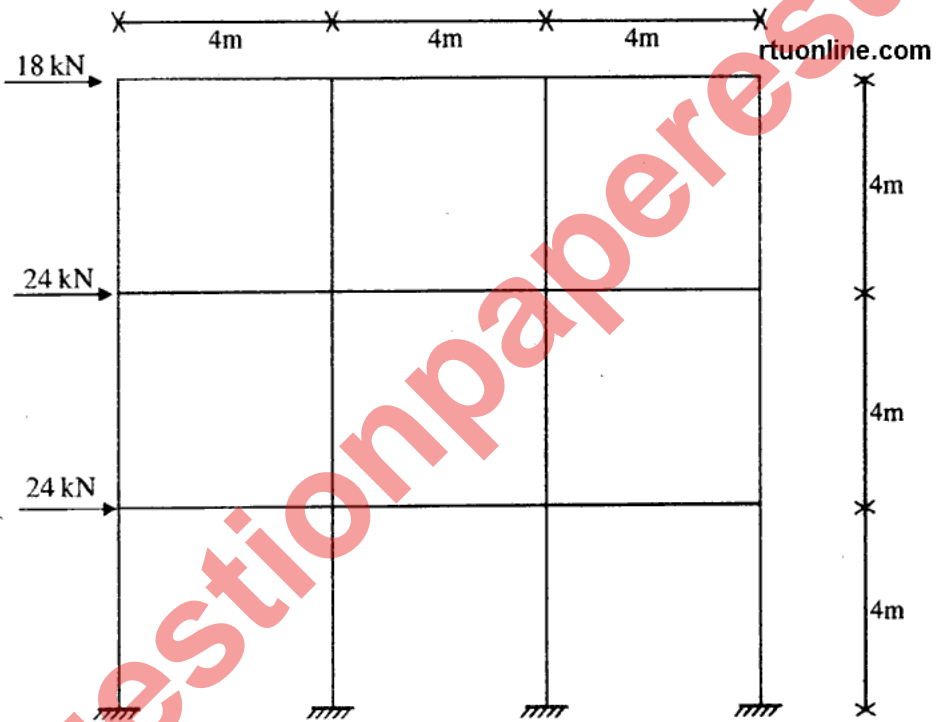


Fig. - 11

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]