

5E5061

Roll No. _____

Total No of Pages: 7

5E5061

B. Tech V Sem. (Main/Back) Exam. Nov-Dec. 2015

Civil Engineering

5CE1A Theory of Structures-I

Time: 3 Hours

Maximum Marks: 80

Min. Passing Marks Main: 26

Min. Passing Marks Back: 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.

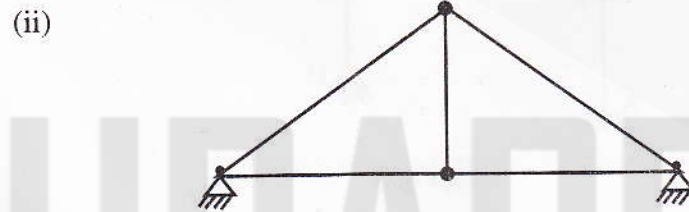
Use of following supporting material is permitted during examination.

1. NIL

2. NIL

UNIT-I

Q.1 (a) Define kinematic indeterminacy. Determine kinematic degree of indeterminacy for the following structures shown in Fig 1 [4]



(iii)

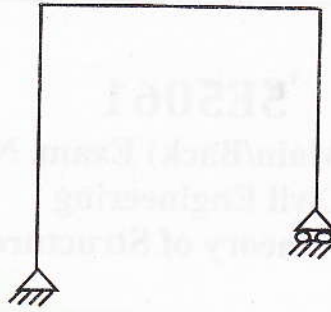


Fig - 1

- (b) Solve the continuous beam using slope – deflection method (Fig 2) and draw B. M. D. [12]

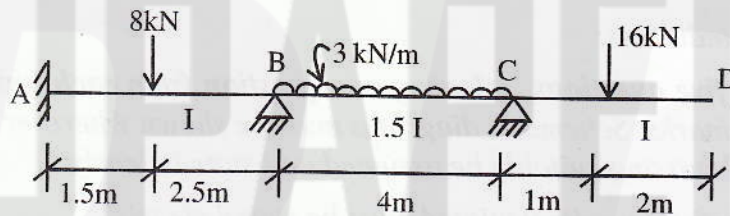


Fig.2

OR

- Q.1 (a) Write Maxwell – Betli's generalized theorem. A vertical downward load of 40 KN acting at F in the portal frame shown in Fig 3 produces a horizontal deflection at E of 2mm towards left and a clockwise rotation of 0.1 radian at D. Determine the vertical deflection at F due to a horizontal load of 20KN at E towards right and an anti clockwise moment of 1.6KN – m acting at D. [4]

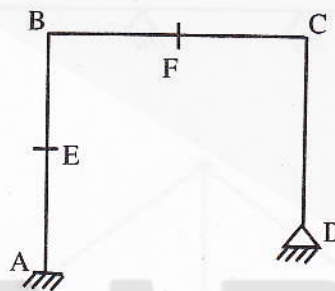
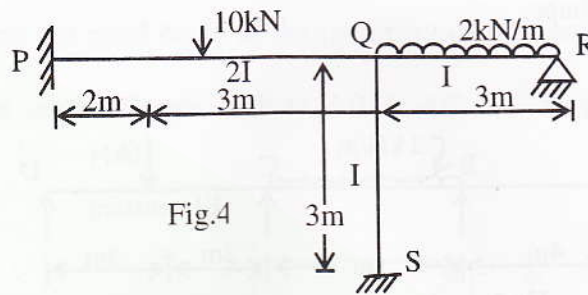


Fig.3

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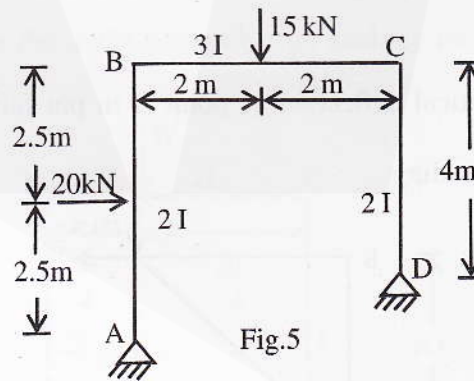
[10120]

- (b) Solve using slope deflection method (Fig 4) and draw the bending moment diagram. Also draw the deflected shape for the from PQRS. [12]



UNIT-II

- Q.2 Analyse the rigid frame shown in Fig 5 using moment distribution method. Draw BMD & deflected shape. [16]



OR

Q.2 A Beam ABCD, 16m long is continuous over three spans and is loaded as shown in Fig 6. The support B sinks by 5mm downwards. I for the beam is $93 \times 10^4 \text{mm}^4$ throughout. Take $E = 2.1 \times 10^5 \text{N/mm}^2$. Calculate the moments and draw the BMD. Also draw deflected shape. [16]

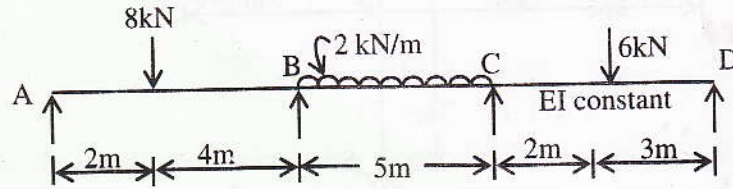


Fig.6

UNIT-III

Q.3 (a) Define strain energy. Calculate the strain energy due to bending for the beam given in Fig 7 having span of 5m. [4]

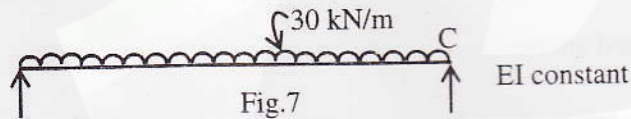


Fig.7

(b) Calculate the vertical deflection of point B in pin fainted truss shown in Fig 8 under the given loading. [12]

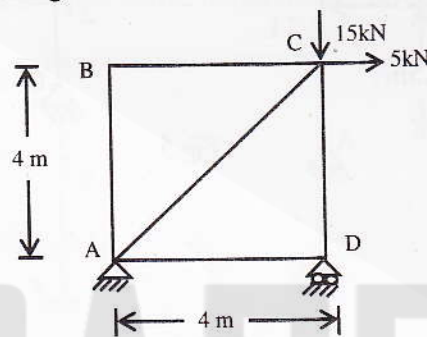


Fig.8

OR

Q.3 (a) Write Castiglione's theorems. [4]

(b) Determine the axial forces in the members of pin jointed frame shown in Fig 9.

The cross sectional area of bars AB & AC is '2a' and that of other members is 'a' [12]

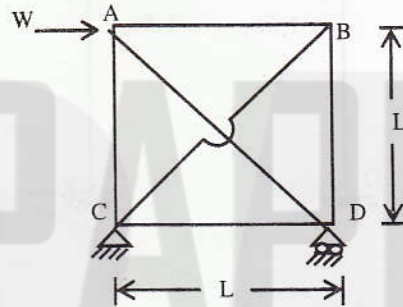


Fig.9

UNIT-IV

Q.4 A portal frame ABCD is fixed at A and D, has rigid joints at B and C. It is loaded as shown in Fig 10. Solve the frame using column analogy method and plot the B. M. D.

[16]

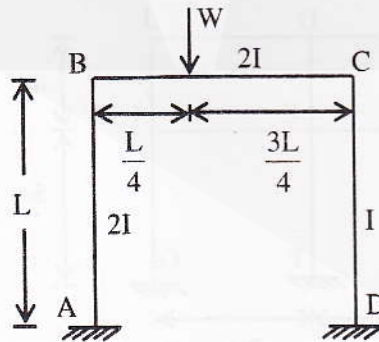


Fig 10

OR

Q.4 Solve the frame using Kani's method (Fig 11). Sketch the B. M. D. for the frame. [16]

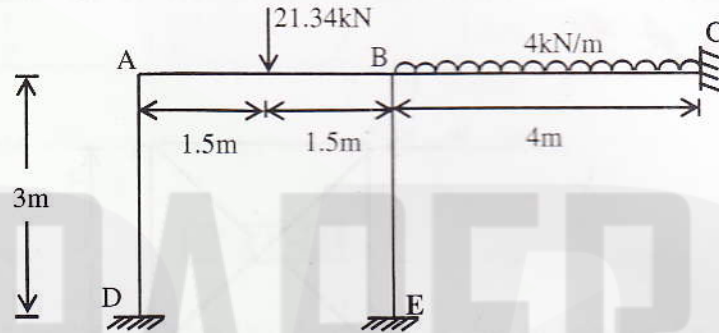


Fig 11

UNIT-V

Q.5 Solve the building frame shown in Fig 12 using portal method. [16]

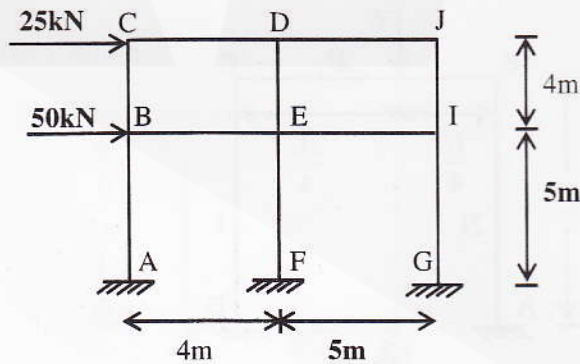


Fig 12

[5E5061]

[10120]

OR

Q.5 Fig 13 shows plan of a Tripod. The feet A, B and C being in the same plane and the open D being 3.75m above the plane. Horizontal loads of 100 kN and 150 kN are applied at D in the directions shown. Find the forces in the members assuming that all joints are pin – joints [16]

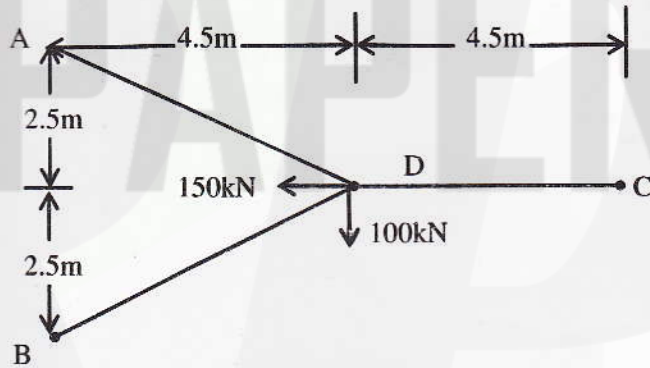


Fig 13
