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Question Paper Code : 57171

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2016

Fifth Semester

Civil Engineering

CE 6501 – STRUCTURAL ANALYSIS – I

(Regulations 2013)

Time : Three Hours **Maximum : 100 Marks**

Answer ALL questions.

PART – A (10 × 2 = 20 Marks)

1. Distinguish between static indeterminacy and kinematic indeterminacy.

2. Brief the method of consistent deformation for the analysis of a propped cantilever.

3. State the position of loading for maximum bending moment at a point in a simply supported beam when it subjected to a series of moving point loads.

4. Draw influence line for shearing force at any point in a simply supported beam using Muller Breslau's principle.

5. Determine the value of horizontal thrust at the supports of a three hinged symmetrical parabolic arch having 15 m span and 3 m central rise with a point load 10 kN at a section 5 m from the left support.

6. What is meant by "reaction locus" of a two hinged arch ?

7. State the assumptions made in slope deflection method for the analysis of indeterminate structures.

8. Write the support reactions induced in a fixed beam when one of its supports sinks.

9. What do you understand by the term distribution factor ?

10. What are the conditions in which a frame is subjected to sway ?

PART – B (15 × 16 = 80 Marks)

11. (a) A fixed beam of span 6 m carries a uniformly distributed load of 4 kN/m over the left half span. Analyze the beam using energy method and draw the bending moment diagram.

OR

(b) A continuous beam ABC of uniform section is fixed at A and simply supported at B and C. The spans AB and BC are 6 m and 4 m respectively. The span BC carries a uniformly distributed load of 6 kN/m and the span AB carries a central concentrated load of 12 kN. Analyze the beam by consistent deformation method and draw the shearing force and bending moment diagrams.

12. (a) A train of loads as shown in Fig. Q.12 (a) crosses a simply supported beam of 24 m span from left to right. Using influence line determine the maximum bending moment at left one - third span point and also the absolute maximum bending moment in the beam.

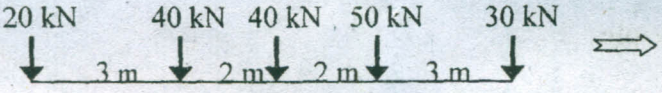

Fig.Q 12 (a)

OR

(b) A continuous beam ABC is simply resting on supports A and C, and continuous over the support B. The span AB is 6 m and the span BC is 8 m. Draw the influence line diagram for moment at B. Assume Flexural rigidity is constant throughout and calculate the influence line ordinates at 2 m intervals.

13. (a) A uniformly distributed load of 6 kN/m covers the left half span of a three hinged symmetrical parabolic arch of span 24 m and central rise 4 m. Determine the horizontal thrust and also the bending moment, shearing force and normal thrust at the loaded quarter span.

OR

(b) A symmetrical two hinged parabolic arch has a span of 50 m and central rise 5 m. It carries a concentrated vertical load of 20 kN at 10 m from left support in addition to a vertical load of 30 kN at the crown. Draw the bending moment diagram for the arch and also determine the radial shear and normal thrust at 12.5 m from the left support.

14. (a) A continuous beam ABC is fixed at A and simply supported at B and C. The span AB is 5 m and carries a concentrated load of 80 kN at its mid-span and the span BC is 8 m and carries a uniformly distributed load of 12 kN/m. Take the flexural rigidity for portion AB as EI and that for portion BC as 2EI. Analyze the beam by slope deflection method and draw the shearing force and bending moment diagrams.

OR

(b) Analyse the portal frame shown in Fig. Q. 14 (b) by slope deflection method and draw the bending moment diagram.

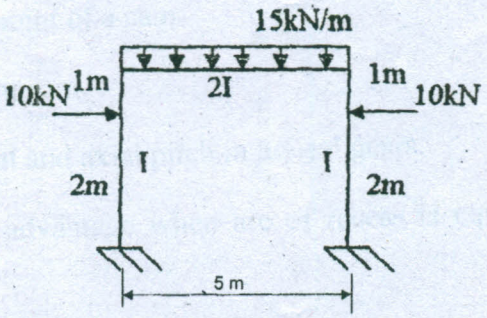

Fig. Q. 14(b)

15. (a) A continuous beam ABCDE 18 m long is simply supported at A and also at B, C and D at 4 m, 10 m and 16 m respectively from the left end A and the portion DE being overhanging over 2 m. The span AB carries a point load of 40 kN at its mid-span, the span BC is subjected to a uniformly distributed load of 12 kN/m, the span CD carries a point load of 60 kN at 2 m from C and the free end (E) carries a point load of 10 kN. Analyse the beam by moment distribution method and draw the shearing force and bending moment diagrams. Consider the flexural rigidity for the portions AB, BC and CD, DE as EI, 3EI and 2EI, 2EI respectively.

OR

(b) Analyse the portal frame shown in Fig.Q.15 (b) by moment distribution method and draw the bending moment diagram. Assume flexural rigidity is constant for all the members.