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Question Paper Code : 52769

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY, 2019.

Fifth Semester

Civil Engineering

CE 6501 — STRUCTURAL ANALYSIS — I

(Regulation 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Determine the degree of kinematic indeterminacy of the frame shown in Fig. Q.1 and show the same in the frame.

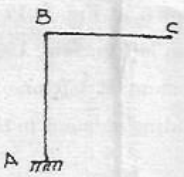

Fig.Q.1

2. What is the reaction at the propped end of a propped cantilever when it is subjected to a concentrated load 'W' at mid-span?
3. What are the uses of influence lines?
4. State Muller Breslau's principle.
5. What are the advantages of three hinged semi circular arch?
6. How do you do account settlement effects in arches?
7. Distinguish between Sway type and Non-sway type problems.
8. Write the advantages of slope deflection method.
9. What do you understand by the term distribution factor?
10. What are the conditions in which a frame is subjected to sway?

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PART B — (5 × 13 = 65 marks)

11. (a) Find the forces in the members of the truss shown in Fig.Q.11(a). The cross sectional area and Young's modulus of all the members are same. pt

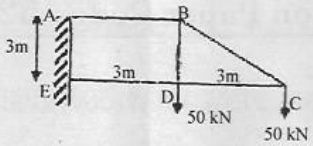

Fig.Q.11(a)

Or

(b) Analyse the truss shown in Fig.Q.11(b) by consistent deformation method. Assume that the cross sectional area of all the members are same.

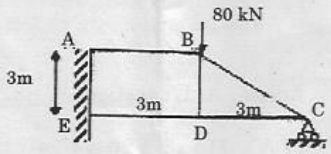

Fig. Q.11(b)

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.

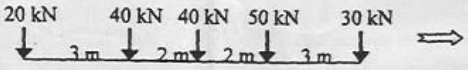

Fig. Q.12 (a)

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.

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13. (a) A three hinged parabolic arch of span 20 m has its crown 9 in high from the left support and 4 m higher than the right support. The crown of the arch is at a horizontal distance of 12 in from the left support and 8 m from the right support. The arch is subjected to a uniformly distributed load of 3 kN/m over a length of 14 m from the right support. Find the horizontal thrust and bending moment at a horizontal distance of 4 m from the right support.

Or

(b) Find the reaction components at the supports of a symmetrical parabolic fixed arch 20 m span and 3 m central rise when it is subjected to a uniformly distributed load of 2 kN/m over the left half span.

14. (a) A continuous beam ABC 24 in long is fixed at A, simply supported at B and C. The intermediate support B is at 12 in from A and sinks by 30 mm. The span AB carries a uniformly distributed load of 3 kN/m and the span BC carries a point load of 24 kN at 8 m from C. Analyze the beam by slope deflection method and draw the shearing force and bending moment diagrams. Take the flexural rigidity EI as 40000 kN — m^2 and is constant throughout.

Or

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

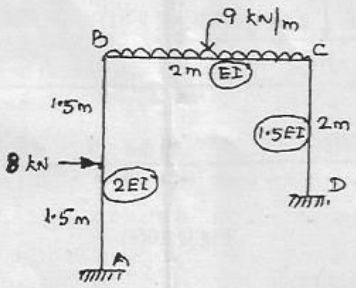

Fig. Q.14.(b)

15. (a) Analyse the portal frame shown in Fig.Q.15(a) using moment Distribution Method.

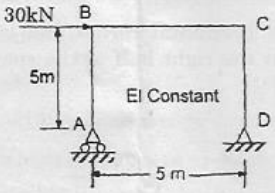

Fig.Q.15(a)

Or

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(b) Analyse the continuous beam shown in Fig.Q.15(b) using moment distribution method.

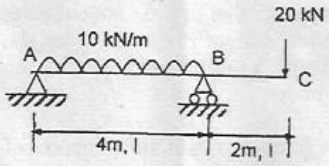

Fig.Q.15(b)

PART C — (1 × 15 = 15 marks)

16. (a) A train of 5 wheel loads crosses a simply supported beam of span 22.5 m. Using influence lines calculate the maximum positive and negative shear forces at mid span. And absolute maximum bending moment anywhere in the span.

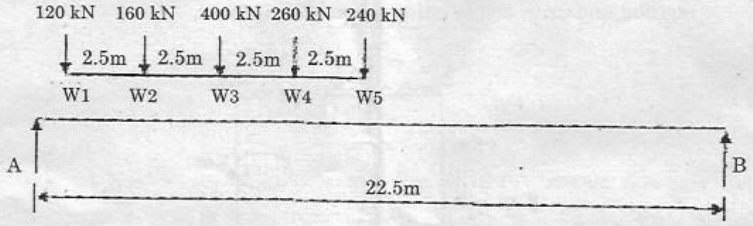

Fig.Q.16(a)

Or

(b) A two hinged parabolic arch of span L and rise R carries a UDL of w/m run over the left hand half of the span. The moment of inertia of the arch rib varies as the secant of the slope of the rib axis.

(i) Obtain the expression for the horizontal thrust H. (10)

(ii) Calculate the horizontal thrust and bending moment at quarter span point on the right half of the span if $l = 20\ m$, $r = 4\ m$ and w = 20 kN/m. (5)

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