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Question Paper Code : 80209

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2016.

Fifth Semester

Civil Engineering

CE 6501 — STRUCTURAL ANALYSIS – I

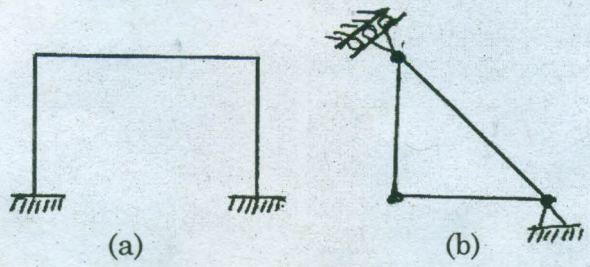
(Regulations 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Find the degree of static indeterminacy for the following structures and specify whether the structure is stable or not.



(a) (b)

2. Determine the prop reaction of a propped cantilever using energy method when it is subjected to a uniformly distributed load over the entire span.

3. What are the uses of influence lines?

4. State: Muller Breslau's principle.

5. What is the value of horizontal thrust at the supports of a three hinged symmetrical parabolic arch of span "l" and central rise 'h', when it is subjected to a uniformly distributed downward load "w" per unit horizontal length over the right half span?

6. Name any two methods available for the analysis of two hinged arches.

7. Write the generalized form of slope – deflection equation with necessary explanation.

8. A propped cantilever of span 6 m is subjected to a uniformly distributed load of 6 kN/m over the entire span. Using slope deflection method, determine the slope at B. Take the flexural rigidity EI as 9000 kN-m^2.

9. A continuous beam ABC of length 2L (with uniform flexural rigidity EI) is simply supported at the ends A and C and continuous over the support B at mid-length. Using moment distribution method, determine the moment at the support B, if it subjected to a uniformly distributed load 'w' throughout the length.

10. What is meant by distribution factor?

PART B — (5 × 16 = 80 marks)

11. (a) The frame shown in figure Q.11 (a) is pin jointed to rigid supports at A and B and the joints C and D are also pinned. The diagonals AD and BC act independently and the members are all of the same cross sectional area and material. ABC and BCD are equilateral triangles. Using energy method, find the forces in all the members if a load of 5 kN is hung at D.

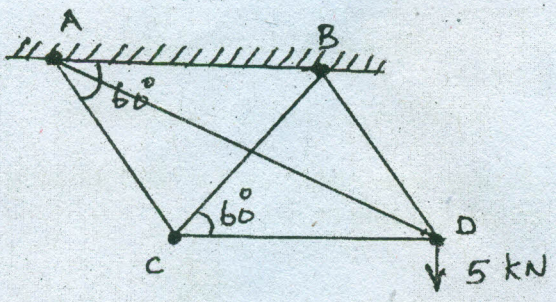


Fig Q. 11 (a)

Or

(b) Using consistent deformation method, determine the horizontal reaction at the support C for the frame shown in figure Q.11 (b). Flexural rigidity EI is constant for both the members.

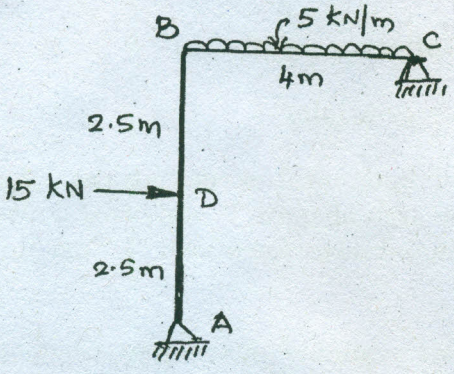


Fig Q. 11 (b)

12. (a) A continuous beam ABC is simply resting on supports A and C, continuous over the support B and has an internal hinge (D) at 3 m from A. The span AB is 7 m and the span BC is 10 m. Draw influence lines for reactions at A and B.

Or

(b) Draw influence line for shearing force at 4 m from the propped end of a propped cantilever of span 7 m. Calculate the ordinates at every 1 m.

13. (a) A three hinged parabolic arch of span 20 m has its crown 9 m 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 m 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 is simply supported at A, fixed at C and continuous over support B. The span AB is 6 m and carries a concentrated load of 60 kN at its mid-span and the span BC is 8 m and carries a uniformly-distributed load of 10 kN/m. Take the flexural rigidity for portion AB as 2EI and that for portion BC as EI. Analyze the beam by slope deflection method and draw the shearing force and bending moment diagrams.

Or

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

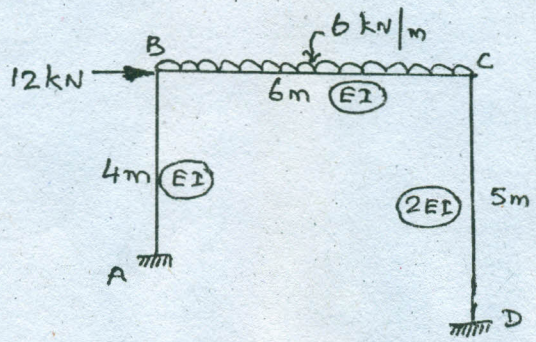


Fig Q. 14 (b)

15. (a) A continuous beam ABC 24 m long is fixed at A, simply supported at B and C. The intermediate support B is at 12 m from A and sinks by 30 mm. The span AB carries a uniformly distributed load of 3 kN/m and the span BC is subjected to a point load of 24 kN at 8 m from C. Analyze the beam by moment distribution method and draw the shearing force and bending moment diagrams. Take the flexural rigidity EI as 40,000 kN-m^2 and is constant throughout.

Or

(b) Analyze the frame shown in figure Q.15 (b) by moment distribution method using Naylor's simplification and draw the bending moment diagram.

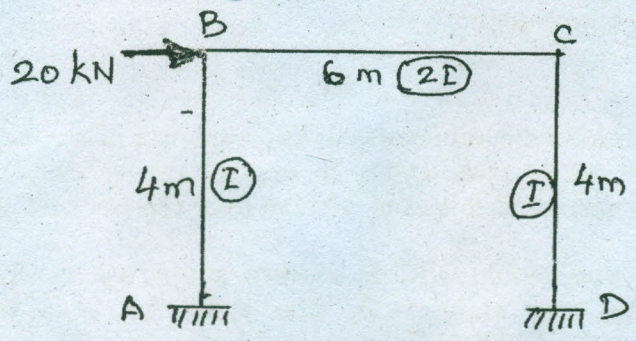


Fig Q. 15 (b)