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Question Paper Code : 73254

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2017.

Fifth Semester

Civil Engineering

CE 2302/CE 51/10111 CE 502 — STRUCTURAL ANALYSIS — I

(Regulations 2008/2010)

(Common to PTCE 2302/10111 CE 502 – Structural Analysis — I for B.E. (Part-Time) Third Semester – Civil Engineering – Regulations 2009/2010)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. State the basic equation of virtual work method.

2. For what purposes, Willot diagram is used and where will you apply the Mohr's correction?

3. Draw Influence Line Diagram (ILD) and determine the shear force at the left support of a simply supported beam subjected to middle third equal loads.

4. Draw ILD for BM at any point on a simply supported beam subjected to udl on the entire span.

5. What are the methods applied in solving the fixed arches?

6. Write down the formula for horizontal thrust developed in a two hinged arch having the effect of yielding of support and explain the notations used.

7. Write down the assumptions made in slope-deflection method.

8. Develop the slope-deflection equations for a fixed beam AB subjected to a point load 'P' at one-third length from the left support, and support B sinks by δ.

9. Show with a simple example, how carry over factor is calculated.

10. Define stiffness factor.

PART B — (5 × 16 = 80 marks)

11. (a) Determine the horizontal displacement of the roller support-D of the rigid jointed plane from shown in Fig. Q. 11(a). Take $E = 200 \times 10^6$ kN/m^2 and $I = 500 \times 10^{-6}$ m^4.

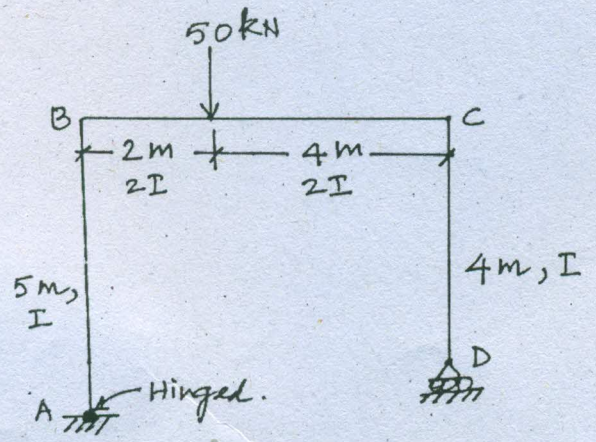

Fig. Q. 11 (a)

Or

(b) Determine the vertical and horizontal deflection of point B in the truss shown in Fig. Q. 11 (b). The cross sectional area of all the members is 1500 mm^2. Take E = 200 GPa.

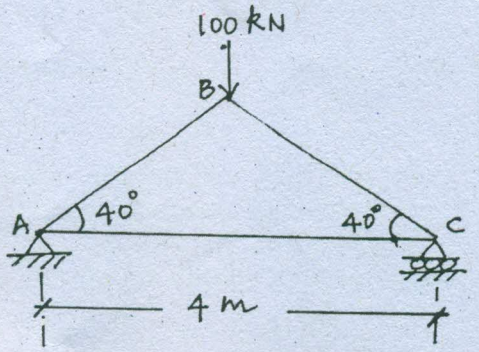

Fig. Q. 11 (b)

12. (a) Two point loads of 150 kN and 250 kN spaced 3 m apart cross a girder of span 12 meters from left to right with the 150 kN leading. Draw the ILD for shear force and bending moment and find the values of maximum shear force and bending moment at a section 3 m from the left hand support. Also evaluate the absolute maximum bending moment due to the given loading system.

Or

(b) Draw the influence line diagram (ILD) for the forces in members $A_1 B_1$ and $A_1 B_2$ of the truss shown in Fig. Q. 12 (b).

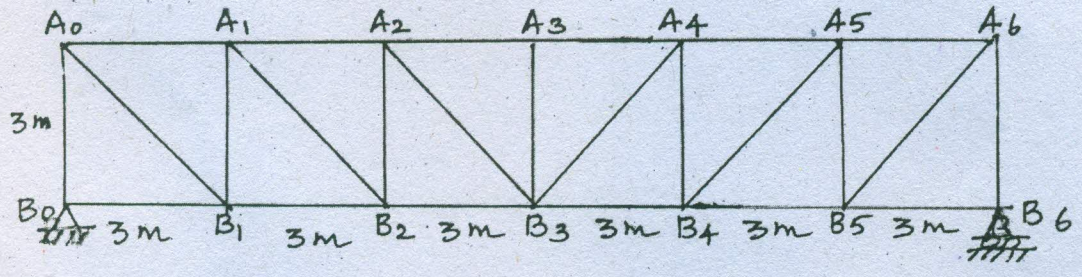

Fig. Q. 12 (b)

13. (a) A three hinged circular arch of span 25 m with a central rise of 6 m is hinged at the crown and the end supports. It caries a point load of 90 kN at 6 m from the left support. Calculate (i) the reaction at the supports and (ii) moment at 4 m from the left support.

Or

(b) A parabolic two hinged arch has a span of 50 m and a rise of 6 m. A concentrated load 25 kN acts at 20 m from the left support. The second moment of area varies as the secant of the inclination of the arch axis. Calculate the horizontal thrust and reactions at the hinge. Also calculate maximum bending moment at the section.

14. (a) Analyze the continuous beam ABC shown in Fig. Q. 14 (a) by slope deflection method and draw the bending moment and shear force diagrams. Take EI = constant.

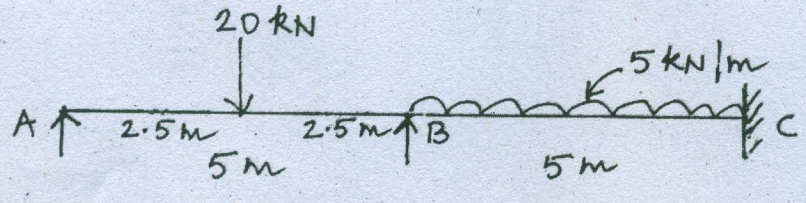

Fig. Q. 14 (a)

Or

(b) Analyze the rigid frame ABC shown in Fig. Q. 14 (b) by slope-deflection method and sketch the Bending Moment Diagram (BMD).

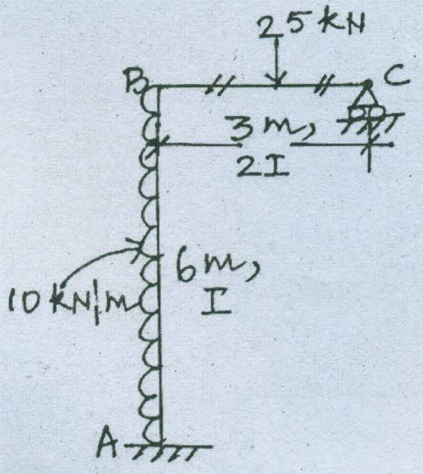

Fig. Q. 14 (b)

15. (a) Analyze the continuous beam ABC shown in Fig. Q. 15 (a) by moment distribution method and draw the BMD and SFD. Take EI = constant.

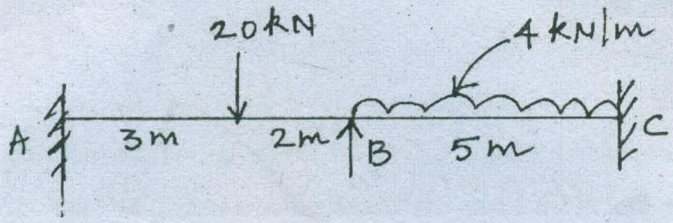

Fig. Q. 15 (a)

Or

(b) Analyze the portal frame ABCD shown in Fig. Q. 15 (b) by moment distribution method. Draw the bending moment diagram.

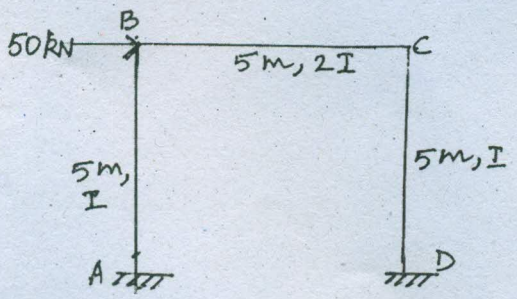

Fig. Q. 15 (b)