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Fourth Semester B.E. Degree Examination, July/August 2021

Analysis of Determinate Structures

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions.

1. a. Distinguish between determinate and indeterminate structures with examples. (06 Marks)
- b. Determine the degree of static indeterminacy for the structures shown in Fig. Q1 (b). (10 Marks)

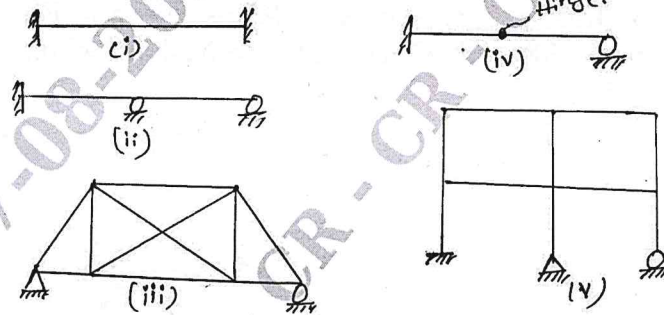


Fig. Q1 (b)

2. Determine the forces in all the members of the truss shown in the Fig. Q2, by the method of joints and verify the forces in members DB, EC and DC by the method of sections. (16 Marks)

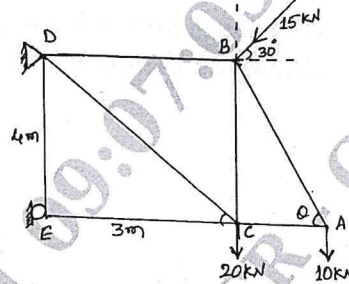


Fig. Q2

3. a. Determine the slope and deflection at the free end for the Cantilever beam shown in Fig. Q3 (a). Using moment area method. (08 Marks)

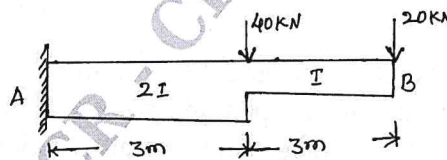


Fig. Q3 (a)

- b. Find the deflection under loads and at mid span for the beam shown in Fig. Q3 (b) by conjugate beam method. Also find slope at the supports. (08 Marks)

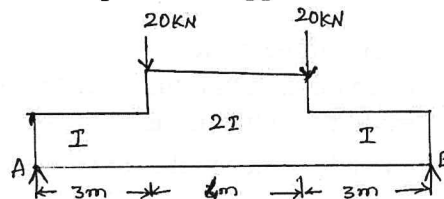
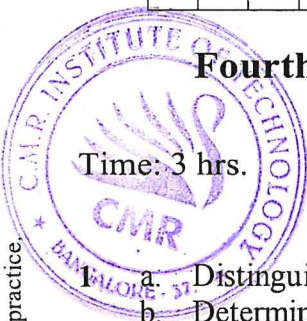


Fig. Q3 (b)



- 4 a. A Cantilever beam of span 6 m subjected to udl of 20 kN/m over entire span. Determine slope and deflection at free end. Using Double Integration method. (06 Marks)
- b. A simply supported beam AB of span 7 m and carries a point load of 100 kN at a distance of 4 m from left end A as shown in Fig.Q4 (b). Find the deflection under the load and also maximum deflection in the beam. Using Double Integration Method. (10 Marks)

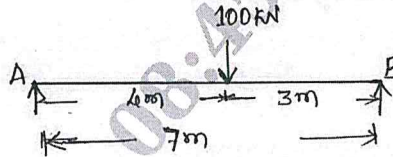


Fig. Q4 (b)

- 5 A steel truss of span 6 m is loaded as shown in Fig. Q5. The cross sectional area of each member is 500 mm^2 . Calculate the vertical deflection at joint B. Take $E = 200 \text{ GPa}$. (16 Marks)

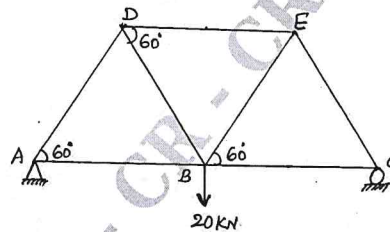


Fig. Q5

- 6 a. Obtain an expression for strain energy stored in a member when it is subjected to bending. (06 Marks)
- b. Find the value of vertical and horizontal deflection at 'D' for the structure shown in Fig. Q6 (b) by Castiglione's theorem. (10 Marks)

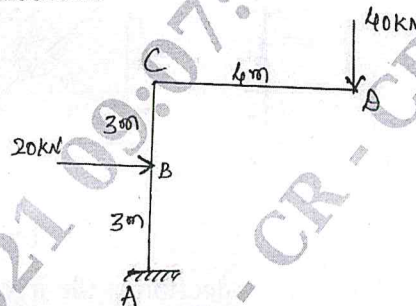


Fig. Q6 (b)

- 7 A three hinged parabolic arch has a span of 20 m and a rise of 5 m. It carries a udl of 2 kN/m over the left half of the span and a point load of 12 kN at 5 m from the right end. Find the B.M, normal thrust and radial shear at a section 4 m from left end. Draw BMD. (16 Marks)
- 8 A cable is suspended between two points A and B, 100 m apart and a central Dip of 8 m. It carries udl of 20 kN/m. Determine
- Length of the cable.
 - Maximum and minimum tension in the cable.
 - Size of the cable, if the permissible stress of the cable material is 200 N/mm^2 .
 - Calculate forces in the tower for both conditions. Take $\theta_A = 25^\circ$. (16 Marks)

- 9 a. What is an Influence line? Explain its importance in structural analysis. (06 Marks)
 b. An N-type girder of span 12 m has to be designed for the member force CI as shown in Fig. Q9 (b). Draw ILD for member CI. (10 Marks)

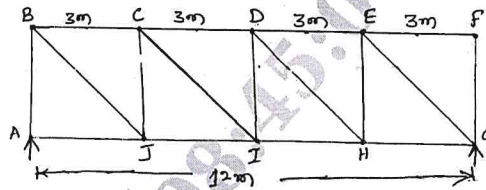


Fig. Q9 (b)

- 10 a. Using I.L, determine the B.M and S.F at 'X'. Due to the given system of loads as shown in Fig. Q10 (a). (06 Marks)

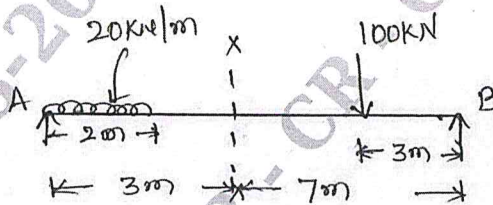


Fig. Q10 (a)

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- b. For a simply supported beam of span 28 m with the multiple points loads system as shown in Fig. Q10 (b). Compute the following by ILD principles. (10 Marks)
 (i) Maximum +ve and -ve SF at a section 12 m from left.
 (ii) Maximum bending moment at a section 12 m from left.

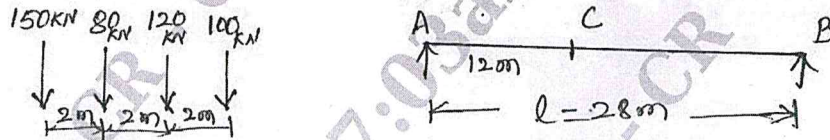


Fig. Q10 (b)
