CBCS SCHEME

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21CV44

Fourth Semester B.E. Degree Examination, Dec.2023/Jan.2024
Analysis of Structures

Time: 3 hrs. Max. Marks: 100

Note: 1. *Answer any FIVE full questions, choosing ONE full question from each module.*
2. *Assume missing data, if any.*

Module-1

1 a. State and prove Mohr's theorems for slope and deflection of prismatic beam. **(10 Marks)**

b. Find the slope and deflection at free end of the cantilever beam shown in Fig.Q1(b) by moment area method.

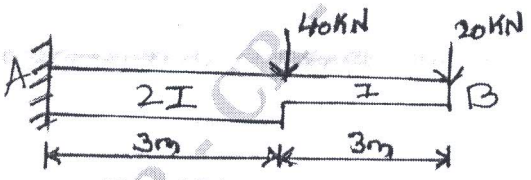

Fig.Q1(b) **(10 Marks)**

OR

2 a. Calculate slope at support and deflection under the point load by conjugate beam method for beam shown in Fig.Q2(a).

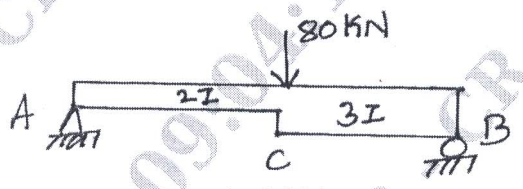

Fig.Q2(a) **(10 Marks)**

b. For a simply supported beam subjected to point loads at one third points. Calculate max slope and maximum deflection. **(10 Marks)**

Module-2

3 A truss is loaded as shown in Fig.Q3. The cross sectional area as indicated in figure. Find strain energy stored due to loading. Take E = 72 GPa.

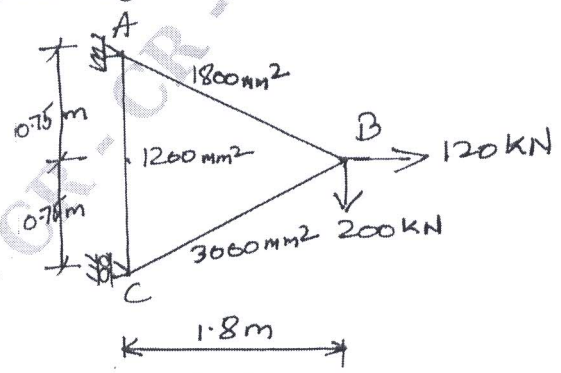

Fig.Q3 **(20 Marks)**

OR

4 For the truss shown in Fig.Q4. The cross sectional area of each member is 400 mm^2. Take E = 200 GPa. Determine the vertical deflection at joint C if 4 kN force is applied to the truss at 'C'.

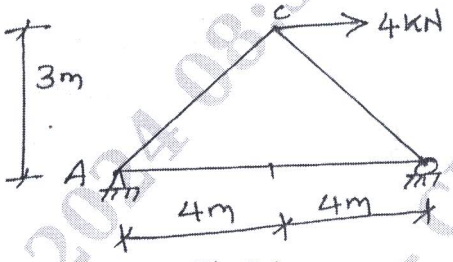

Fig.Q4 **(20 Marks)**

Module-3

5 A three hinged symmetrical parabolic arch has a span of 30 m and a central rise of 6 m. The arch carries a uniformly distributed load of intensity 30 kN/m over left half portion and a concentrated load of 60 kN at 9m from right had support. Compute the:

(i) Bending moment
(ii) Normal thrust
(iii) Radial shear at 9m from left support. Also draw the B.M.D. **(20 Marks)**

OR

6 A suspension bridge of 120 m span has a central dip of 12 m and support a U.D.L. of 15 kN/m over the span. Calculate the maximum and minimum tension in cable, size of the cable if the permissible stress of the cable material is 200 N/mm^2. The length of the cable and forces in the tower if the cable is passing over a smooth pulley. Take height of the tower h = 20 m and inclination of anchor cable = 25°. **(20 Marks)**

Module-4

7 Analyze the continuous beam shown in Fig.Q7 by slope deflection method and draw bending moment, shear force diagram and elastic curve. Consider Young's modulus E to be same, throughout the beam.

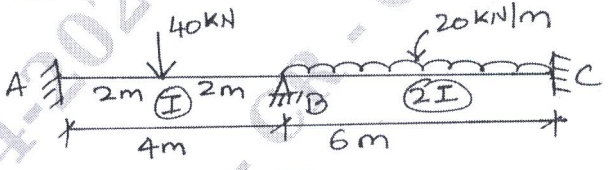

Fig.Q7 **(20 Marks)**

OR

8 Analyze the frame shown in Fig.Q8 by slope deflection method and draw bending moment diagram. E = constant.

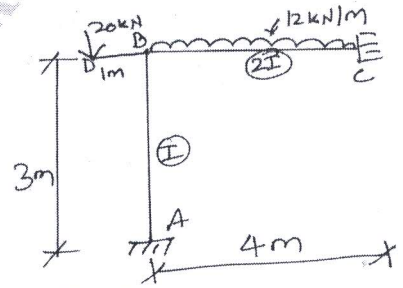

Fig.Q8 **(20 Marks)**

Module-5

9 Analyze the beam shown in Fig.Q9. By stiffness matrix method, take E same throughout the beam. Draw S.F.D and B.M.D.

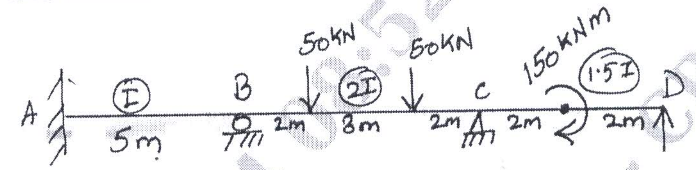

Fig.Q9 **(20 Marks)**

OR

10 Analyze the beam shown in Fig.Q10. By stiffness matrix method, the support B sinks by 10 mm. Take E = 2047 kN/m, I = 4162×10^4 mm^4.

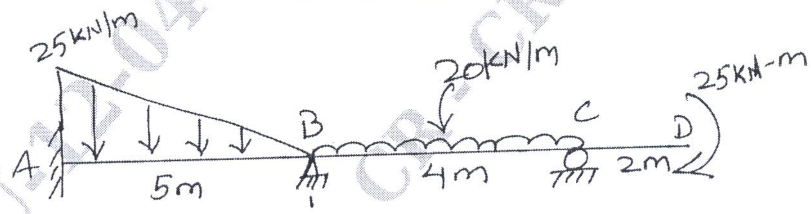

Fig.Q10 **(20 Marks)**

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