CBCS SCHEME

USN | | | | | | | | | | 15CV42

Fourth Semester B.E. Degree Examination, Dec.2019/Jan.2020
Analysis of Determinate Structures

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Define the degree of static and kinematic indeterminacies with examples. **(06 Marks)**

b. Find the forces in the members PQ, PR and RS of the truss shown in Fig.Q.1(b) using method of section. **(10 Marks)**

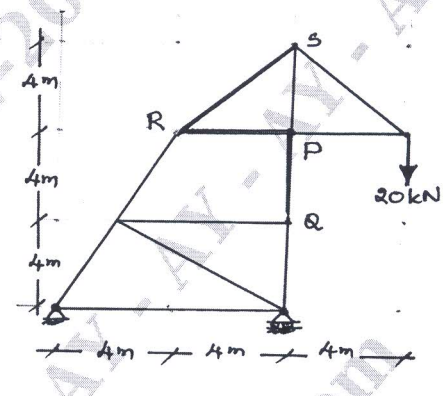

Fig.Q.1(b)

OR

2 a. Determine the Degrees of freedom for the structures shown in Fig.Q.2(a) (i) (ii) and (iii) with and without considering axial deformation. **(06 Marks)**

Fig.Q.2(a)(i)

Fig.Q.2(a)(ii)

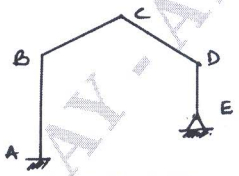

Fig.Q.2(a)(iii)

b. Analyze the truss shown in Fig.Q.2(b) and tabulate the values. **(10 Marks)**

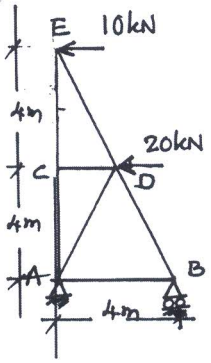

Fig.Q.2(b)

Module-2

3 a. Determine the maximum deflection at the free end of a cantilever beam subjected to udl of w/mt run over its entire span 'L' with constant EI. Use Macaulay's method. **(06 Marks)**

b. For the simply supported beam loaded as shown in Fig.Q.3(b). Find the slope at A and B and deflection at 'E'. Take EI = 4000 kN-m^2. Use moment area method. **(10 Marks)**

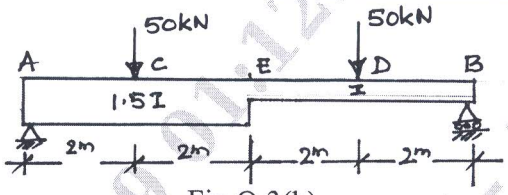

Fig.Q.3(b)

OR

4 a. Derive the differential equation of deflected curve for the beam with usual notations. **(04 Marks)**

b. For the simply supported beam loaded as shown in Fig.Q.4(b). Taking E = 200GPa, I = 7 × 10^{8}mm^4. Find the magnitude and location of Max. deflection in the beam. Use Conjugate Beam Method. **(12 Marks)**

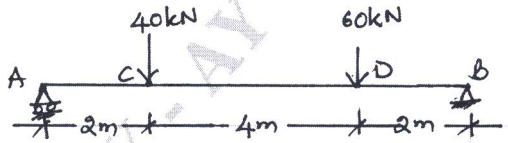

Fig.Q.4(b)

Module-3

5 a. Derive the expression for the strain energy stored in a member due to axial force. **(04 Marks)**

b. Using castigliano's approach find the vertical and horizontal deflection at 'C' of abent loaded as shown in Fig.Q.5(b). Take EI = 15000 kN/m^2. **(12 Marks)**

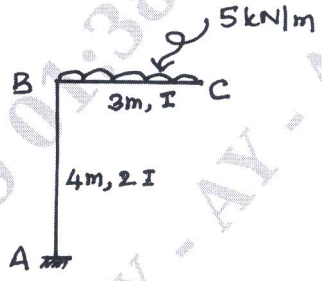

Fig.Q.5(b)

OR

6 a. Determine the horizontal movement at support B of the steel truss loaded as shown in Fig.Q.6(a) by unit load method. Take A = 1000mm^2, E = 200Gpa. **(10 Marks)**

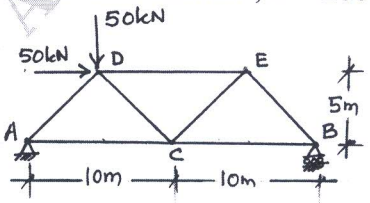

Fig.Q.6(a)

b. Determine the deflection at the mid span of a simply supported beam subjected to a point load 'W' at its mid span using strain energy method. **(06 Marks)**

Module-4

7 a. Show that the bending moment is zero at all sections of a parabolic arch when it is subjected to udl over its entire span. **(06 Marks)**

b. A suspension cable has span of 120m and dips by 10m and carries a load of 10kN/m over its entire span. Find:

i) The length of the cable

ii) Maximum and minimum tension in the cable with its location and direction.

iii) What could be the force transmitted to the supporting tower when the cable passes over a smooth pulley fixed on top of the tower. Assume angle of back stay as 30° to vertical. **(10 Marks)**

OR

8 A three hinged parabolic arch of span 30m has its left and height supports at 12m and 4m below crown point. The arch carries a load of 80kN at distance of 4m to the left of crown C and an udl of 15kN/m between crown and right support. Find the B.M. under the point load, maximum bending moment on the right portion of the arch. Also find normal thrust and radial shear at the point load. **(16 Marks)**

Module-5

9 a. Establish the expression for load position to get maximum bending moment at a section which is at a distance of 'a' from left support 'A' in a simply supported beam AB of span 'L' and traversed by a udl w/mt run which is shorter span. **(06 Marks)**

b. A beam has a span of 20m subjected to two point loads 80kN and 40kN 2m apart rolls from left to right with 40kN load leading. Draw ILD for reaction at B, BM and SF at section 5m from left support, hence find the maximum values of above quantities. **(10 Marks)**

OR

10 a. Wheel loads shown in Fig.Q.10(a) moves from left to right on a S.S. beam of 12m span. Find the absolute maximum BM any where in the beam and also find equivalent udl to be placed over the entire span. **(08 Marks)**

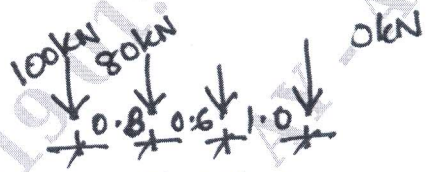

Fig.Q.10(a)

b. Draw the ILD for axial force in member 1 of the truss shown Fig.Q.10(b) and hence find its maximum tensile/ compressive value when a udl of 10kN/m of length traverse from left to right. **(08 Marks)**

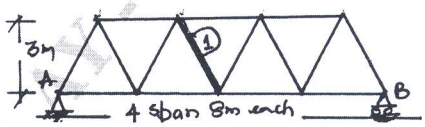

Fig.Q.10(b)

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