CBCS SCHEME

USN

15CV42

Fourth Semester B.E. Degree Examination, Jan./Feb. 2021
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. Determine static and Kinematic in determinacies of the structures shown in Fig Q1(a) i), ii), iii).

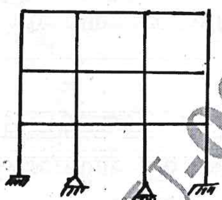
Fig Q1(a) – i)

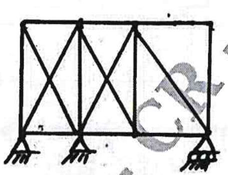
Fig Q1(a) – ii)

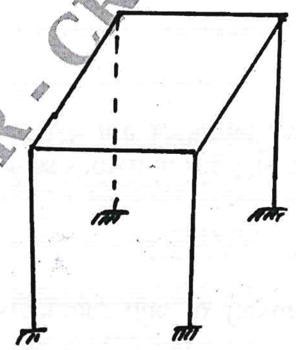
Fig Q1(a) – iii)

(08 Marks)

b. Determine the forces in the numbered members of the loaded truss shown in Fig Q1(b) using method of sections.

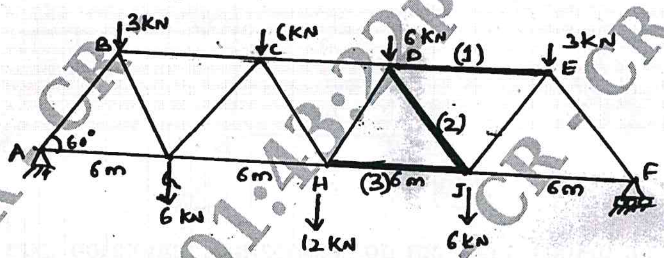

Fig Q1(b)

(08 Marks)

OR

2 Determine forces in all the members of the truss shown in Fig Q2 using method of joints.

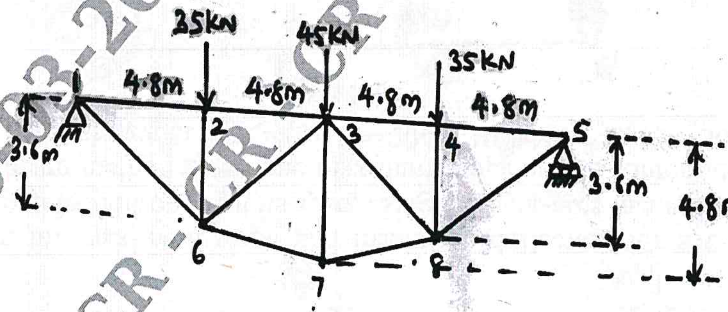

Fig Q2

(16 Marks)

Module-2

3 a. Determine maximum slope and maximum deflection for a simply supported beam subjected to a uniformly distributed load (throughout its span) using Double Integration method.

(06 Marks)

b. Determine maximum slope and maximum deflection for the beam shown in Fig Q3(b) using Macaulay's method.

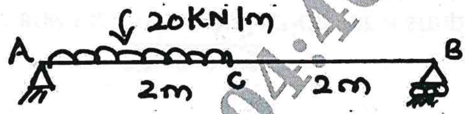

Fig Q3(b) **(10 Marks)**

OR

4 a. Obtain expression for maximum slope and maximum deflection for a Cantilever with a uniformly distributed load throughout its span, using moment-area method. **(06 Marks)**

b. Using Conjugate beam method determine maximum slope and maximum deflection for the simply supported beam shown in Fig Q4(b). $E = 204 \times 10^6$ kN/m^2 and $I = 50 \times 10^{-6}$m^4.

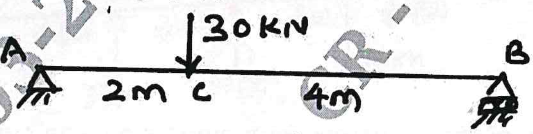

Fig Q4(b) **(10 Marks)**

Module-3

5 a. Determine vertical and horizontal deflections of the bent shown in Fig Q5(a), using Castigliano's method.

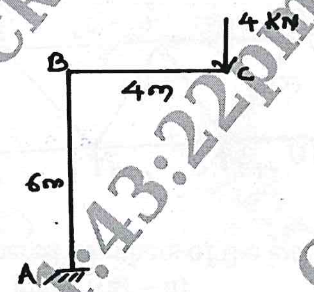

Fig Q5(a) **(12 Marks)**

b. Determine the expression strain energy stored in a member due to flexure, with usual notations. **(04 Marks)**

OR

6 Determine the vertical deflection at the free end of the truss shown in Fig Q6, using unit load method. The cross sectioned areas of members AD and DE are 1500mm^2, while those of other members are 1000mm^2. Take E = 200 kN/mm^2.

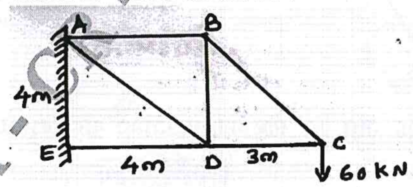

Fig Q6 **(16 Marks)**

Module-4

7 a. A three hinged parabolic arch of span 12m and central rise 3m is subjected to a uniformly distributed load of 30kN/m over its left half portion. Determine vertical reactions and horizontal thrust at the supports. Also determine Bending moment, Normal Thrust and Radial Shear at 3m from the left-hand support. **(12 Marks)**

b. A suspension cable 140m span and 14m central sag, carries a load of 1kN/m. calculate maximum and minimum tension in the cable. Find length of the cable. **(04 Marks)**

OR

8 A three hinged stiffening girder of a suspension bridge, of span 100m is subjected to two concentrated loads of 10kN each, placed at 20m and 40m respectively from the left end support. Determine bending moment and shear force at 30m from the left support. Also determine the maximum and minimum tensions in the supporting cable which has a central dip of 10m. **(16 Marks)**

Module-5

9 a. A simply supported beam has a span of 15m. A uniformly distributed load of 40 kN/m of length 5m passes over the beam from left to right. Using influence line diagram determine maximum bending movement at a section 6m from the left end. **(04 Marks)**

b. Four point loads 16, 30, 30 and 20kN have a centre to centre spacing of 2m between consecutive load and pass over a girder of 30m span from left to right with 20kN load leading. Calculate maximum bending moment and shear force at 8m from the left end, using influence line diagrams. **(12 Marks)**

OR

10 a. A train of concentrated loads shown in Fig Q10(a) move from left to right on a simply supported girder of span 16m. Determine absolute maximum bending moment developed in the beam.

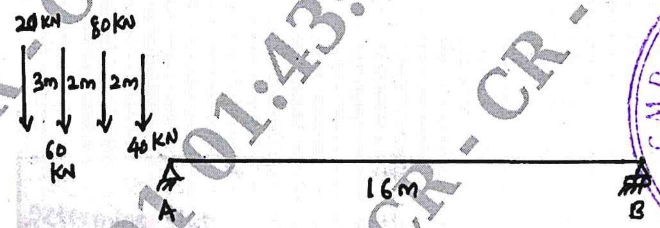

Fig Q10(a) **(08 Marks)**

b. Determine maximum forces in the members CE, DE and DF of the truss shown in Fig Q10(b), due to the dead load of 10 kN/m covering the entire span and a moving load of 20kN/m longer than the span passing over the truss. Consider the loads are transmitted through the lower chord.

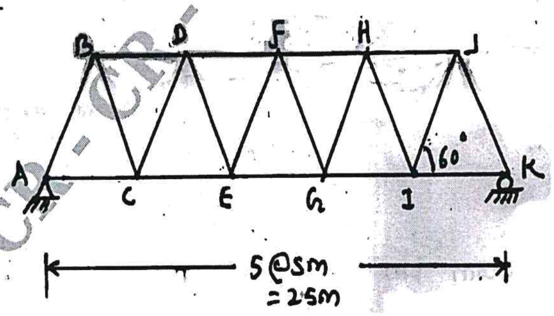

Fig Q10(b) **(08 Marks)**

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