USN [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]   **10CT43**

Fourth Semester B.E. Degree Examination, Dec.2016/Jan.2017
Structural Analysis

Time: 3 hrs.   Max. Marks:100

Note: *Answer FIVE full questions, selecting*
at least TWO questions from each part.

PART – A

1 a. Write a note on conditions of equilibrium and degrees of freedom. **(06 Marks)**
   b. Find the forces in the members EF, EP, EO and PO of the truss shown in Fig Q1(b) by the method of **(14 Marks)**
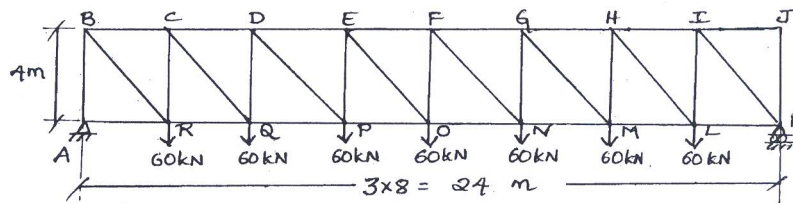

Fig Q1(b)

2 a. Determine the slope at the supports and deflection at the mid span for the beam shown in Fig Q2(a) by moment area method. **(12 Marks)**
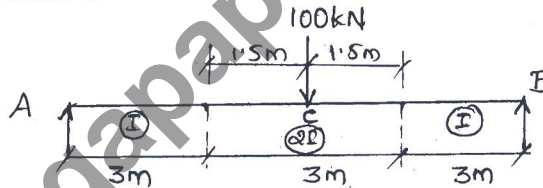

Fig Q2(a)

   b. Calculate the slope and deflection at the free end of the beam shown in Fig Q2(b) by conjugate beam method. **(08 Marks)**
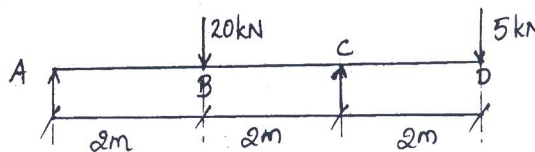

Fig Q2(b)

3 a. State and explain Castiglione's first theorem and Maxwell's theorem of Reciprocal deflection. **(06 Marks)**
   b. Determine the vertical deflection of point D in the truss shown in Fig 3(b). the cross-sectional areas of members AD and DE are $1500mm^2$ while those of the other members are $1000mm^2$. Take $E = 200kN/mm^2$. **(14 Marks)**
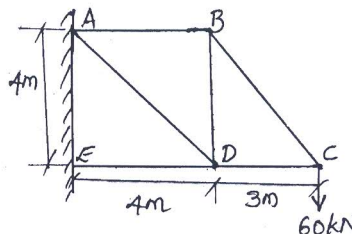

Fig Q3(b)

4 a. A three hinged parabolic arch of 60m span and 15m rise. It has self weight of 15kN/m and a live load of 30kN/m is also applied over the right half portion of span. Determine the bending moment, radial shear and normal thrust at a section 10m from the supports and the magnitude and position of maximum sagging and hogging bending moment in the arch.

(14 Marks)

   b. A suspension cable of span 120m has a central dip of 12m and supports a udl of 15kN/m over entire span.
Find:
   i)   the maximum tension in the cable
   ii) the size of the cable if the permissible stress of the cable material is 200N/mm^2.

(06 Marks)

PART – B

5 a. Determine the reaction components in the propped cantilever shown in Fig Q5(a). EI is constant throughout **(10 Marks)**
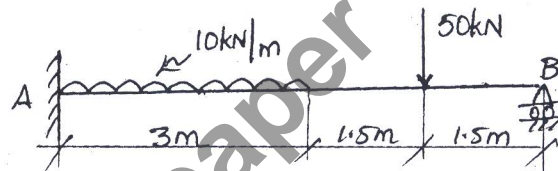

Fig Q5(a)

   b. A cantilever beam as shown supported by a 2n long, 3mm diameter wire CB. Determine the force developed in the wire due to loading shown in Fig Q5(b), if the flexural rigidity of the beam, EI = 5000kNm^2 and the Young's modulus of the wire = 200kN/mm^2 **(10 Marks)**
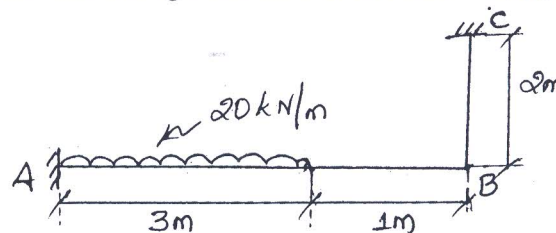

Fig Q5(b)

6   Analyze the continuous beam shown in Fig Q6 by Clopeyron's there moment equation. Draw BMD and SFD. **(20 Marks)**
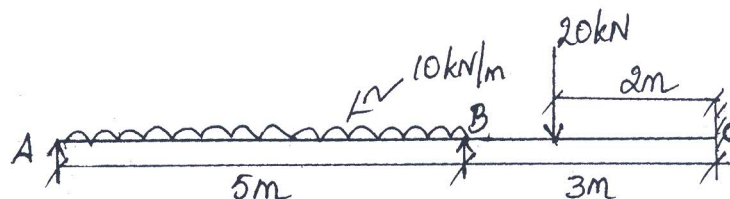

Fig Q6

7   Analyze the frame shown in Fig Q7 by slope deflection method. Draw BMD and elastic curve.   (20 Marks)
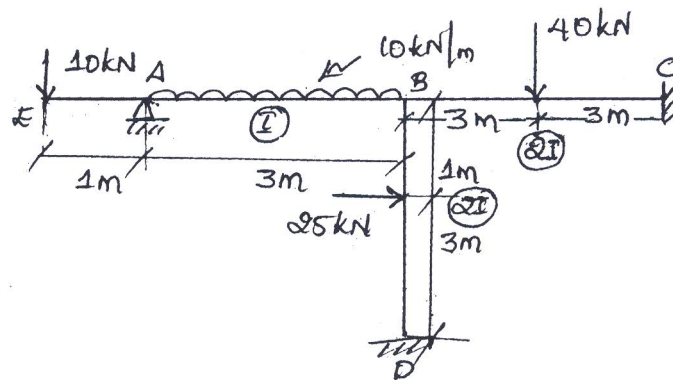

Fig Q7

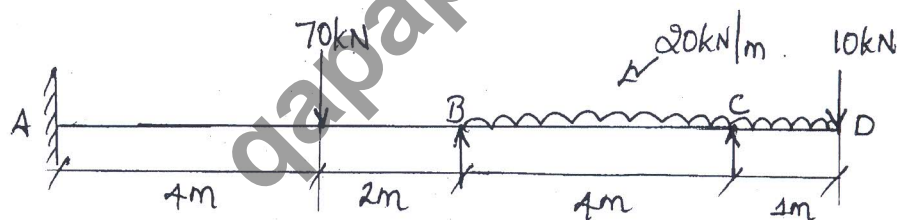8   Analyze the beam shown in Fig Q8 by moment distribution method. Draw DMD and elastic curve.   (20 Marks)

Fig Q8

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