Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FOURTH SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2018

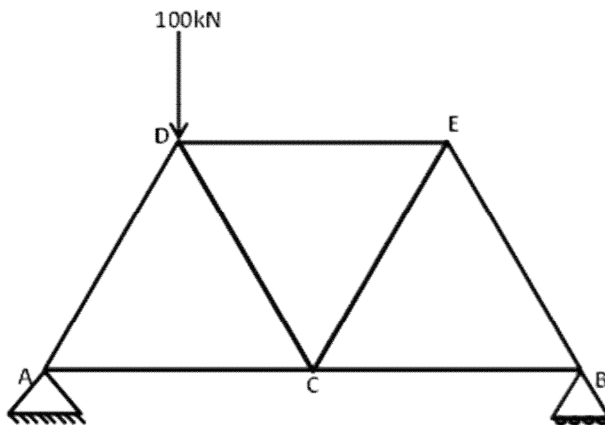**Course Code: CE202**
Course Name: STRUCTURAL ANALYSIS – I (CE)

Max. Marks: 100   Duration: 3 Hours

PART A
Answer any two full questions. Each question carries 15 marks.

1   a)   Briefly explain Castigliano's first and second theorems.   5

      b)   Analyse the pin-jointed truss given below. All members have the same length and   10
cross sectional area. Tabulate the results.

2   a)   Discuss Maxwell's theorem of reciprocal deflection as applied to structural systems.   5

      b)   Determine the horizontal and vertical deflection at point E of the frame shown in   10
figure. Assume uniform flexural rigidity EI.
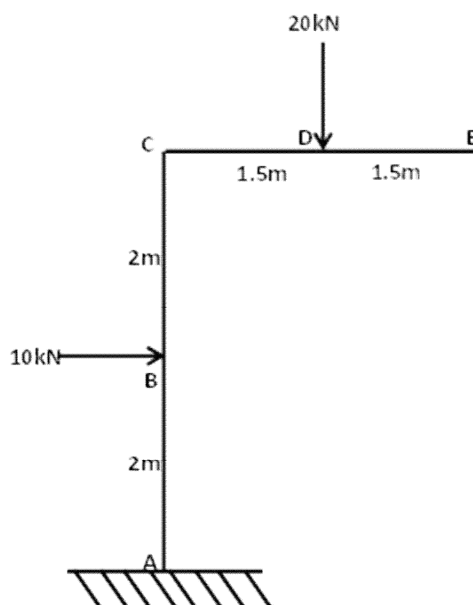
3   a)   Distinguish between force and displacement method of analysis.   5

    b)   Determine the vertical deflection of point D in the pin-jointed truss shown below. The   10
         cross sectional area of members AD and AE are 1500 mm² while those of other   marks
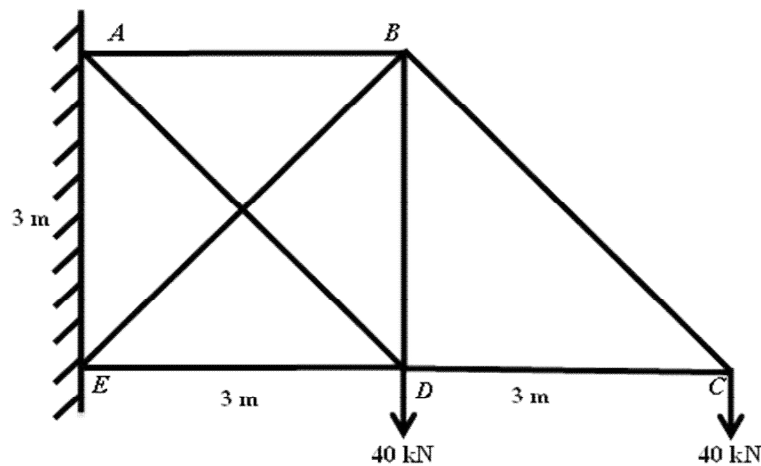   members   are   1000   mm².   Take   modulus   of   elasticity   E   as   200
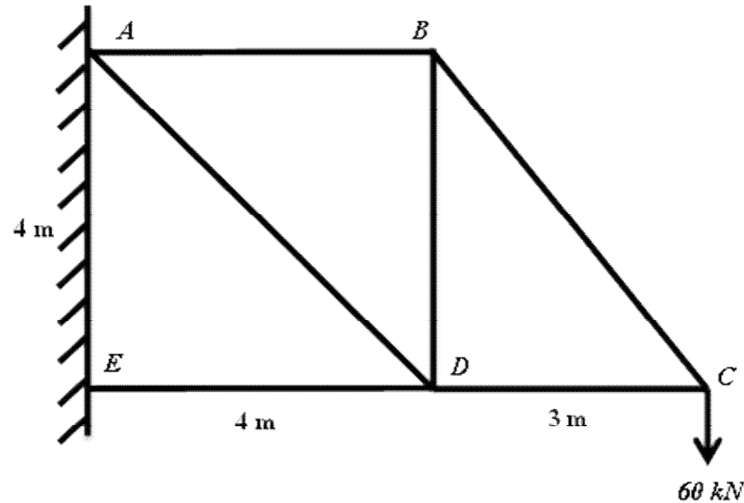

kN/mm².

PART B
Answer any two full questions. Each question carries 15 marks.

4   a)   Describe the steps involved in analysis of indeterminate beams subjected to support   5
         settlement.

    b)   Find the member forces in the pin-jointed truss shown in figure. Tabulate the   10


         results.

5   a)   Describe the steps involved in analysis of indeterminate beams by consistent   5
         deformation method.

    b)   Analyse   the   beam   shown   in   figure   using   consistent   deformation   10

60 kN   30 kN

A   2 m   2 m   B   2 m   C

method.
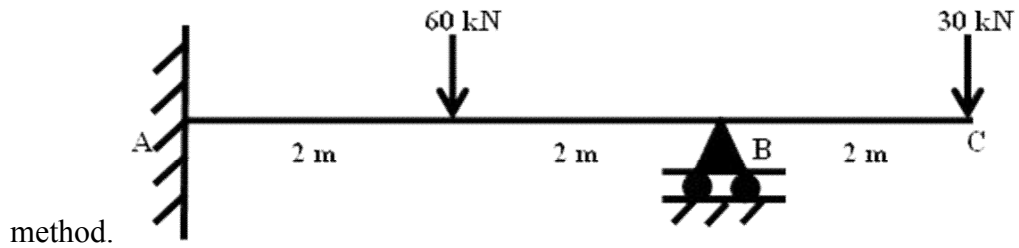
6   a)   Construct ILD for BM at fixed support for a cantilever beam of span 'l'.   5

     b)   A train of concentrated loads moves from left to right on a simply supported girder of   10
          span 16 m as shown in figure. Determine the absolute maximum shear force and
          bending moment developed in the beam.

20 kN   60 kN   80 kN   40 kN

3 m   2 m   2 m

A   B

16 m
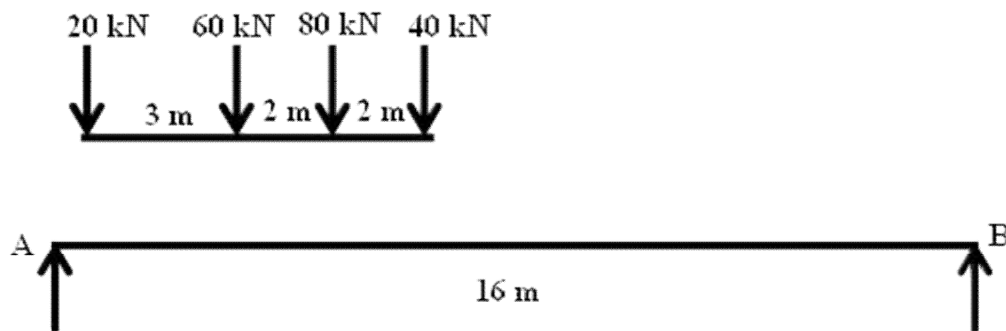
PART C
Answer any two full questions. Each question carries 20 marks

7   a)   With neat sketch, explain the functions of major components of a suspension bridge.   6

     b)   A light cable is supported at two points 20 m apart which are at the same level. The   14
          cable supports three concentrated loads as shown in figure. The deflection at first
          point is found to be 0.8m. Determine the tension in the different segments and the
          total length of the cable.

5 m   5 m   5 m   5 m

A   E

B   D

40 kN   C   20 kN
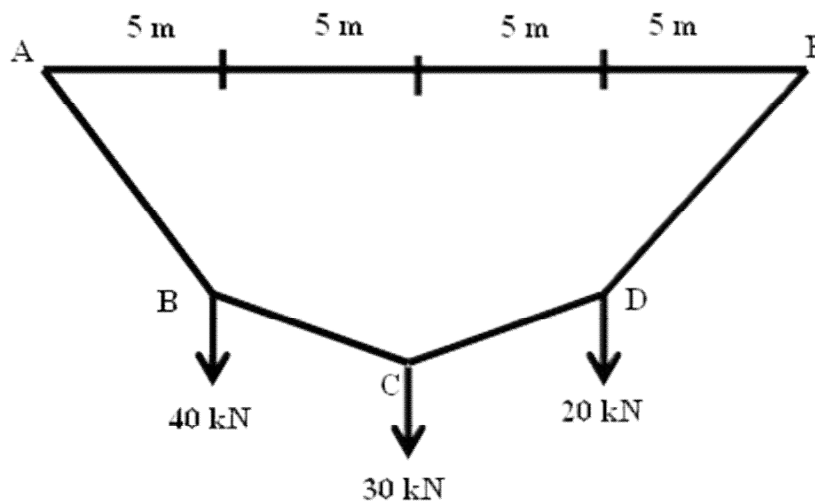
30 kN

8   a)   With neat sketch, discuss the profile/shape of cable subjected to uniformly distributed   5
          load 'w' per unit horizontal length.

    b)   A bridge cable is suspended from towers A and B, 80 m apart and carries a load 30   15
          kN/m on the entire span. If the maximum sag is 8m at point C, calculate the
          maximum tension in the cable. If the cable is supported by saddles which are stayed
          by wires inclined at 30 degrees to the horizontal, determine the forces acting on the
          towers. If the same inclination of back stay passes over pulley, determine the forces
          on the towers.

9   a)   With neat sketches, explain the different types of arches.   6

    b)   A three- hinged circular arch hinged at the springing points A and B and crown point   14
          C, has a span of 40 m and a central rise of 8m. It carries a uniformly distributed load
          20kN/m over the left-half of the span together with a concentrated load of 100 kN at
          the right quarter span point. Find the reactions at the supports, normal thrust, radial
          shear and bending moment at a section D 10 m from the left support.

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