Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FOURTH SEMESTER B.TECH DEGREE EXAMINATION(S), DECEMBER- 2019

Course Code: CE202
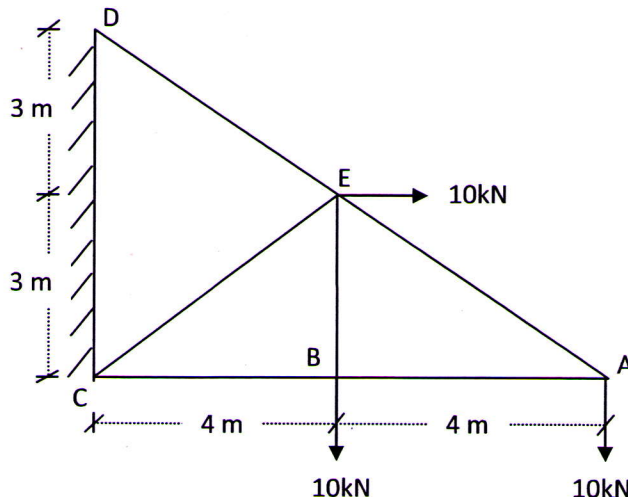**Course Name: STRUCTURAL ANALYSIS – I**

Max. Marks: 100   Duration: 3 Hours

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

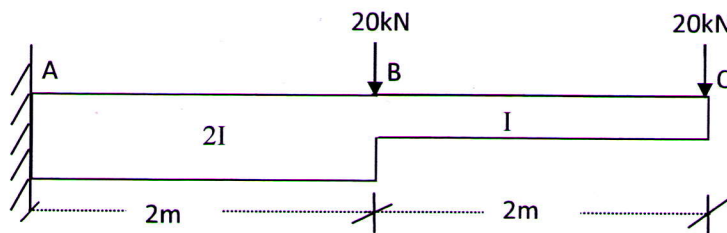|		*Answer any two full questions, each carries 15 marks.*	Marks

1   a)   Analyse the plane truss by method of joints and tabulate the forces in all the members.   (12)


     b)   Explain the 'method of sections' for the analysis of truss.   (3)

2   a)   State Maxwell's law of reciprocal deflections.   (3)

     b)   Determine the vertical deflection at B using unit load method. Cross sectional area of all horizontal members: 50 sq.cm, vertical members and inclined members: 25 sq.cm. E = 200GPa.   (12)
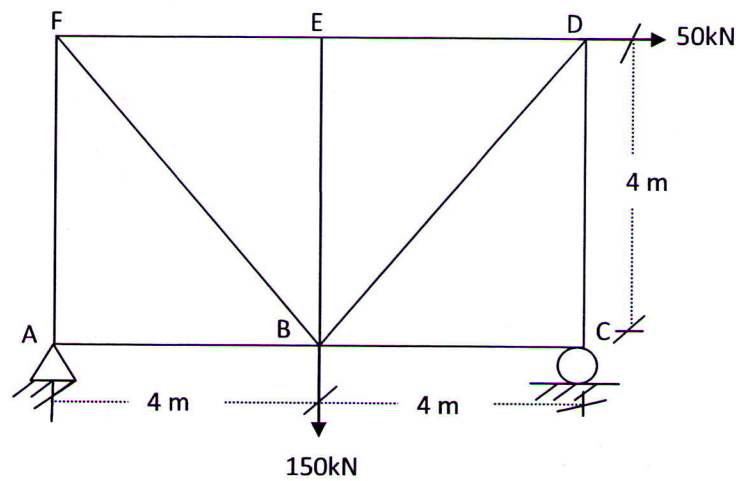
3   a)   Derive the expression for strain energy due to bending moment.   (3)

    b)   Determine the deflection at the free end of the cantilever using strain energy   (10)
   method. Given E= 200GPa, I = 6.67 x 10^7mm^4

    c)   Determine degree of static and kinematic indeterminacy in the structure shown in (2)
   fig. Assume all members are axially rigid.
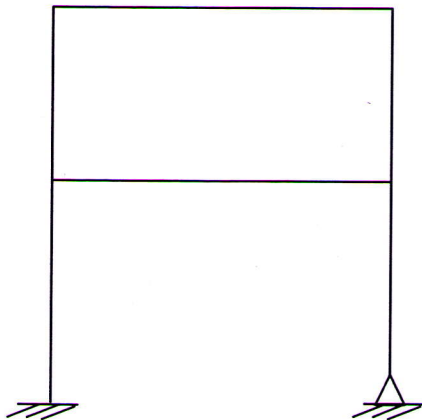
PART B
Answer any two full questions, each carries 15 marks.

4 a) Explain the effect of temperature change in any member of an indeterminate   (5)
        truss.

   b) Determine the support reactions of the beam shown in fig. using the method of   (10)
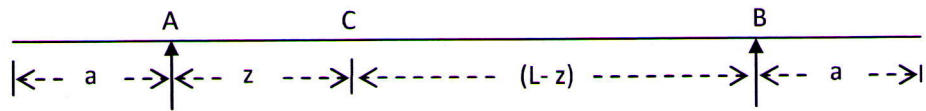   consistent deformation.
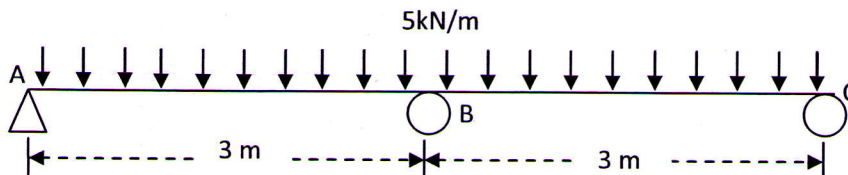
5 a) Three wheel loads, each of magnitude W, are traversing a simply supported beam   (8)
        from left to right. If the distance between consecutive wheel loads is a and span
        of the beam is $2l$, determine the maximum bending moment at mid-span of the
        beam. Given, $a= l/4$

   b) A UDL 2kN/m of length 1.5 m is traversing a simply supported beam of span   (7)
        8m. Determine i) the maximum support reaction ii) Maximum shear force at a
        section 2m from left support. In both the cases, indicate the position of the UDL
        on the span.

6 a) Analyse the frame shown in figure using strain energy method.   (10)
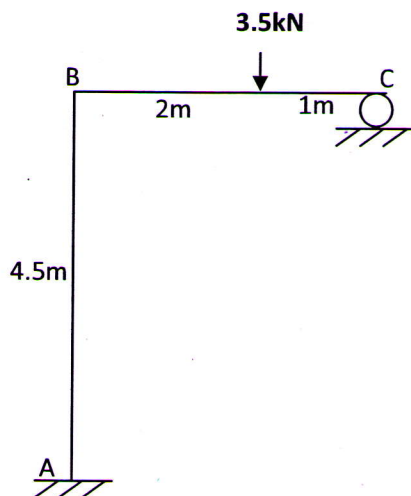
   b) For the overhanging beam AB shown in fig., draw influence line diagram for the   (5)
        following :
        i)Shear force at C   ii) BM at C   iii) Support reaction at A   iv) Support

reaction at B.

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_____
                A           C                         B
               |↑                                    |↑
 |<-- a -->|<-- z --->|<------- (L- z) ------->|<-- a -->|
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PART C
Answer any two full questions, each carries 20 marks.

7 a) A cable is suspended between two supports 120m apart, at the same level. It   (12)
      carries a UDL of 25kN/m over the entire span. The dip of the cable is 10m. Find
      i) the length of the cable ii) tension in the cable at the support iii) lowest tension
      in the cable.

   b) Explain the various components of a suspension bridge with the help of a neat   (8)
      figure.

8 a) A 3-hinged parabolic arch has a span of 18m and a rise of 6m. The arch is hinged   (15)
      at the springing A and B and at the crown C. It carries a UDL of 20kN/m over
      the left half of the span and a point load of 100kN at 4.5m from the right support
      B. Find the bending moment, normal thrust and radial shear at a section 3m from
      left end.

   b) Draw the influence line diagram for bending moment at any section of a three   (5)
      hinged arch.

9 a) A cable is suspended between two supports 120m apart, at the same level. It   (10)
      carries two concentrated loads each of 5kN at points 30m and 90m from left
      support. The length of the cable is 160m. Determine i) the support reactions ii)
      tension in various portions of the cable.

   b) A 3-hinged semi-circular arch of radius R carries a UDL of w/ unit run over the   (10)
      whole span. Find i) horizontal thrust at each support ii) location and magnitude
      of maximum bending moment.

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