

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

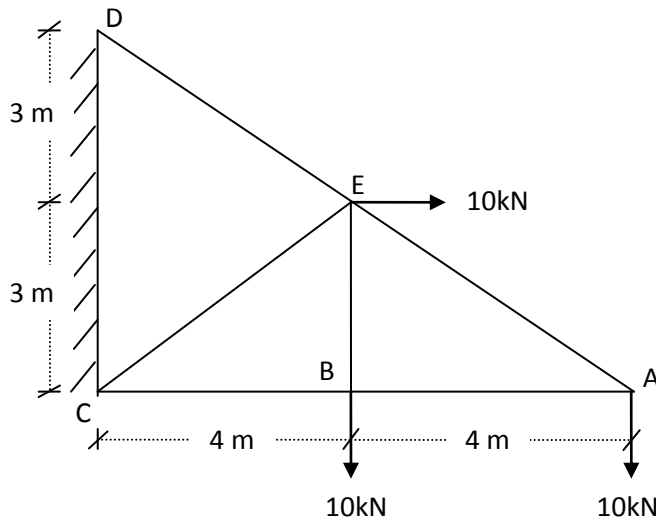
PART A

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

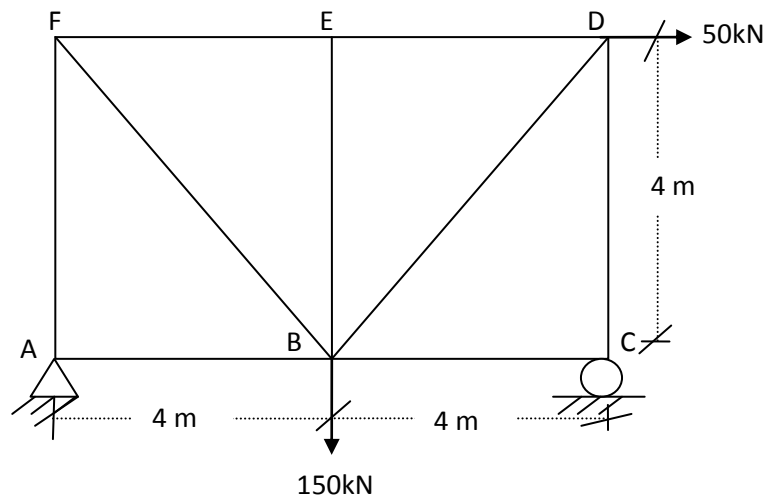
Answer any two full questions, each carries 15 marks.

Marks

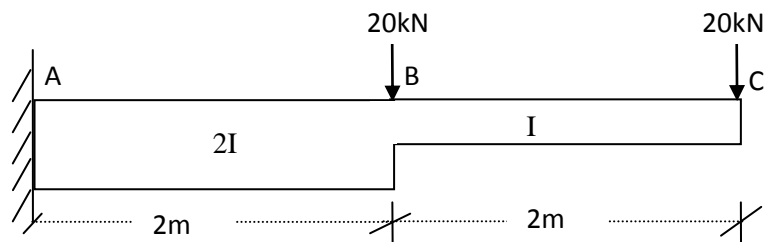
- 1 a) Analyse the plane truss by method of joints and tabulate the forces in all the members. (12)



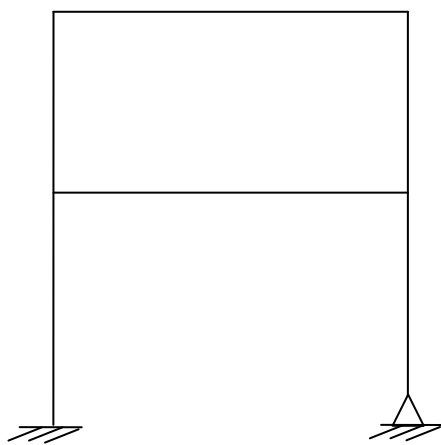
- b) Explain the 'method of sections' for the analysis of truss. (3)
- 2 a) State Maxwell's law of reciprocal deflections. (3)
- b) Determine the vertical deflection at B using unit load method. Cross sectional area of all horizontal members: 50 sq.cm, vertical members and inclined members: 25 sq.cm. $E = 200\text{GPa}$. (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 method. Given $E = 200 \text{ GPa}$, $I = 6.67 \times 10^7 \text{ mm}^4$ (10)



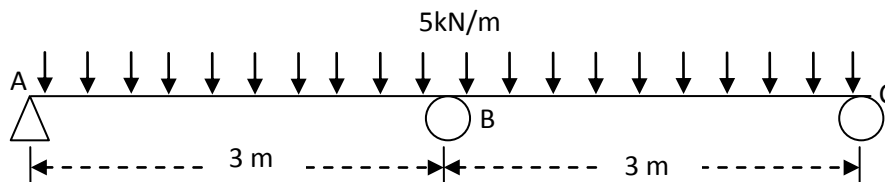
- c) Determine degree of static and kinematic indeterminacy in the structure shown in fig. Assume all members are axially rigid. (2)



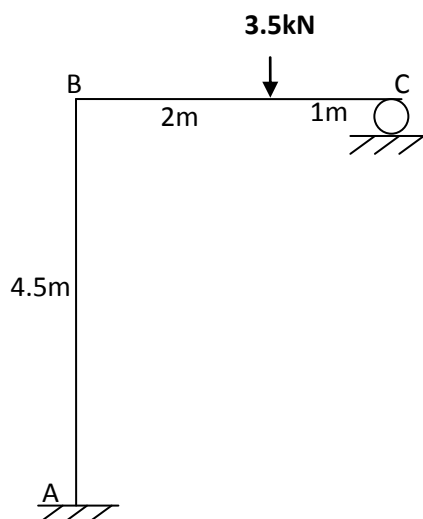
PART B

Answer any two full questions, each carries 15 marks.

- 4 a) Explain the effect of temperature change in any member of an indeterminate truss. (5)
- b) Determine the support reactions of the beam shown in fig. using the method of consistent deformation. (10)

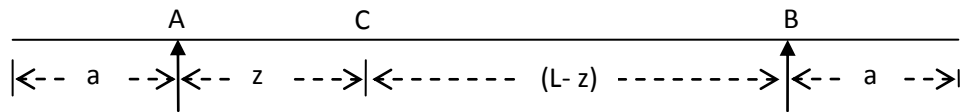


- 5 a) Three wheel loads, each of magnitude W , are traversing a simply supported beam from left to right. If the distance between consecutive wheel loads is a and span of the beam is $2l$, determine the maximum bending moment at mid-span of the beam. Given, $a = l/4$ (8)
- b) A UDL 2 kN/m of length 1.5 m is traversing a simply supported beam of span 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. (7)
- 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 following : (5)
- i) Shear force at C ii) BM at C iii) Support reaction at A iv) Support

reaction at B.



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 carries a UDL of 25kN/m over the entire span. The dip of the cable is 10m. Find (12)
 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 figure. (8)
- 8 a) A 3-hinged parabolic arch has a span of 18m and a rise of 6m. The arch is hinged 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. (15)
- b) Draw the influence line diagram for bending moment at any section of a three hinged arch. (5)
- 9 a) A cable is suspended between two supports 120m apart, at the same level. It 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. (10)
- b) A 3-hinged semi-circular arch of radius R carries a UDL of w / unit run over the whole span. Find i) horizontal thrust at each support ii) location and magnitude of maximum bending moment. (10)
