

Reg No.: \_\_\_\_\_

Name: \_\_\_\_\_

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  
**FOURTH SEMESTER B.TECH DEGREE EXAMINATION, JULY 2017**

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

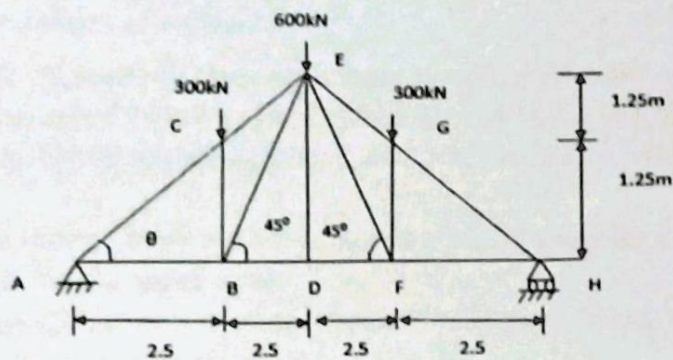
Max. Marks: 100

Duration: 3 Hours

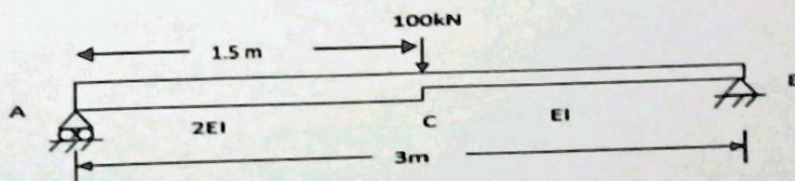
**PART A**

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

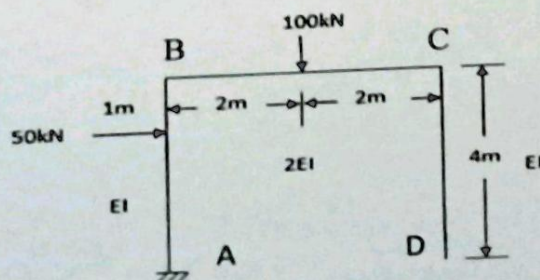
- 1 a) Explain the method of sections. (5)  
 b) Analyse the pin jointed truss as shown by the method of joints. (10)



- 2 a) Explain Maxwell's law of reciprocal deflection. (5)  
 b) Find the deflection at C of the beam as shown in figure by strain energy method. (10)

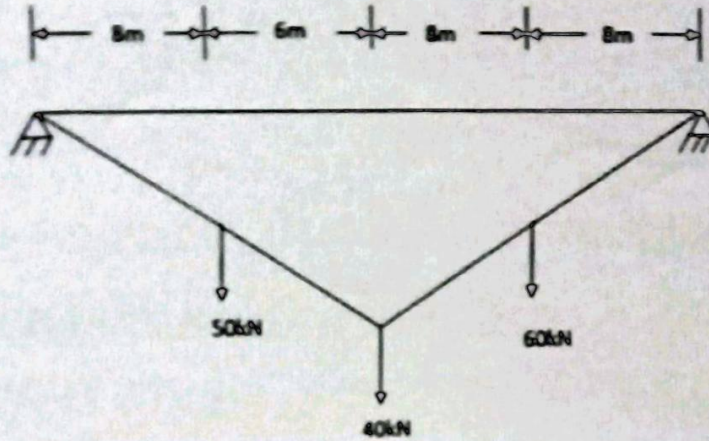


- 3 a) Differentiate between static and kinematic indeterminacy with examples. (5)  
 b) Find the vertical deflection at the free end of the frame loaded as shown by unit load method. (10)





- c) A light cable is supported at two points 30m apart which are at the same level. The cable supports three concentrated loads as shown. The deflection at first point is 1m. Determine the tension in the different segments and total length of the cable. (12)



- 8 a) State Eddy's theorem. (3)  
 b) What are the advantages of arches? (5)  
 c) Draw the bending moment diagram for a three-hinged symmetric parabolic arch of span 50m rise 10m subjected to a concentrated load of 50 kN acting at 8m from left support and a uniformly distributed load of 25 kN/m acting over the right half portion. (12)
- 9 a) Show that the parabolic shape is a funicular shape for a three-hinged arch subjected to UDL for the entire span. (6)  
 b) Draw the influence lines for horizontal thrust 'H', Moment at any section and radial shear for a three-hinged arch of span L and rise 'h'. (14)
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Reg No.: \_\_\_\_\_

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

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

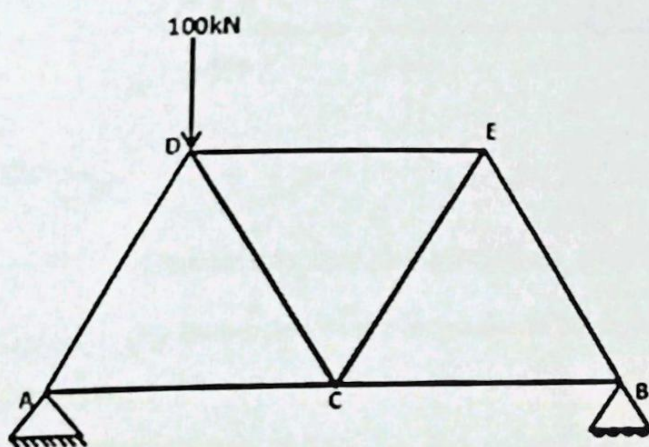
Max. Marks: 100

Duration: 3 Hours

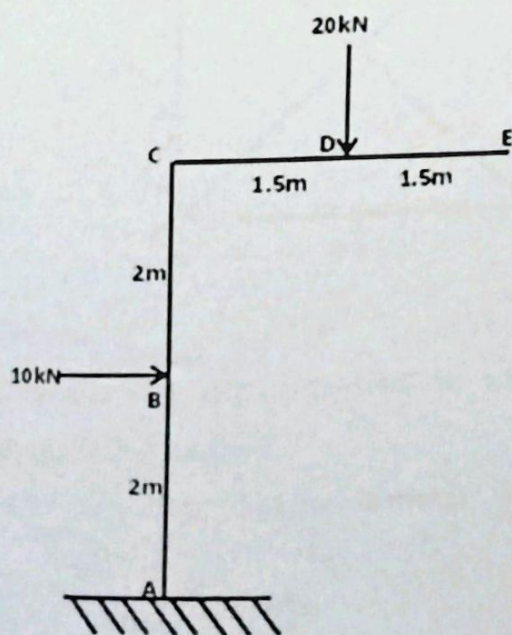
**PART A**

*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 cross sectional area. Tabulate the results. 10



- 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 figure. Assume uniform flexural rigidity EI. 10

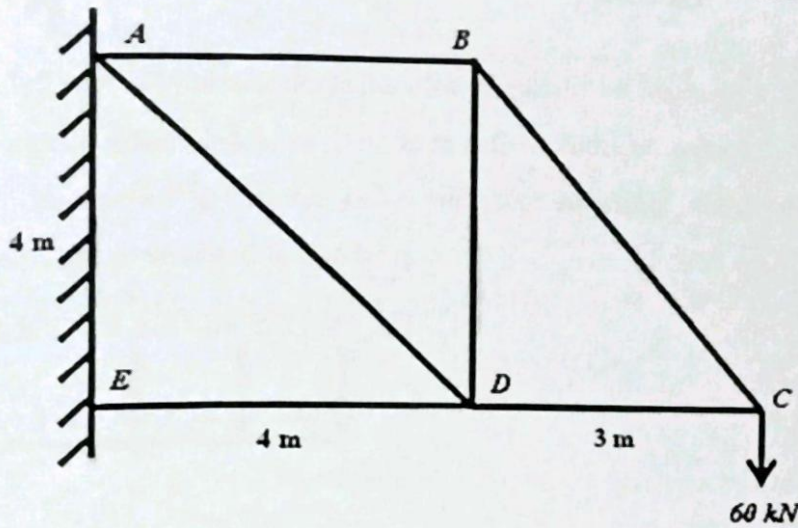




B

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 cross sectional area of members AD and AE are  $1500 \text{ mm}^2$  while those of other members are  $1000 \text{ mm}^2$ . Take modulus of elasticity  $E$  as  $200 \text{ kN/mm}^2$ . 10 marks

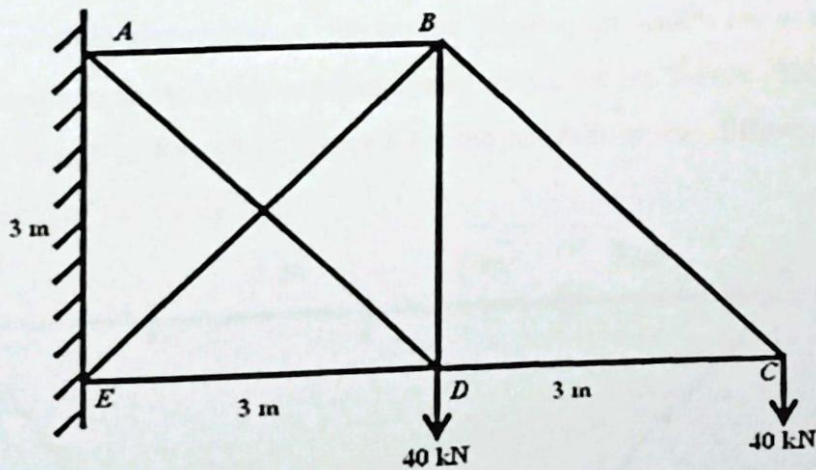


$\text{kN/mm}^2$ .

**PART B**

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

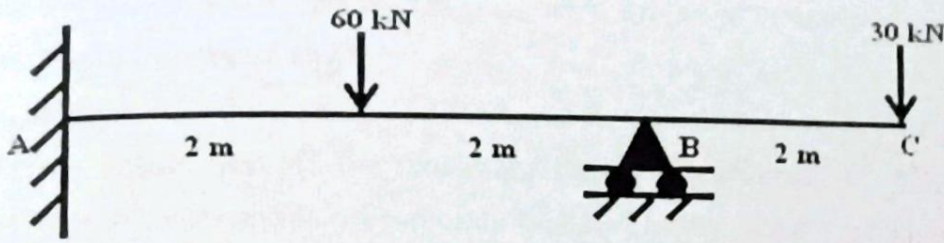
- 4 a) Describe the steps involved in analysis of indeterminate beams subjected to support settlement. 5
- b) Find the member forces in the pin-jointed truss shown in figure. Tabulate the results. 10



results.

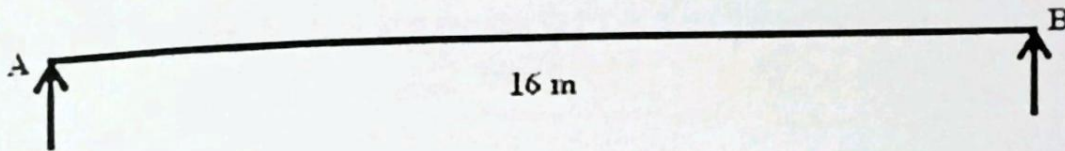
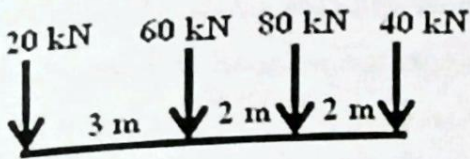
- 5 a) Describe the steps involved in analysis of indeterminate beams by consistent deformation method. 5
- b) Analyse the beam shown in figure using consistent deformation method. 10





method.

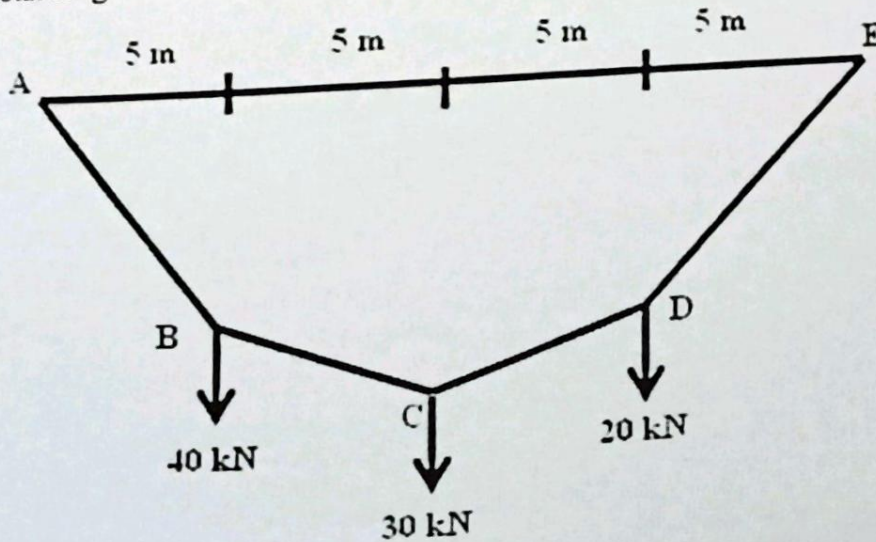
- 6 a) Construct ILD for BM at fixed support for a cantilever beam of span 'l'. 5  
 b) A train of concentrated loads moves from left to right on a simply supported girder of span 16 m as shown in figure. Determine the absolute maximum shear force and bending moment developed in the beam. 10



**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 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. 14





- a) With neat sketch, discuss the profile/shape of cable subjected to uniformly distributed load 'w' per unit horizontal length. 5
- b) A bridge cable is suspended from towers A and B, 80 m apart and carries a load 30 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. 15
- 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 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. 14

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**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  
**FOURTH SEMESTER B.TECH DEGREE EXAMINATION, MAY 2017**

Course Code: CE202

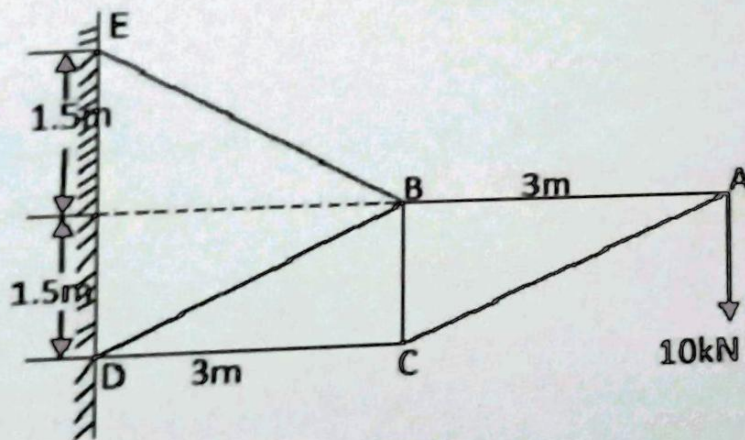
Course Name: STRUCTURAL ANALYSIS – I (CE)

Max. Marks: 100

Duration: 3 Hours

**PART A***Answer any TWO questions. 15 marks each.*

- Enumerate the methods of analysing a determinate truss and illustrate along with sketches, the significance of the methods. (7)
  - Using Castigliano's theorem, determine the deflection under the load. A simply supported beam of span 'L' carries a concentrated load P at a distance 'a' from left hand support. Assume uniform flexural rigidity. (8)
- Elucidate Maxwell's theorem of reciprocal deflection and Betti's theorem. (5)
  - Differentiate static and kinematic indeterminacies with one example each. (5)
  - Demonstrate unit load method as applied to the analysis of a rigid frame. (5)
- Analyse the pin jointed frame and tabulate the results.



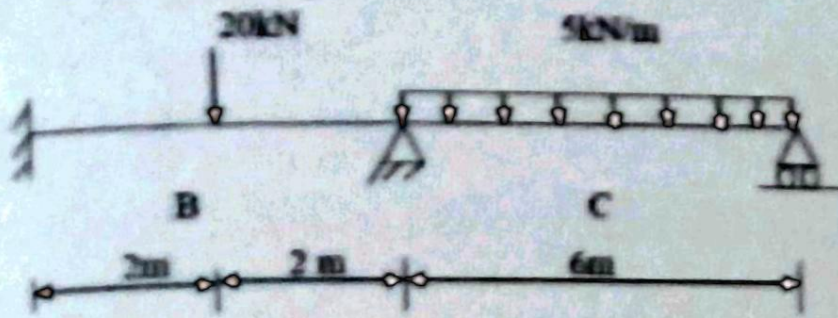
(15)

**PART B***Answer any TWO questions. 15 marks each.*

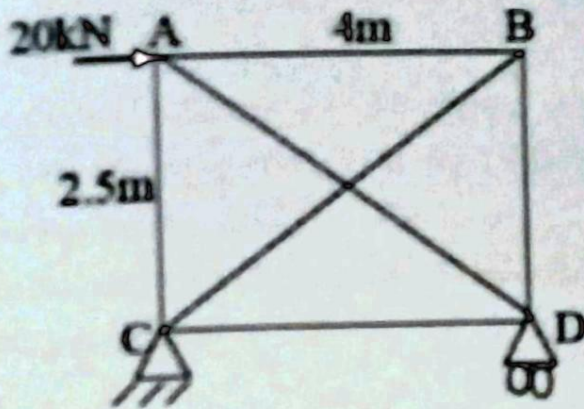
- Determine the reaction components in the beam shown using Consistent deformation method. EI is constant throughout.

(15)



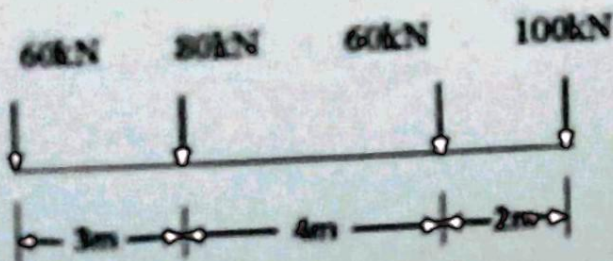


5. Compute the forces in the members. Given for all members, cross-sectional area =  $1000 \text{ mm}^2$ , Young's modulus =  $200 \text{ kN/mm}^2$ .



(15)

6. A load system as shown crosses a girder of span 25m from right to left with 60kN load leading. Find the max. BM at 15m from left end. Also find the absolute maximum BM and state where it occurs.



(15)

PART C

Answer any TWO questions. 20 marks each.

7. a) Justify that an arch is more economical compared to a SS beam of same span carrying the same load. (6)



- b) A 3 hinged parabolic arch has a horizontal span of 36m with a central rise of 5m. A udl of 1kN/m acts at right half of the span. Calculate the magnitude and position of maximum positive BM in the arch. Also calculate the BM, NT and RS at left quarter point. (14)
8. a) A bridge cable is suspended from towers 80 m apart and carries a load of 30 kN/m on the entire span. If the maximum sag is 8 m, calculate the maximum tension in the cable. If the cable is supported by saddles which are stayed by wires inclined at  $30^\circ$  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. Height of the tower is 10m. (14)
- b) Illustrate Eddy's theorem in arches. (6)
9. a) A 3 hinged semi-circular arch ACB of uniform section and radius 'r' carries a udl of w/m run over the whole span. Find the position and magnitude of maximum bending moment. Draw the BMD. (14)
- b) For a cable carrying concentrated loads, estimate the maximum and minimum tensions and their locations. (6)

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