

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

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

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  
**FOURTH SEMESTER B.TECH DEGREE EXAMINATION(R&S), MAY 2019**

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

Max. Marks: 100

Duration: 3 Hours

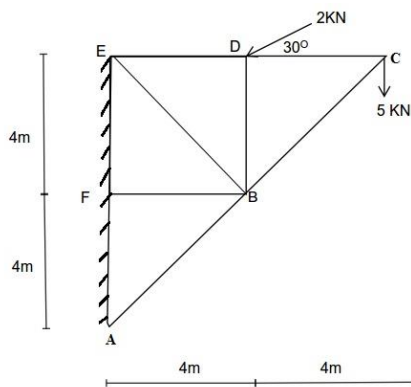
**PART A**

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

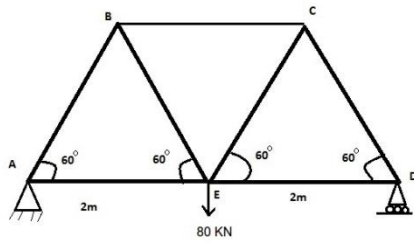
*Answer any two full questions, each carries 15 marks.*

Marks

- |   |   |    |
|---|---|----|
| 1 | a) Distinguish between method of joints and method of sections used in the analysis of pin jointed framed structures. | 5  |
|   | b) Analyse the truss shown in figure by method of sections  | 10 |



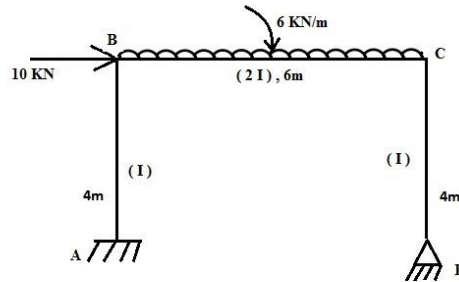
- |   |  |    |
|---|--|----|
| 2 | a) Derive an expression for strain energy due to bending of a beam subjected to general loading  | 4  |
|   | b) Explain Castigliano's theorems with the help of sketches  | 4  |
|   | c) State Betti's theorem   | 4  |
|   | d) Explain the Principle of least work   | 3  |
| 3 | a) Describe static and kinematic indeterminacies with the help of examples   | 5  |
|   | b) Determine the vertical displacement of joint E of truss shown in figure by unit load method. Given, for all members cross sectional area = 1000mm <sup>2</sup> , Young's modulus = 200 kN/mm <sup>2</sup> | 10 |



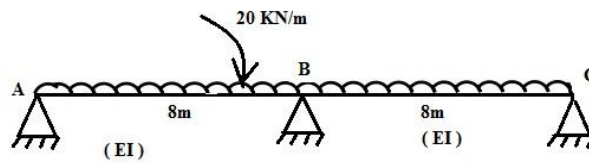
**PART B**

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

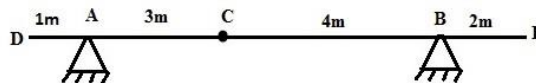
- 4 a) Describe the steps involved in the analysis of indeterminate beams subjected to support settlement 5  
 b) Analyse the frame shown in figure using consistent deformation method. Draw the bending moment diagram. 10



- 5 a) Analyse the beam shown in figure by strain energy method and draw the bending moment diagram. 9

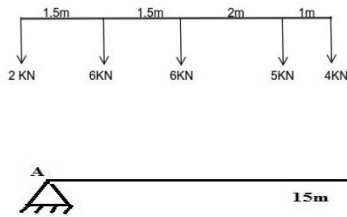


- b) Draw the influence lines for shear force and bending moment at a point C of the beam shown in figure 6



- 6 a) What are influence lines? What are its advantages? 3  
 b) A train of concentrated loads moves from left to right on a simply supported girder of span 15 m, and 4kN load leading as shown in figure. Determine the 12

maximum shear force and the maximum bending moment at a section 4m from left support.



### PART C

*Answer any two full questions, each carries 20 marks.*

- 7 a) With the help of a sketch, explain the various steps involved in the analysis of a loaded cable 8
- b) A light cable is supported at two points 20m apart which are at the same level. The cable supports three concentrated loads of magnitudes 20 kN, 30 kN and 25 kN at points 1,2 and 3 respectively. The points 1,2 and 3 are at distances 5m, 10m,15 m respectively from the left support. The deflection at first point is found to be 0.8m. Determine the tension in the different segments and total length of the cable. 12
- 8 a) Explain with the help of sketches, the different types of arches. 8
- b) A flexible suspension cable of weight 0.75 N/m hangs between two vertical walls 60m apart, the left hand end being attached to the wall at point 10m below the right hand end. A concentrated load of 100 N is attached to the cable in such a manner that the point of attachment of the load is 20m horizontally from the left hand wall and 5m below the left hand support. Show that the maximum resultant cable tension is at the right hand end and find its value. The cable weight may be taken as uniformly distributed horizontally. 12
- 9 a) State Eddy's theorem 5
- b) A parabolic three hinged arch carries a udl of 30 kN/m on the left half of the span. It has a span of 16 m and a central rise of 3 m. Determine the resultant reactions at the supports. Find the bending moment, normal thrust and radial shear at a section 2m from left support. 15

\*\*\*\*