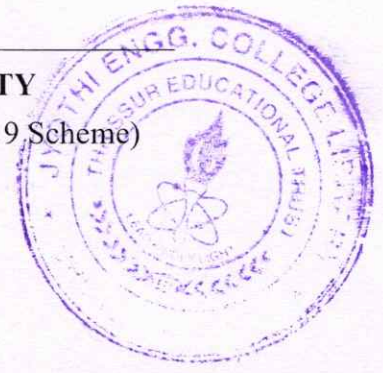


Reg No.: \_\_\_\_\_

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

**1100CET301122103****APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**

B.Tech Degree S5 (S, FE) / S3 (PT) (S) Examination June 2024 (2019 Scheme)

**Course Code: CET 301****Course Name: STRUCTURAL ANALYSIS - I**

Max. Marks: 100

Duration: 3 Hours

**PART A***(Answer all questions; each question carries 3 marks)*

Marks

- |    |  |     |
|----|--|-----|
| 1  | Explain arches and its parts with a neat figure  | (3) |
| 2  | Explain the method of joints to analyse trusses  | (3) |
| 3  | Differentiate force method and displacement method   | (3) |
| 4  | Write the equation for<br>(i) stiffness at the near-end for a beam with hinged far-end<br>(ii) stiffness at the near-end for a beam with fixed far-end   | (3) |
| 5  | Explain about the lack of fit of an indeterminate frame  | (3) |
| 6  | Write the steps for slope deflection method to analyse beams   | (3) |
| 7  | Write the condition for maximum BM, maximum negative SF, maximum positive SF when a moving UDL longer than the span of a simply supported beam   | (3) |
| 8  | If the cable is connected to guided pully support, write the equation for<br>(i) Vertical force on the tower in a suspension bridge<br>(ii) Horizontal force on the tower in a suspension bridge | (3) |
| 9  | Derive an expression for deflection at the free end of a cantilever beam of span $l$ with a concentrated load of $w$ kN at the free end by using Castigliano's theorem                           | (3) |
| 10 | Write the equation for support reactions and $H$ , when cable is subjected to a UDL of $w$ kN/m over the span  | (3) |

**PART B***(Answer one full question from each module, each question carries 14 marks)***Module -1**

- |    |   |      |
|----|---|------|
| 11 | Determine the rotation at the supports and deflection at the mid span and under the loads in a simply supported beam. | (14) |
|----|---|------|

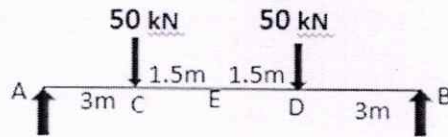


Figure 1

- 12 a) Find the forces in the member CD, DG, GH by using method of section (10)

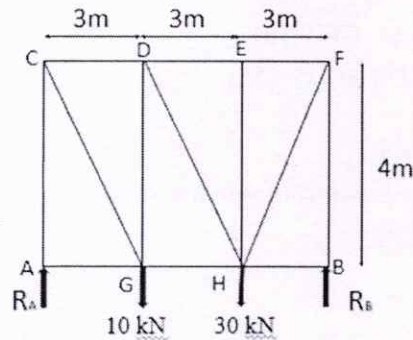


Figure 2

- b) State and prove Castigliano's theorem for deflection (4)

**Module -2**

- 13 Analyse the beam using consistent deformation method (14)

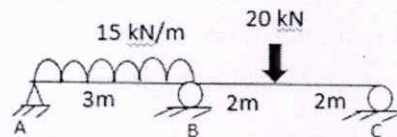


Figure 3

- 14 Determine the deflection and rotation at the free end by using unit load method. Assume uniform flexural rigidity EI throughout. (14)

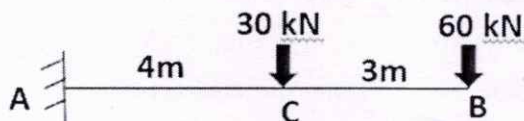


Figure 4

**Module -3**

- 15 Analyse the beam and Draw SFD and BMD using moment distribution method (14)

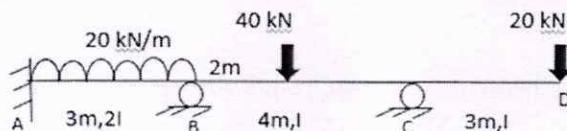


Figure 5

- 16 Analyse the beam and Draw SFD and BMD using slope deflection method (14)

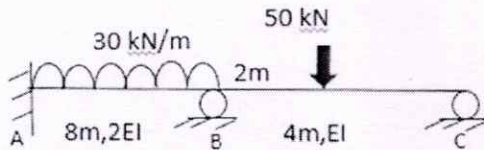


Figure 6

**Module -4**

- 17 a) A cable is suspended from the point A and B which are 100m apart horizontally and at different levels, the point A being 5m vertically higher than the point B and the lowest point in the cable is 10m below A. the cable subjected to a UDL of 60 kN/m over the horizontal span. Find (i) the maximum tension in the cable ii) the vertical and horizontal reactions at the each end. (10)
- b) Write a note on anchor cable supports. (4)
- 18 A cable of span 60meter is supporting four concentrated loads 30kN, 40kN, 10kN and 20kN respectively at points C, D, E, and F which are 10m, 20m 30m and 40m from left support. Both supports are in same level. Dip of point D is 8m. Calculate the support reactions and the tensions in the various parts of the cable. Also find the length of the cable. (14)

**Module -5**

- 19 a) A simply supported beam has a span of 20m.UDL of 60 kN/m and 8m long crosses the girder from left to right. Draw ILD for SF and BM at a section 8m from left end. Calculate the maximum positive shear force, maximum negative shear force, and maximum bending moment at this section (10)
- b) Draw ILD for SF and BM at any intermediate section of a simply supported beams (4)
- 20 a) A three hinged parabolic arch hinged at the supports and at the crown has a span of 30m and a central rise of 5m. it carries a concentrated load of 60kN at 18m from left support and a uniformly distributed load of 40 kN/m over the left half portion. Determine the moment, normal thrust, and radial shear at a section of 7.5m from the left support. (7)
- b) Show that the parabolic shape is a funicular shape for a three hinged arch subjected to UDL over to its entire span (7)

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