R18 Regulation *Subject code:* **2P4AD**

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A' Grade)

B.Tech IV Semester Regular/Supplementary Examinations, July 2021

STRUCTURAL ANALYSIS-I

(CIVIL ENGINEERING)

Maximum Marks: 70 Date:04.08.2021 Duration: 3 hours

Note: **1.This question paper contains two parts A and B.**
2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit which carries 10M.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks **(10x2M=20 Marks)**

1 Distinguish between static and kinematic indeterminacy.
2 Show the propped reaction of a propped cantilever using energy method when it is subjected to a uniformly distributed load over the entire span.
3 List the various method of computing the joint deflection of a perfect frame.
4 Distinguish between pin jointed and rigid jointed structures.
5 State Castigliano's first theorem.
6 Distinguish between two hinged and three hinged arches.
7 List the advantages of slope deflection method.
8 Write down the formula for the support reactions in a fixed beam when one of its supports sinks.
9 What are the uses of influence line diagram?
10 State Muller-Breslau principle.

Part-B

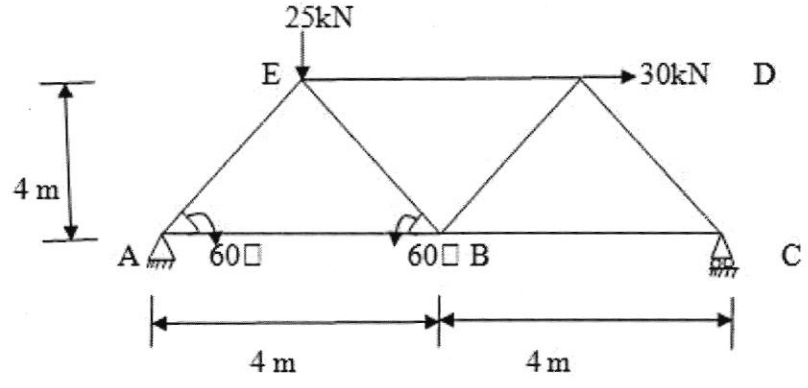
Answer All the following questions. (5X10M=50Marks)

11 A propped cantilever of span 6m is subjected to a udl of 2 kN/m over a length of 4m from the fixed end. Determine the prop reaction and draw the shear force and bending moment diagrams. (10M)

OR

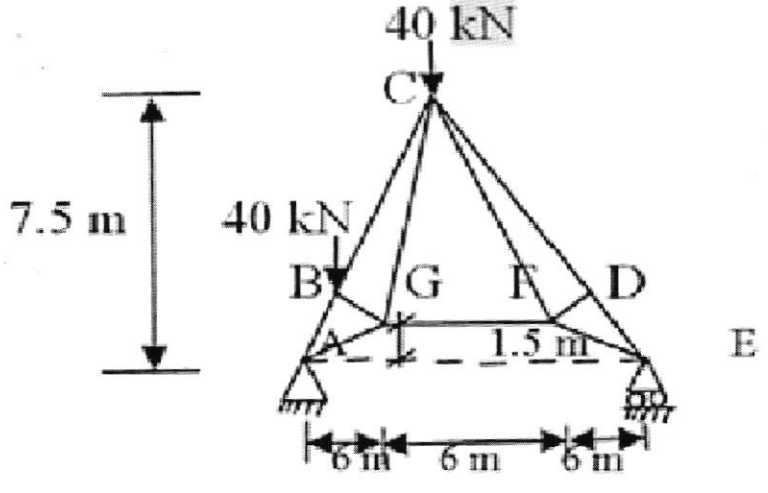
12 A fixed beam of 5 m length is loaded with equal point loads of 130 kN each at a distance of 1.5 m from each support, calculate deflection, draw BMD and SFD. $E = 2 \times 10^8$ kN/m^2, $I = 1 \times 10^8$ mm^4 (10M)

13 Determine the forces in the members by using the method of joints as shown in figure. Tabulate the results and also indicate the members, whether tension or compression. (10M)



OR

14 Determine the unknown forces in the members of truss CD, CF and GF by using method of section. Figure is given below. Tabulate the results and also indicate the members, whether tension or compression. (10M)

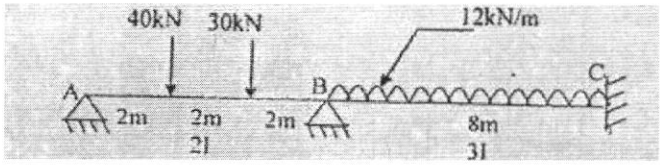


15 A beam simply supported over a span of 3m carries a UDL of 20 kN/m over the entire span. The flexural rigidity EI = 2.25 MN/m^2 Using Castigliano's theorem, determine the deflection at the center of the beam. (10M)

OR

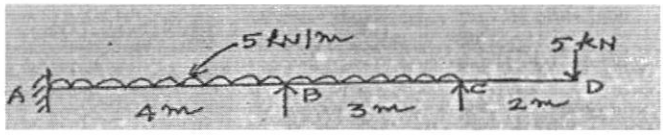
16 A three hinged parabolic arch of span 16m and rise 4m is subjected to two point loads of 100 kN and 80 kN at the left and right quarter span points respectively. Examine and find the reaction at the supports. Find also the bending moment, radial shear and normal thrust at 6m from left support. (10M)

17 Analyse the continuous beam ABC shown in fig. by slope deflection method .Take EI=Constant. Also sketch the Bending Moment diagram. (10M)



OR

18 Analyse the continuous beam ABCD shown in fig. by moment distribution method .Take EI=Constant. Also sketch the Bending Moment diagram. (10M)



19 Two point loads of 100 kN and 200 kN spaced at 3 m apart cross a girder of span 12 m from left to right with the 100 kN leading. Draw the ILD for shear force and bending moment and find the values of maximum shear force and bending moment at a section 4 m from the left hand support. Also evaluate the absolute maximum bending moment due to the given loading system. (10M)

OR

20 A simply supported beam has a span of 16 m, and is subjected to a UDL of 8 kN/m (longer than the span) travelling from left to right. Draw the ILD for shear force and bending moment at a section 4 m from the left end. Use these diagrams to determine the maximum shear force and bending moment at the section. (10M)