*R20 Regulation* *Subject code: 3P4AE*

# TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

## B.Tech IV Semester Regular Examinations, July 2022

## STRUCTURAL ANALYSIS-I

(CIVIL ENGINEERING)

***Maximum Marks: 70*** Date:30.07.2022 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 Differentiate the statically determinate structures and indeterminate structures.
2 What is propped cantilever beam?
3 What are the types of frames?
4 Define tension co-efficient.
5 Define strain energy.
6 State the Castigliano's first theorem.
7 What are the sign conventions used in slope deflection equations and write the equations
8 What is meant by continuous beam?
9 State Muller Breslau's principle.
10 What is the use of an influence line diagram (ILD)?

Part-B

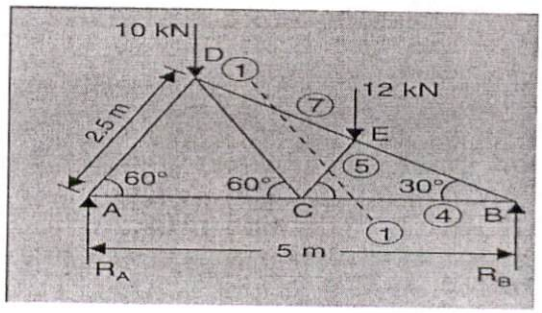
Answer All the following questions. (10MX 5=50Marks)

11 A propped cantilever of the span of 9 m having the prop at the end is subjected to two concentrated loads of 24 kN and 48 kN at 3m and 6m, respectively, from left fixed end support. Calculate the maximum deflection, also draw the shear force and bending moment diagram with salient points. [10]

OR

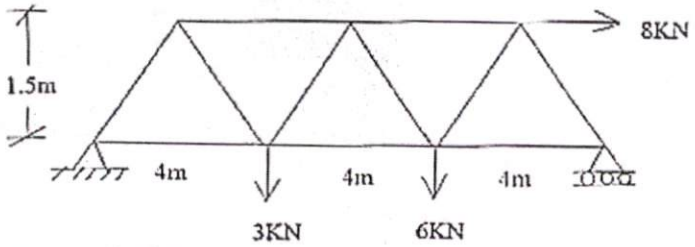
12 Derive an expression for the prop reaction in a cantilever carrying a UDL over the entire span and propped at the free end. [10]

13 For truss shown in fig. Determine reactions at two supports A and B. Find forces in members 4,5 & 7.




OR

14 Determine the forces using method of joints. [10]




15 A symmetrical three-hinged parabolic arch has a span of 13 m and a rise to the central hinge of 3 m. it carries a vertical load of 15 kN at 3 m from the left-hand end. Find [10]

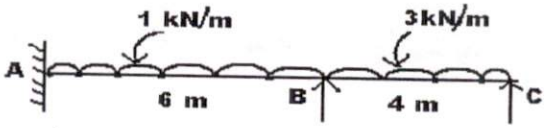
i. The reactions at the supports,
ii. The magnitude of the thrust at the springing,
iii. Bending moment at 5 m from the left-hand hinge and
iv. The maximum positive and negative bending moment.

OR

16 a) Derive the strain energy equation due to axial loading. [4]

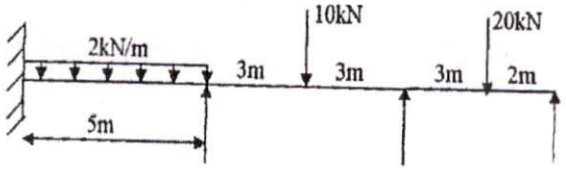
b) Analyze a continuous beam simply supported at A,B and C . The span AB is 6m and BC is 8m. The span AB is carrying an UDL of 30kN/m and span BC carries a load of 40kN at a distance of 3m from B. Use Strain energy method, draw the B.M.D. [6]

17 Analyze the continuous beam ABC shown in figure by slope deflection method and sketch the bending moment diagram. Take EI = constant. [10]




OR

18 Analyze the continuous beam as shown in fig. by using moment distribution method. EI is constant. Draw the bending moment diagram and shear force diagram.




19 A live load of 15 kN, moves on a girder simply supported on a span of 13 m. Find the maximum bending moment that can occur at a section 6 m from the left end. [10]

OR

20 Draw the influence line for BM and SF for a section 8 m from the left hand support as shown in figure below. Determine the maximum BM and SF values for simply supported span 28 m. The section carries a uniformly rolling load 5 kN/m over a span of 9 m. [10]