R20 Regulation *Subject code:3P4AE*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech IV Semester Regular/Supplementary Examinations, September 2023

STRUCTURAL ANALYSIS – I

(CIVIL ENGINEERING)

Maximum Marks: 70 Date:23.09.2023 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 Write the difference between statically determinate and indeterminate structure?

2 A propped cantilever of length 'L' carries a concentrated load 'W' at its mid-span. Find the reaction at the prop.

3 Define Perfect frame

4 Define force and deflection

5 Define Castiglione's 1st theorem

6 Write the comparison between three hinged and two hinged arch.

7 What are the assumptions made in slope deflection method

8 Define point of contraflexure with an example

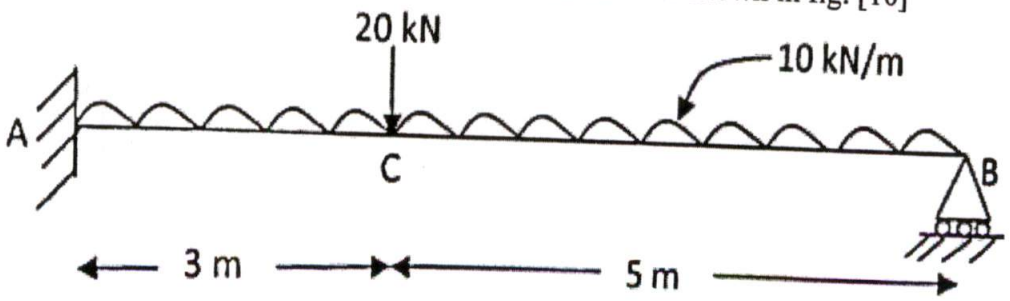
9 What are influence lines

10 Sketch the influence line diagram for shear force at any section of a simply supported beam.

Part-B

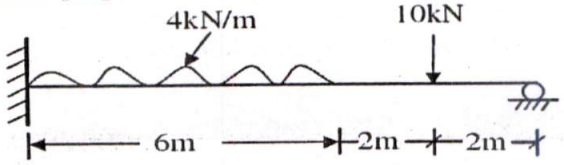
Answer All the following questions. (5X10M=50Marks)

11 Solve for the deflection at point B of a propped cantilever as shown in fig. [10]

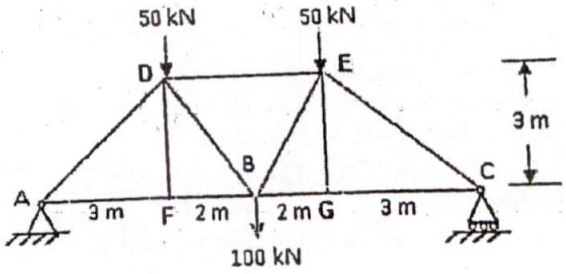


OR

12 A propped cantilever beam is shown in figure. Calculate the prop Reaction and also draw the BM & SF diagrams. [10]

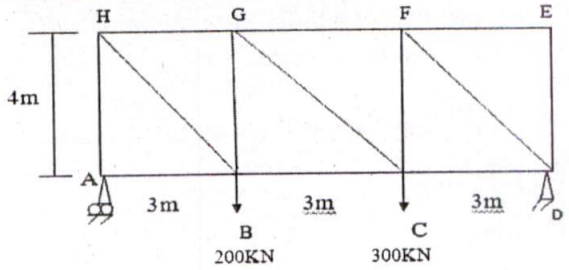


13 Determine the member forces for the truss shown in fig by any of the methods. [10]



OR

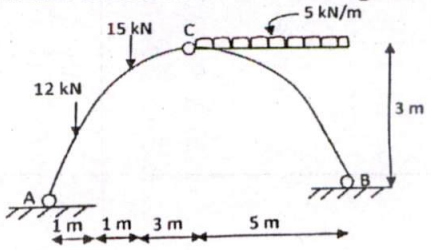
14 For the truss loaded and supported as shown in figure, determine the forces in the members GF and GC using method of sections. [10]



15 Derive the strain energy equation due to bending moment. [10]

OR

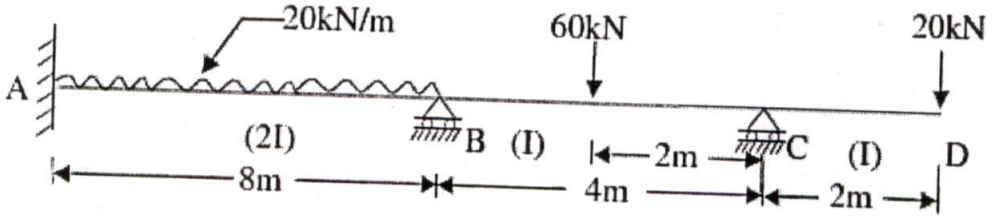
16 Compute the reactions and maximum BM for the given three hinged parabolic arch. [10]



17 A continuous beam is built in at A and it is carried over rollers at B and C with spans of AB and BC being 10m. The beam carries a uniformly distributed load of 7.5KN/m over AB and a point load of50KN over BC 2.5m from the support B, which sinks by 20mm. Values of E and I are $2 \times 10^5 N/mm^2$ and $2 \times 10^9 mm^4$. Calculate the support moments and draw bending moment diagram giving critical values. Use Slope deflection method. [10]

OR

18 Analyse the beam ABCD shown in figure by moment distribution method and draw bending moment diagram. [10]



19 Sketch the influence line diagram for a shear force at any section of a simply supported beam. [10]

OR

20 A uniformly distributed load of 40kN/m and of length 3m transverse across the span of simply supported length of 18m.Compute the maximum bending moment at 4m from left support and absolute bending moment. [10]