R20

SET - 1

III B. Tech II Semester Regular Examinations, July -2023
ADVANCED STRUCTURAL ANALYSIS
(Civil Engineering)

Time: 3 hours   Max. Marks: 70

Answer any **FIVE** Questions **ONE** Question from **Each unit**
All Questions Carry Equal Marks
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UNIT-I

1. a) State castigliano's first theorem. What are the limitations of castigliano's theorem? [7M]

   b) A simply supported beam of span "l" carries a concentrated load P at a distance of 'a' and 'b' from two ends. Find the strain energy stored in the beam and the deflection under the load by castigliano's theorem. [7M]

(OR)

2. a) Is Castigliano's theorem valid for inelastic systems? Explain it. [7M]

   b) Analysis the truss and all members have the same cross section and same length. E is same. [7M]
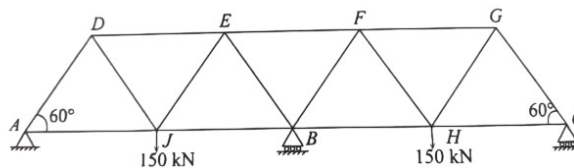
UNIT-II

3. a) What is meant by rib shortening? How it is influencing the horizontal thrust? Discuss it. [7M]

   b) A symmetrical parabolic three hinged arch of span 30m and rise 5m carries a uniformly distributed load of intensity 20kN/m starting from the central hinge and runs over for 10m towards right hinge. Calculate the reactions also normal thrust and radial shear at quarter span. [7M]

(OR)

4. a) What is the value of the horizontal thrust at each support of a two hinged semicircular arch of radius R which carries a concentrated load? [4M]

   b) A two hinged parabolic arch rib has a span of 10m has a central rise 2.5m. It is loaded with uniformly distribute load 2kN/m over a half of the span from the left support. Determine the end reactions, horizontal thrust, maximum and minimum B.M of the arch. [10M]
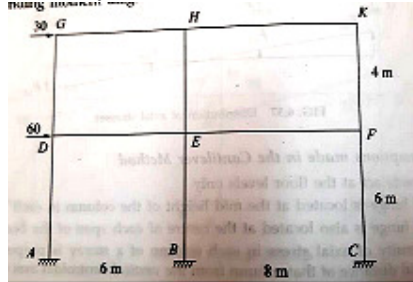
UNIT-III

5. a) In the portal method, is shear force or axial force evaluated first? Explain [7M]

   b) Analyze the frame by Portal method. Draw BMD. [7M]

(OR)

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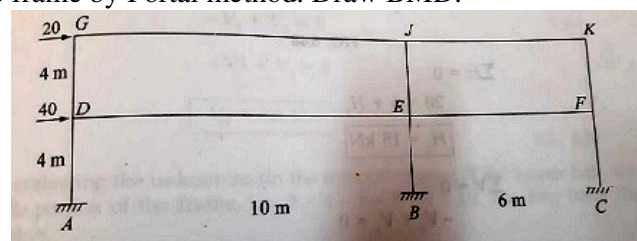
6. a) Discuss the assumptions, limitations and applications in the cantilever method.   [7M]
    b) Analyze the building frame by cantilever method. Draw BMD.   [7M]

UNIT-IV

7. a) Differentiate between the Tied arches and fixed arches.   [7M]
    b) A cable is used to support six equal and equidistant loads over a span of 14m. The central dip of the cable is 1.6m and the loads are of magnitude 20kN. Calculate the length of the cable, tension in the cable segments.   [7M]

(OR)

8. a) Prove the Eddy's theorem?   [7M]
    b) A three hinged stiffening girder of a suspension bridge of 100m span is subjected to two point loads of 10kN each placed at 20m and 40m respectively from the left hinge. Determine the bending moment and shear force in the girder at a section 30m from the left end. Also determine the tension in the cable which has a central dip of 10m.   [7M]

UNIT-V

9. a) Why the slope deflection method is called the displacement method. Discuss it.   [4M]
    b) Analyze the portal frame by moment distribution method. Draw the bending moment diagram and sketch the deflected shape of the structure. The two columns of AB and CD of 4m height with 2I, Beam BC of span 5m, with I. The beam BC carries an udl of 20 kN/m. The supports at A and D are fixed.   [10M]

(OR)

10. a) What are the assumptions made in the Kani's method?   [4M]
    b) Analyze the portal frame using Kani's procedure. The two columns of AB and CD of 5m height, Beam BC of span 8m, with EI constant. The column AB carries an udl of 15 kN/m. The supports at A and D are fixed.   [10M]