

## Fourth Semester B.E. Degree Examination, Dec.2023/Jan.2024

### Analysis of Determinate Structures

Time: 3 hrs.

Max. Marks: 100

**Note:** Answer any FIVE full questions, choosing ONE full question from each module.

#### Module-1

- 1 a. List the assumptions made in the analysis of pin jointed plane truss. (04 Marks)
- b. Explain different forms of structures with examples. (06 Marks)
- c. Determine static and kinematic in determinates of the structures shown in Fig.Q1(c)(i), Fig.Q1(c)(ii).

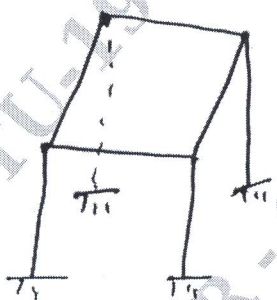


Fig.Q1(c)(i)

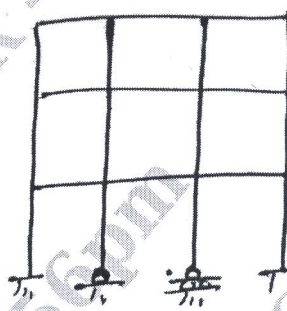


Fig.Q1(c)(ii)

(10 Marks)

OR

- 2 a. Distinguish between determinate and indeterminate structures with examples. (08 Marks)
- b. Explain the following :
  - i) Geometric and material non – linearity
  - ii) Linear and non-linear structural system
  - iii) Degree of freedom with example. (12 Marks)

#### Module-2

- 3 a. Determine maximum slope and maximum deflection for the beam shown in Fig.Q3(a) using Macaulay's method.

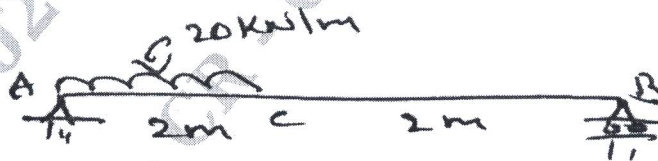


Fig. Q3(a)

(10 Marks)

- b. For the cantilever beam shown in Fig.Q3(b), determine the maximum slope and deflection at B using moment area method. Take  $EI = 7000\text{kN} - \text{m}^2$ .



Fig.Q3(b)

(10 Marks)

OR

- 4 a. By using conjugate beam method determine maximum slope and deflection for the simply supported beam show in Fig.Q4(a), Take  $E = 204 \times 10^6 \text{ kN/m}^2$ ,  $I = 50 \times 10^{-6} \text{ m}^4$ .



Fig.Q4(a)

(10 Marks)

- b. Determine the slope at supports and deflection at point load as shown in Fig.Q4(b) by using Macaulay's method.

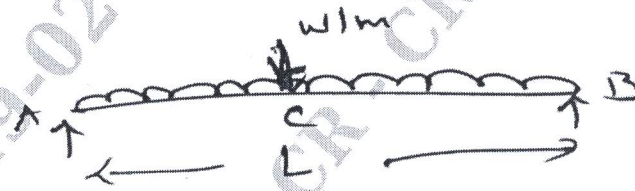


Fig.Q4(b)

(10 Marks)

**Module-3**

- 5 a. Derive an expression for strain energy stored due to bending. (10 Marks)  
 b. Determine vertical and horizontal deflection of the bent shown in Fig.Q5(b), using Castiglione method.

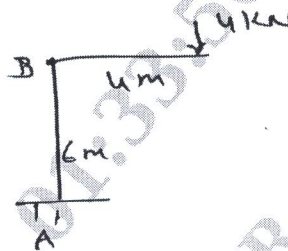


Fig.Q5(b)

(10 Marks)

OR

- 6 a. State the moment area theorems and derive the expression. (10 Marks)  
 b. Determine the deflection at the load point 'C' for the beam show in Fig.Q6(b) by using strain energy method.

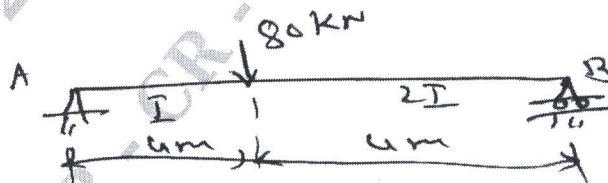


Fig.Q6(b)

(10 Marks)

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- 7 A three hinged stiffening girder of a suspension bridge of span 100m is subjected to two concentrated loader of 10kN each, placed at 20m and 40m respectively from the left end support. Determine banding and shear force at 30m from the left support. Also determine the maximum and minimum tensions in the supporting cable which has a central dip of 10m. (20 Marks)

OR

- 8 A three hinged parabolic arch has a span of 30m and central rise of 6m. The arch carries a UDL of intensity 30kN/m over left half position and a concentrated load of 60kN at 9m from right hand support. Determine the bending moment normal thrust, radial shear at 9m from left hand support. (20 Marks)

Module-5

- 9 a. What is influence line? Explain its importance in structural analysis. (08 Marks)  
 b. Four point loads 16, 30, 30 and 20kN have a centre to centre spacing of 2m between construction load and pass over a girder of 30m span from left to right with 20kN load leading. Calculate maximum bending moment and shear force at 8m from the left end, using influence line diagram. (12 Marks)

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OR

- 10 A train of five wheel loads crosses a simply supported beam of span 30m as shown in Fig.Q10. Calculate maximum positive and negative SF at mid span and absolute maximum BM anywhere in the span.

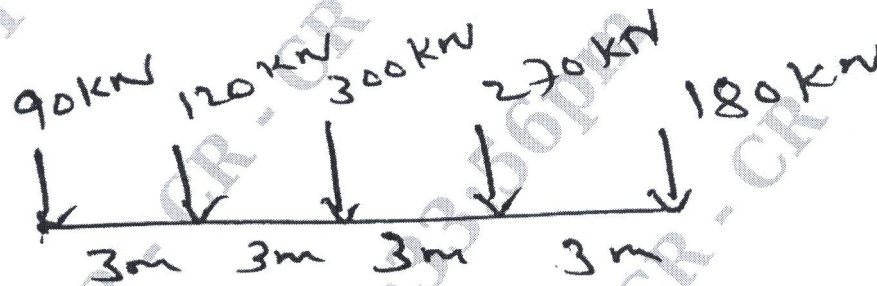


Fig.Q10

(20 Marks)

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