

# CBCS Scheme

USN 

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15CV42

**Fourth Semester B.E. Degree Examination, Dec.2017/Jan.2018**

## Analysis of Determinate Structures

Time: 3 hrs.

Max. Marks: 80

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

### Module-1

- 1 a. Differentiate between statically determinate and indeterminate structures. (06 Marks)
- b. What are linear and non-linear systems? Explain. (02 Marks)
- c. Determine the degree of static indeterminacy for the following structures [Fig.Q1(c)]:

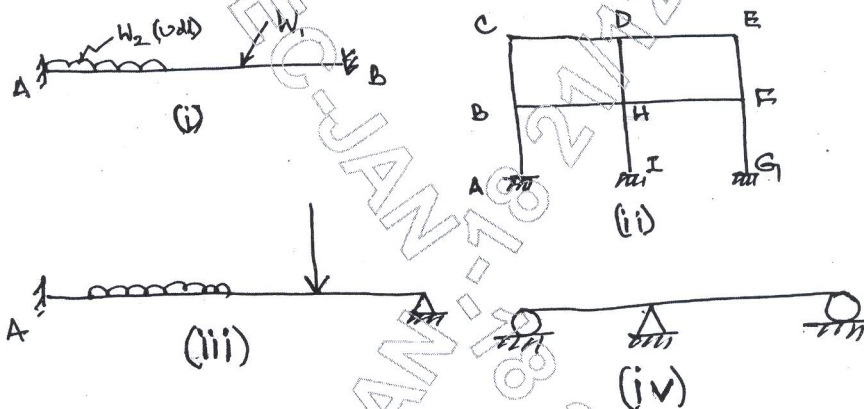


Fig.Q1(c)

(08 Marks)

OR

- 2 Determine the forces in all the members of the truss shown in the Fig.Q2 by the method of joints and verify the forces in members BC, CF and FE by the method of sections.

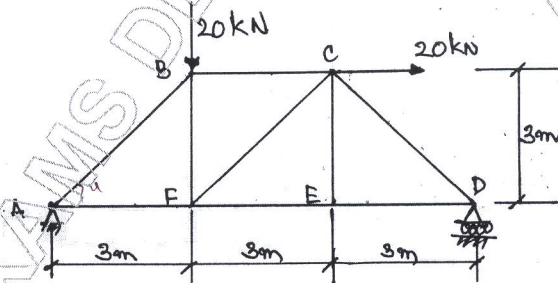


Fig.Q2

(16 Marks)

### Module-2

- 3 a. Derive the moment-curvature equation for deflection. (06 Marks)
- b. A simply supported beam AB has a span of 5m and carries a point load of 50 kN at a distance of 3m from left end A as shown in Fig.Q3(b). Find the deflection under the load and also maximum deflection in the beam.

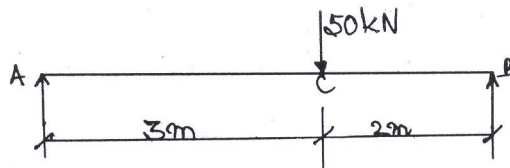


Fig.Q3(b)

(10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and/or equations written eg, 42+8 = 50, will be treated as malpractice.

OR

- 4 a. Determine the slope and deflection at the free end of a cantilever shown in Fig.Q4(a) by the moment area method.

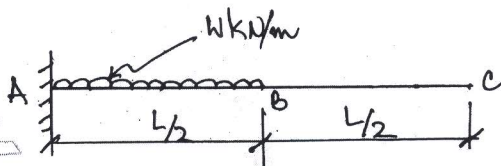


Fig.Q4(a) (08 Marks)

- b. Determine the slope and deflection under the load for the beam shown in Fig.Q4(b) using conjugate beam method.

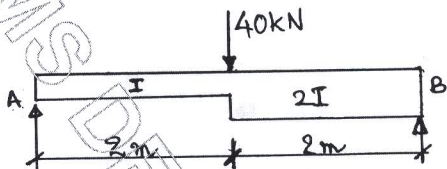


Fig.Q4(b) (08 Marks)

Module-3

- 5 a. Obtain the expression for strain energy stored in a member when it is subjected to axial load. (08 Marks)
- b. Determine the deflection under the given 60 kN load acting on the beam as shown in Fig.Q5(b) by strain energy method.

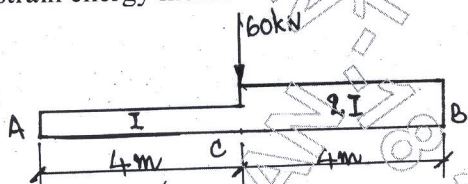


Fig.Q5(b) (08 Marks)

OR

- 6 a. Find the value of vertical deflection at C for the structure shown in Fig.Q6(a) by Castiglione's theorem.

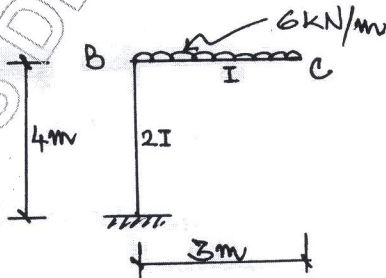


Fig.Q6(a) (08 Marks)

- b. Determine the vertical and horizontal deflections at joint C of the truss shown in Fig.Q6(b). The cross sectional area of inclined member (tie) is  $2000 \text{ mm}^2$  while the area of horizontal member is  $1600 \text{ mm}^2$ . Take  $E = 200 \text{ kN/mm}^2$ .

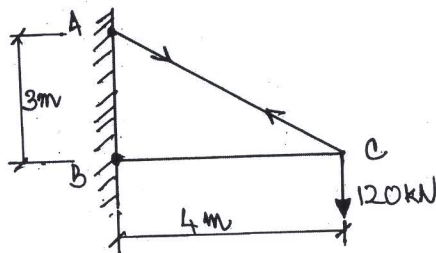


Fig.Q6(b) (08 Marks)

Module-4

- 7 A three hinged parabolic arch has a span of 30 m and rise of 6m. It carries a udl of 3 kN/m over the left half of the span and a point load of 6 kN at 9m from right end. Find the BM, normal thrust and radial shear at a section of 9m from left end support. Also find the maximum bending moment along the span. (16 Marks)

OR

- 8 A cable is suspended between two points A and B 120 m apart and a central dip of 8m. It carries a udl of 20 kN/m. Determine:  
 i) The maximum and minimum tension in the cable.  
 ii) Length of the cable.  
 iii) The size of cable if the permissible stress of cable material is 200 N/mm<sup>2</sup>. (16 Marks)

Module-5

- 9 a. Define a influence line diagram and mention its applications. (06 Marks)  
 b. Draw the influence line diagrams for:  
 i) Reactions at supports of a simply supported beam.  
 ii) Shear force of a simply supported beam carrying concentrated unit load. (10 Marks)

OR

- 10 For a simply supported beam of span 25m with the series of concentrated loads to be taken as rolling load system as shown in Fig.Q10. Compute the following by influence line principles.

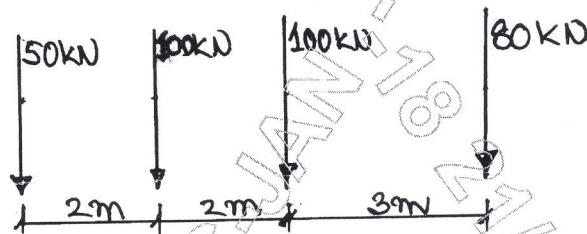


Fig.Q10

- i) Maximum reactions.  
 ii) Maximum bending moment at 8 m from left support. (16 Marks)

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