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## Fourth Semester B.E. Degree Examination, June/July 2017 Analysis of Determinate Structure

Time: 3 hrs.

Max. Marks: 80

- Note: 1. Answer FIVE full questions, choosing one full question from each module.  
2. Assume any missing data, if any.*

### Module-1

- 1 a. Briefly explain different forms of structures. (03 Marks)  
 b. State the assumptions made in the analysis of truss. (04 Marks)  
 c. Find the forces in the numbered members of the loaded truss shown Fig.Q1(c) using method of sections.

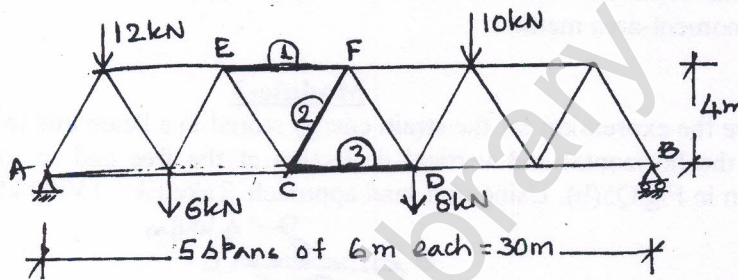


Fig.Q1(c)

(09 Marks)

OR

- 2 a. Explain statically determinate and indeterminate structures with examples. (04 Marks)  
 b. Analyze the loaded truss shown in Fig.Q2(b) by method of joints and tabulate the results neatly.

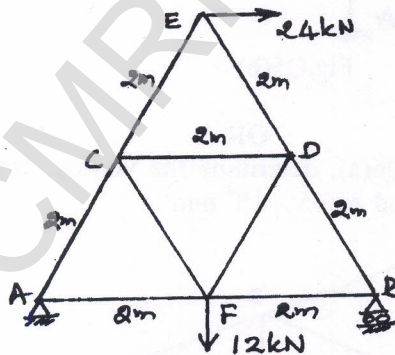


Fig.Q2(b)

(12 Marks)

### Module-2

- 3 a. Derive the differential equation of deflected curve for the beam. (04 Marks)  
 b. Determine the maximum deflection at the free end of a cantilever beam subjected point load  $W$  at free end of span ' $L$ ' with constant  $EI$ . Use Macaulay's method. (06 Marks)  
 c. Using conjugate beam method, find the deflection at end of a cantilever beam of span ' $L$ ' subjected udl of  $w/m$  run over entire span.  $EI$  constant. (06 Marks)

OR

- 4 a. State first and second moment area theorems. (04 Marks)  
 b. Find the ratio of deflection at C and D for the simply supported beam shown in Fig.Q4(b). Take  $E = 200 \text{ GPa}$ ,  $I = 6 \times 10^7 \text{ mm}^4$ . Use Macaulay's method.

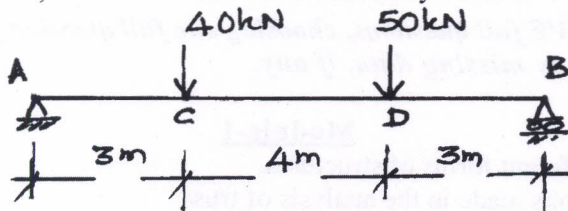


Fig.Q4(b) and Fig.Q4(c)

- c. Find the maximum deflection for the simply supported beam loaded as shown in Fig.Q4(c). Use moment-area method. (07 Marks)

**Module-3**

- 5 a. Derive the expression for the strain energy stored in a beam due to flexure. (04 Marks)  
 b. Find the horizontal and vertical deflection at the free end 'c' of a bent frame loaded as shown in Fig.Q5(b). Using unit load approach. Take  $EI = 15000 \text{ kN-m}^2$ .

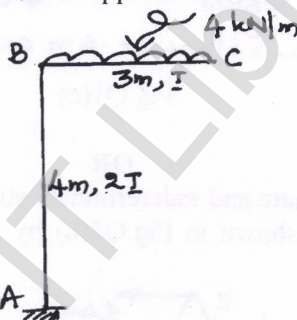


Fig.Q5(b)

(12 Marks)

OR

- 6 a. For the truss shown in Fig.Q6(a), determine the vertical deflection at C by strain energy method. Take  $E = 210 \text{ GPa}$  and  $A = 5 \times 10^4 \text{ mm}^2$ .

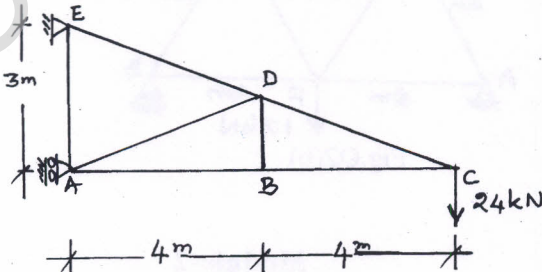


Fig.Q6(a)

(09 Marks)

- b. A cantilever beam is loaded as shown in Fig.Q6(b). Compute the deflection at point C by unit load approach. Take  $E = 200 \text{ GPa}$ ,  $I = 8 \times 10^7 \text{ mm}^4$ .

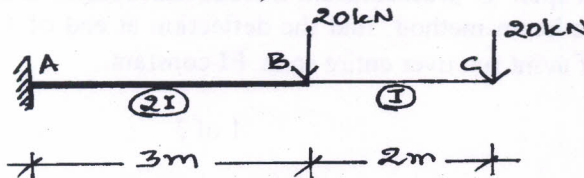


Fig.Q6(b)

(07 Marks)

**Module-4**

- 7 a. A three hinged parabolic arch of span 30 m, rise 5m is subjected to uniformly distributed load of 20 kN/m for left half of the span. Determine support reactions at the springing levels. Also determine normal thrust, radial shear and bending moment at a section 8 m from left support. (09 Marks)
- b. A suspension cable of span 100 m and slip 10 m carries a udl of 8 kN/m of horizontal span over the entire span. Find the maximum and minimum tension in the cable and where they occur in the cable. Find the length of cable. (07 Marks)

**OR**

- 8 a. A flexible suspension cable of weight 12 kN/m hangs between two vertical walls 60 mt apart, left being at a point 10 m below the right point. A point load of 200 kN is attached to cable in such a manner that the point of attachment of load is 20 m horizontally from left end wall and 5 m below the left hand support. Find the maximum and minimum tension in the cable. (08 Marks)
- b. A parabolic arch of span 24 m with a central rise of 4 m is subjected to a point load of 30 kN at 6 m from left support and a udl of 15 kN/m over the right half of the span. Sketch BMD, also find normal thrust and radial shear at 10 m from right support. (08 Marks)

**Module-5**

- 9 a. What are the uses of influence line diagram? (03 Marks)
- b. A simply supported beam of span 8m is traversed by a udl of 10 m long with intensity 20 kN/m. Draw the influence line diagram for:
- Reaction at left support
  - S.F at 3 mt from left support
  - BM at 3 mt from left support.
- Find the maximum values of above quantities. (13 Marks)

**OR**

- 10 a. A beam has a span of 20 m. Draw influence line for BM and SF at a section 8m from the left support and determine the maximum BM and SF for this section due to two point loads 80 kN and 40 kN at a fixed distance of 2m apart rolling from left to right with 80 kN load leading. (06 Marks)
- b. Draw influence line for shear force and bending moment at a section 5 m from left support of a simply supported beam, 25 m long. Hence calculate the maximum SF and BM at this section due to uniformly distributed rolling load of 8m long with intensity 5 kN/m. (10 Marks)

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