

Fourth Semester B.E. Degree Examination, Dec.2019/Jan.2020

## 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. Explain the different types of trusses, with neat sketches. (04 Marks)
- b. State the assumptions made in the analysis of truss. (04 Marks)
- c. Find the forces in all members of the pin jointed truss shown in Fig.Q1(c) by method of joints.

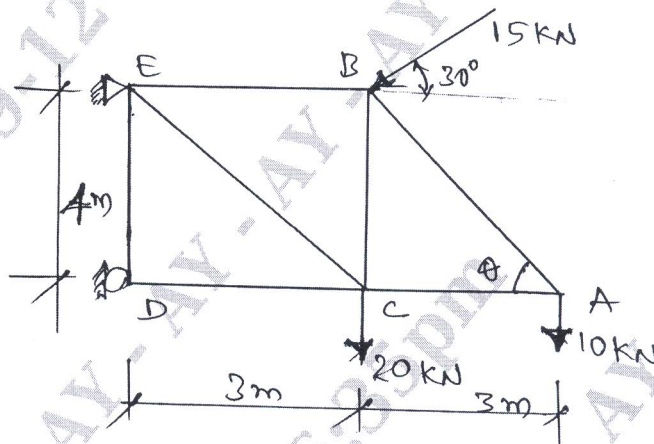


Fig.Q1(c)

(12 Marks)

OR

- 2 a. Differentiate between statically determinate and indeterminate structures. (04 Marks)
- b. Explain linear and non linear systems. (04 Marks)
- c. Find the forces in the members EB, EC and DC by method of sections shown in Fig.Q2(c).

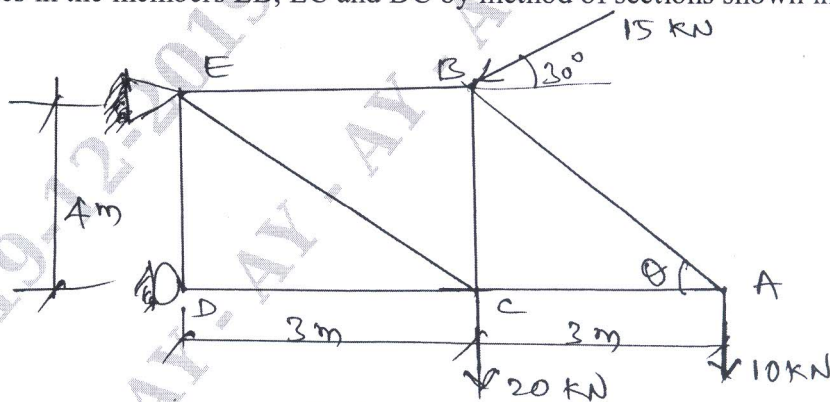


Fig.Q2(c)

(12 Marks)

### Module-2

- 3 a. State the first and second moment area theorems. (04 Marks)
- b. Derive the Moment Curvature Equation for deflection. (06 Marks)

- c. Determine slope and deflection for the simply supported beam subjected to point load at mid span shown in Fig.Q3(c).

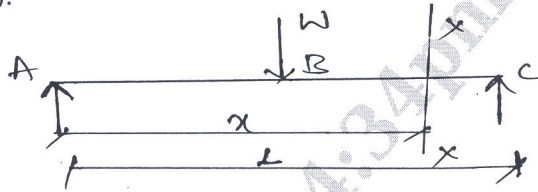


Fig.Q3(c)

(10 Marks)

OR

- 4 a. Find the maximum slope and deflection at free end for the loaded beam shown in Fig.Q4(a) by Moment Area method.

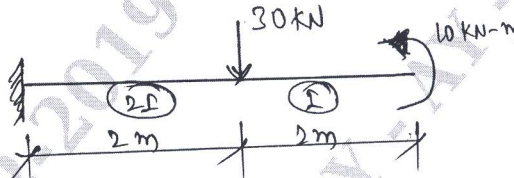


Fig.Q4(a)

(10 Marks)

- b. Determine the slope and deflection of the cantilever beam shown in Fig.Q4(b), using conjugate beam method.

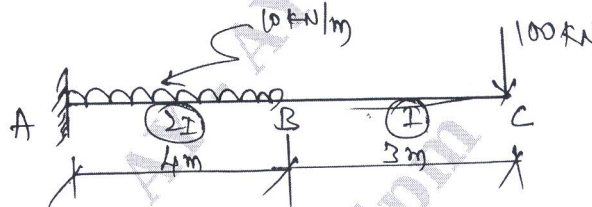


Fig.Q4(b)

(10 Marks)

**Module-3**

- 5 a. Derive the expression for strain energy stored in an prismatic element subjected to pure bending moment. (08 Marks)  
 b. Determine the deflection at the center of the loaded simply supported beam as shown in Fig.Q5(b) by Castiglion's theorem.

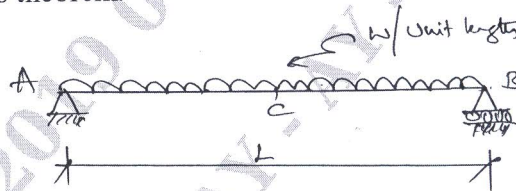


Fig.Q5(b)

(12 Marks)

OR

- 6 a. Determine the horizontal displacement of the roller support end A of the frame shown in Fig.Q6(a), take  $EI = 8000 \text{ kN-m}^2$  by unit load method.

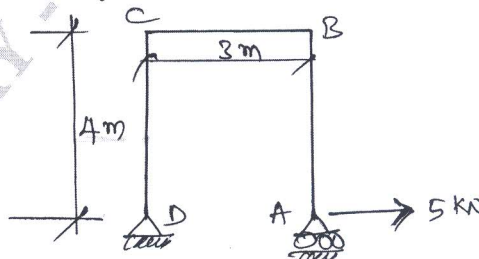


Fig.Q6(a)

(10 Marks)



- b. Determine the deflection at the load point for the beam shown in Fig.Q6(b) by using strain energy method.

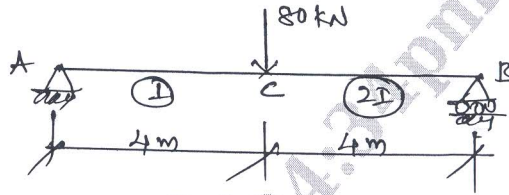


Fig.Q6(b)

(10 Marks)

**Module-4**

- 7 a. Show that  $L_c = L + \frac{8h^2}{3L}$  for a cable of span  $L$  and UDL of intensity  $W$  kN-m. (08 Marks)
- b. A three hinged parabolic arch of span 24 m rise 6 m with hinged at abutments and at crown point. Arch subjected to a point loads of 50 kN and 150 kN at a distance of 8m and 20 m from left supports, determine, reactions at supports, radial shear and normal thrust at a distance of 6m both from left and right support and draw Bending Moment Diagram. (12 Marks)

OR

- 8 a. A cable of 20 m and dip 4m carries a UDL of 20 kN-m over the whole span, find the maximum tension in the cable and length of the cable. (08 Marks)
- b. A three hinged parabolic arch is having a span of 36 m. It is subjected to UDL 30 kN/m from left support hinge to crown hinge. Determine the normal thrust, radial shear and bending moment at quarter span point located from left support. (12 Marks)

**Module-5**

- 9 a. What are the uses of influence line diagram? (04 Marks)
- b. Draw the influence line diagram for shear force at a section for a simply supported beam subjected to single point load. (06 Marks)
- c. Find the shear force at the section G for the loaded simply supported beam by using influence line diagram. Also find shear forces. [Refer Fig.Q9(c)]

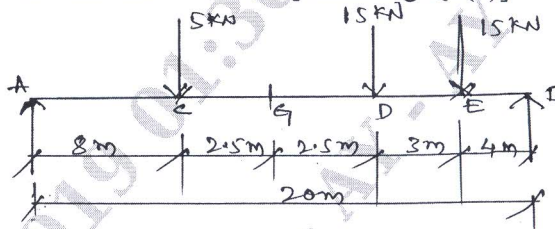


Fig.Q9(c)

(10 Marks)

OR

- 10 a. Explain the procedure for generating influence line diagrams. (04 Marks)
- b. Determine the influence line diagram for the forces in the members  $U_1U_2$   $U_2U_3$   $L_2L_3$   $U_2L_2$  and  $U_2L_3$  for the part truss as shown in Fig.Q10(b).

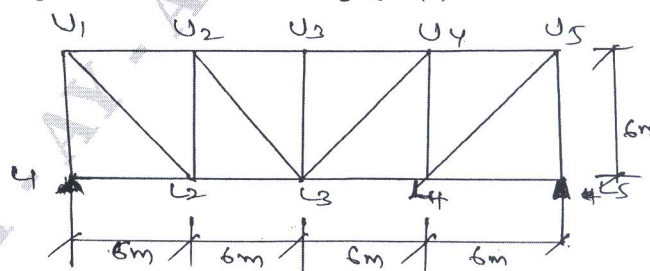


Fig.Q10(b)

(16 Marks)

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