Total No. of Questions—**8**] [Total No. of Printed Pages—**5**

Seat No.	

[5352]-509

S.E. CIVIL (II Sem.) EXAMINATION, 2018

STRUCTURAL ANALYSIS-I

(2015 COURSE)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) Answer Q. No. **1** or Q. No. **2**, Q. No. **3** or Q. No. **4**, Q. No. **5** or Q. No. **6**, Q. No. **7** or Q. No. **8**.

(*ii*) Neat diagrams must be drawn wherever necessary.

(*iii*) Figures to the right indicate full marks.

(*iv*) Assume suitable data, if necessary.

(*v*) Use of electronic pocket calculator is allowed.

1. (*a*) Derive equation to determine slope and deflection at free end of a cantilever beam subjected to a clockwise moment at free end. Use Macaulay's method. 'EI' is constant. [6]

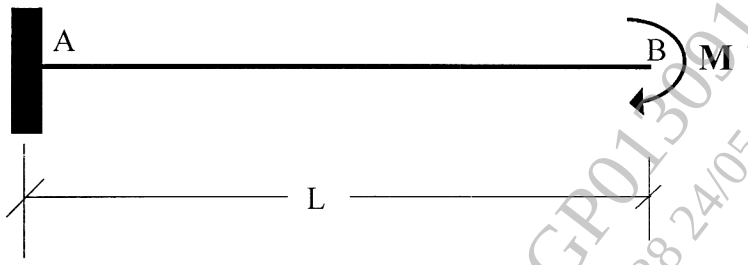

Fig. 1

(*b*) For the beam shown below, determine magnitude and direction of a couple 'M' to be applied at free end of same beam so

P.T.O.

that deflection at free end becomes zero. [6]

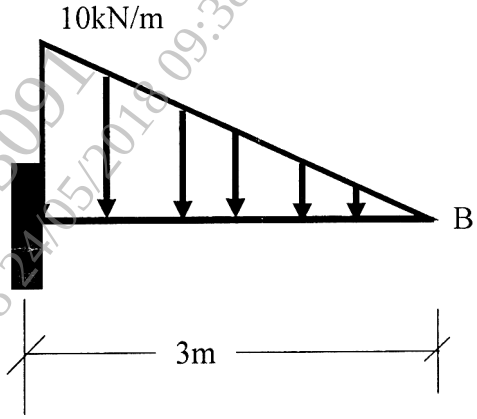

Fig. 2

Or

2. (*a*) Write notes on : [6]

(*i*) Maxwell-Betti's Theorem

(*ii*) Advantages and disadvantages of fixed beam over simply supported beam.

(*b*) Analyze the beam by Castingliano's second theorem and determine reaction of prop at 'B' if 10 mm sinking is allowed at 'B'. Take $E_{prop} = 0.23 \times 10^5$ MPa and $I_{prop} = 3 \times 10^8$ mm^4 [6]

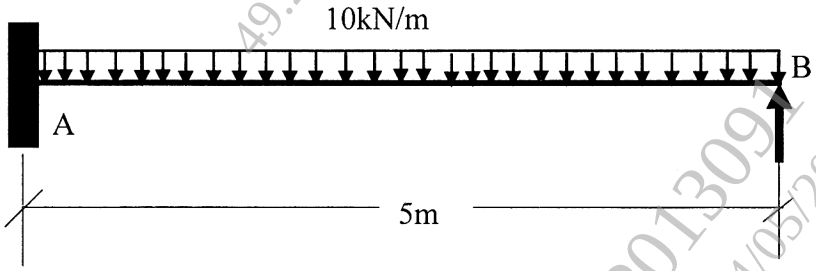

Fig. 3

3. (*a*) A cantilever truss shown below is loaded by a vertical force of 10 kN at free end. Find modulus of elasticity of member material, if area of each member is 70 mm^2 and vertical deflection

is 5 mm at E. All members are made of same material. [6]

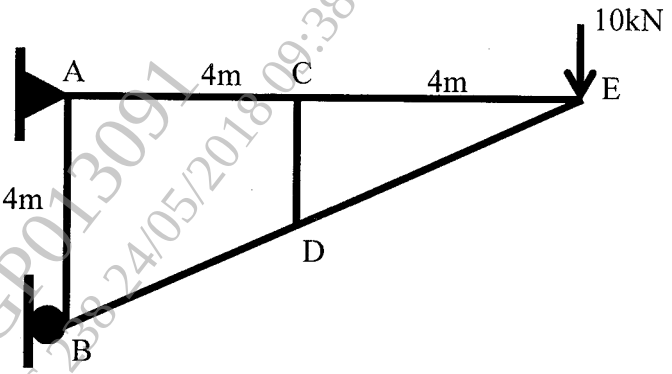

Fig. 4

(*b*) For a cantilever beam shown below, calculate reactions at fixed end and shear force and bending moment at C by influence line diagram method. [6]

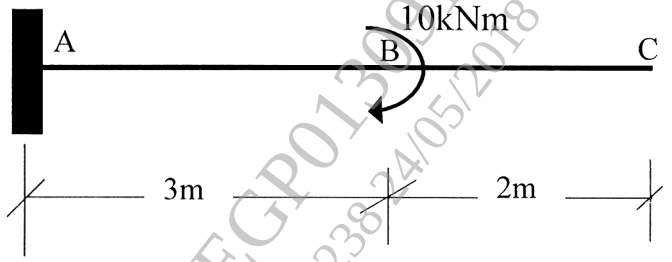

Fig. 5

Or

4. (*a*) For the following bracket, members of same cross-sectional area and same material are used. If horizontal deflection at 'C' is 5 mm and modulus of elasticity is 2.1×10^5 MPa, determine area of members. [6]

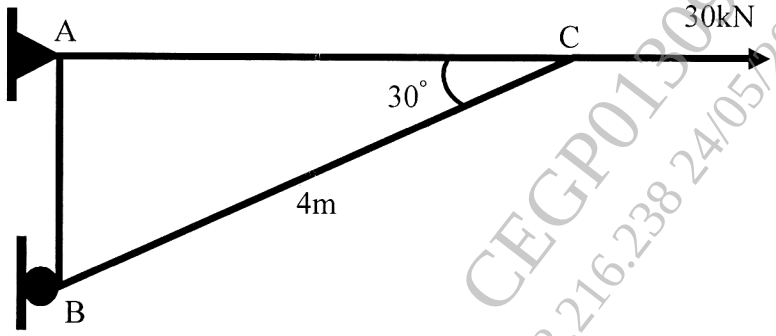

Fig. 6

(*b*) For the cantilever beam shown below, calculate reactions at fixed end and shear force and bending moment at 'C' by influence line diagram method. Also draw influence line diagrams. [6]

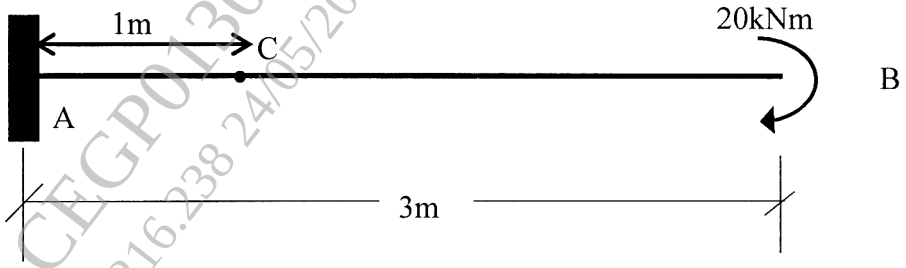

Fig. 7

5. A three hinged parabolic arch is loaded and supported as shown in figure below. Determine : [13]

(*a*) Support reactions

(*b*) Maximum positive and negative moment.

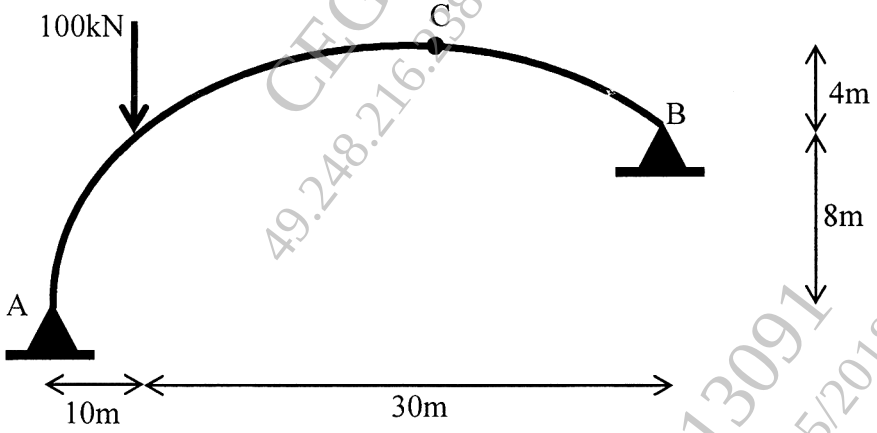

Fig. 8

Or

6. Determine horizontal thrust for a two hinged arch of span 'L' and central rise 'H' carries a point load 'W' at a distance '*a*' from left hand support. Assume $I + I_0 \sec \theta$. [13]

7. (*a*) Explain : [9]

(*i*) Plastic Moment

(*ii*) Plastic Collapse

(*iii*) Shape Factor.

(*b*) Write a note on Elastic-Plastic behavior beam. [4]

Or

8. For the cross-section shown below find shape factor. [13]

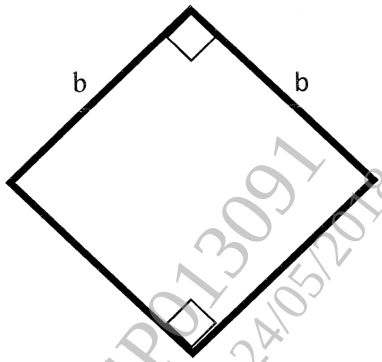

Fig. 9