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]
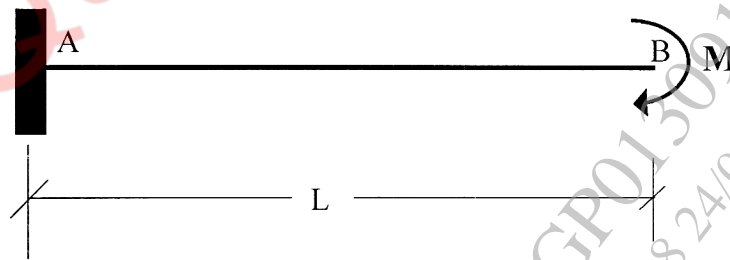

Fig. 1

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

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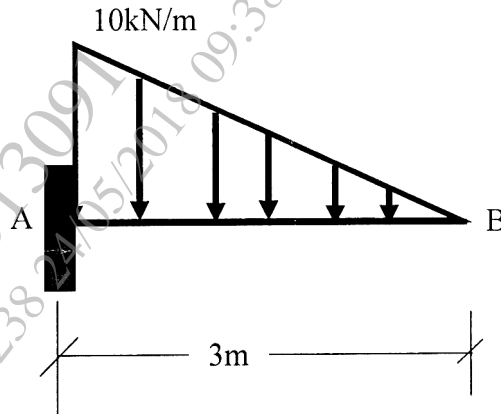that deflection at free end becomes zero. [6]

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]
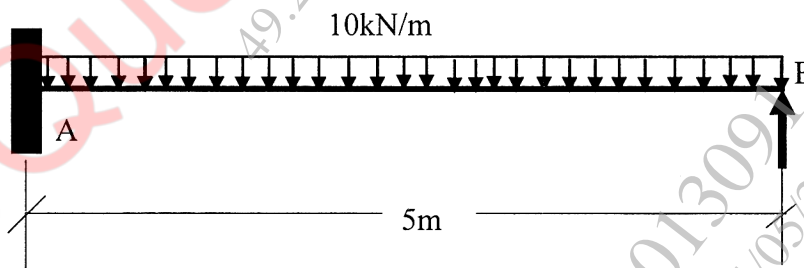

Fig. 3

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

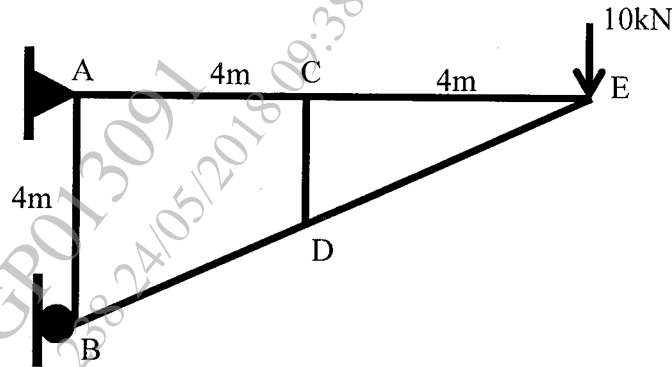is 5 mm at E. All members are made of same material. [6]

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]
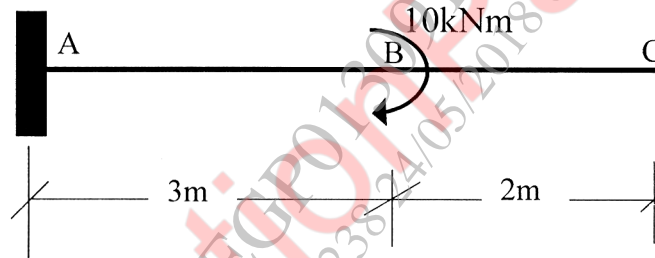

Fig. 5

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]
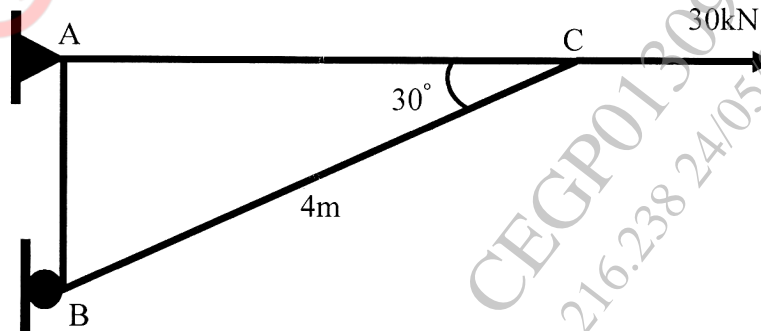

Fig. 6

(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]
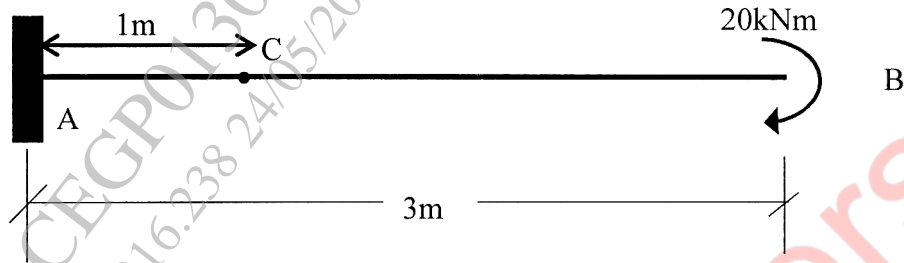

Fig. 7

5. A three hinged parabolic arch is loaded and supported as shown in figure below. Determine : [13]
   (a) Support reactions
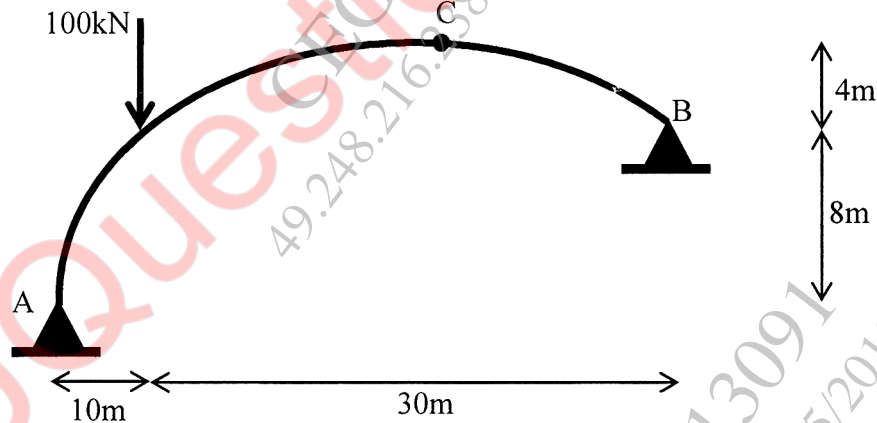   (b) Maximum positive and negative moment.

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

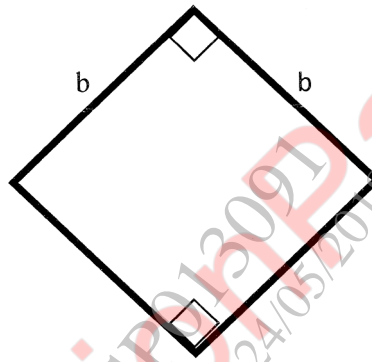**8.** For the cross-section shown below find shape factor. [13]

Fig. 9