Total No. of Questions—**8**] [Total No. of Printed Pages—**6**

Seat No.	

[5559]-108

S.E. (Civil) (Second Semester) EXAMINATION, 2019

STRUCTURAL ANALYSIS—I

(2015 PATTERN)

Time : 2 Hours **Maximum Marks : 50**

Instruction to the students:

1) *Answer **Q. 1** or **Q. 2**, **Q. 3** or **Q. 4**, **Q. 5** or **Q. 6**, **Q. 7** or **Q. 8**.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right indicate full marks.*
4) *Assume suitable data, if necessary*
5) *Use of electronic pocket calculator is allowed.*

Q1) (a) For the simply supported beam shown in figure 1. Find slope at end A and deflection at C by using Macaulay's method. Take constant value of EI. **[06]**

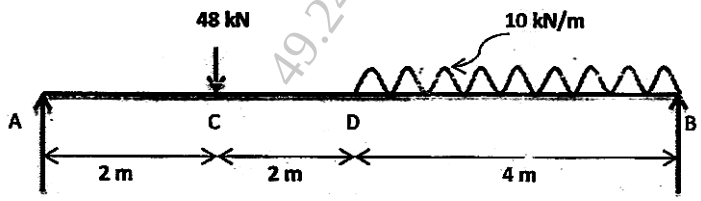

Figure 1

(b) Determine the vertical deflection at free end of cantilever beam shown in figure 2 in terms of EI by using Castigliano's first theorem. **[06]**

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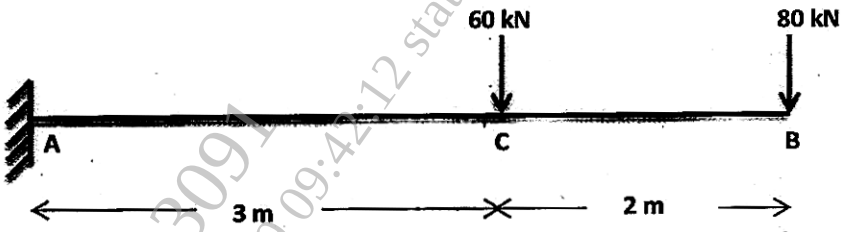

Figure 2

[OR]

Q2) (a) Analyse the continuous beam ABC supported and loaded as shown in figure 3 by using Clapreyon's three moment theorem **[06]**

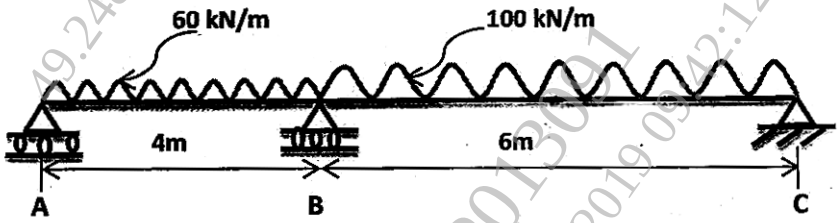

Figure 3

(b) Determine the reaction B for a propped cantilever beam AB shown in figure 4 by using Castigliano's second theorem. **[06]**

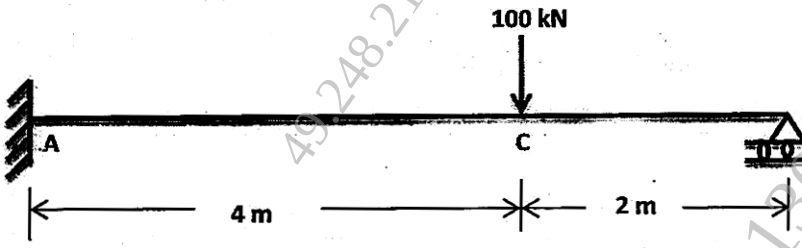

Figure 4

Q3) (a) Find the vertical deflection of joint C of the pin jointed truss shown in figure 5. The area of horizontal member is 150mm^2 and the area of inclined members is 200mm^2 each. Take E = 200 kN/mm^2. **[06]**

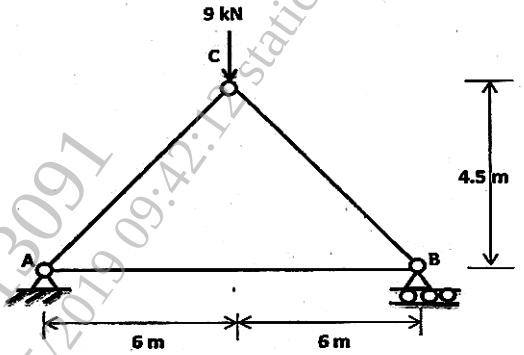

Figure 5

(b) Analyse the truss shown in figure 6 if member BE is redundant member. Take constant EI. **[06]**

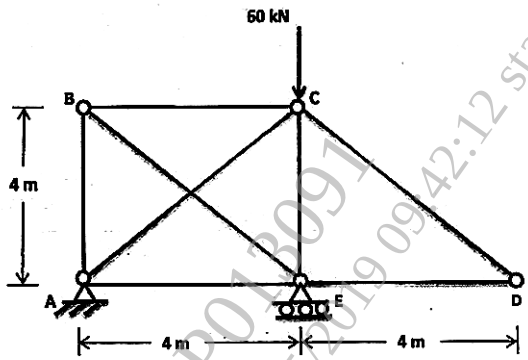

Figure 6

[OR]

Q4) (a) Two wheel loads 30kN and 60 kN spaced at 1m apart as shown in figure 7. Find the position of loads to give maximum positive SF and maximum negative SF and determine the maximum positive SF and maximum negative SF at E, 6m from support C. **[06]**

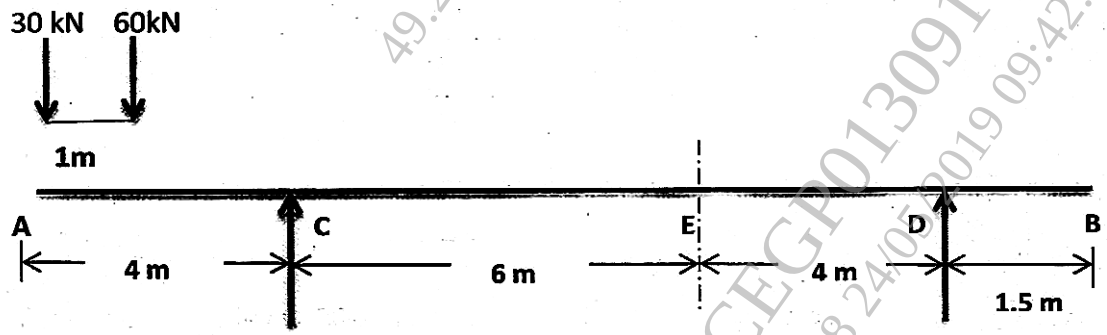

Figure 7

(b) Draw the influence line diagrams for the forces in the members U_2U_3, L_3L_4 and U_3L_3 of the through type bridge truss shown in figure 8. **[06]**

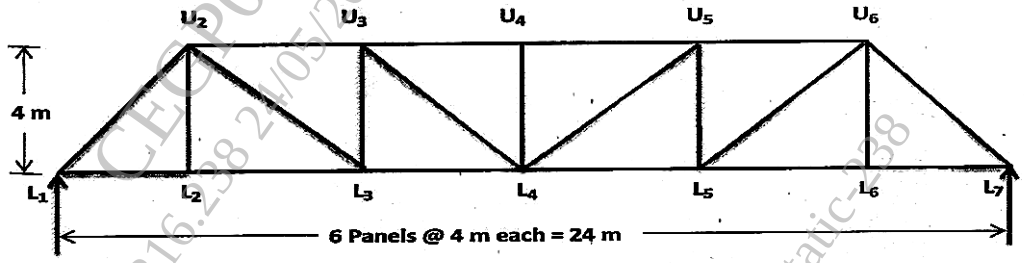

Figure 8

Q5) (a) A symmetric semicircular three hinged arch of span 20 m carries a uniformly distributed load of 60 kN/m on the left half of span as shown in figure 9. Determine BM, Normal thrust and Radial shear at a section D, 4 m from the left support. **[07]**

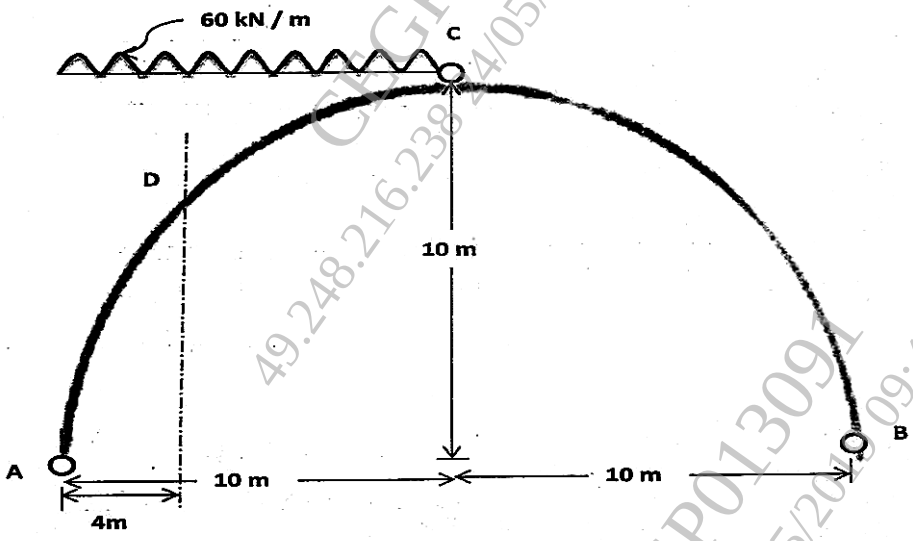

Figure 9

(b) Derive an expression for horizontal thrust when entire span of two hinged parabolic arch is loaded with uniformly distributed load of intensity w kN/m. **[06]**

[OR]

Q6) A three hinged parabolic arch having supports at different levels as shown in figure 10 carries uniformly distributed load of 30kN/m over the left portion of the crown. Determine the horizontal thrust developed. Find also Bending moment, Normal Thrust and Radial shear at a section 15 m from the left support. **[13]**

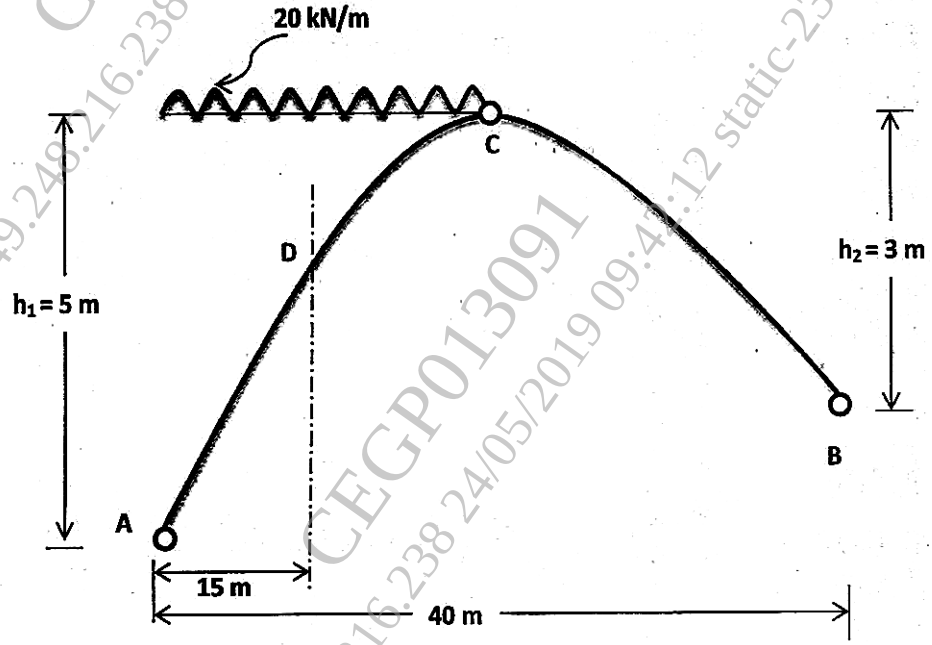

Figure 10

Q7) (a) Determine the shape factor for unsymmetrical I section whose

Top flange = 100 mm x 20 mm.

Bottom flange = 150 mm x 20 mm.

Depth of web = 150 mm.

Thickness of web = 20mm. **[08]**

(b) Draw the beam mechanism, sway mechanism and combined mechanism for the frame shown in figure11. **[05]**

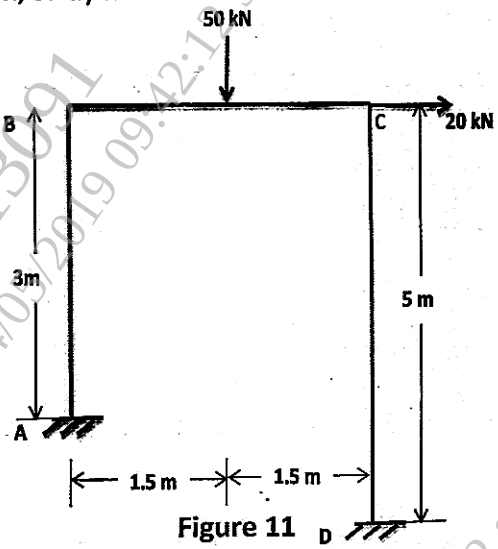

Figure 11

[OR]

Q8) (a) For the frame ABCD subjected to collapse load system shown in figure 11, determine the plastic moment required. **[08]**

(b) Determine the shape factor for symmetric triangle of base "b" and height "h". **[05]**