

[5152]-509

**S.E. (Civil) (Semester - II)**  
**STRUCTURAL ANALYSIS - I**  
**(2015 Pattern)**

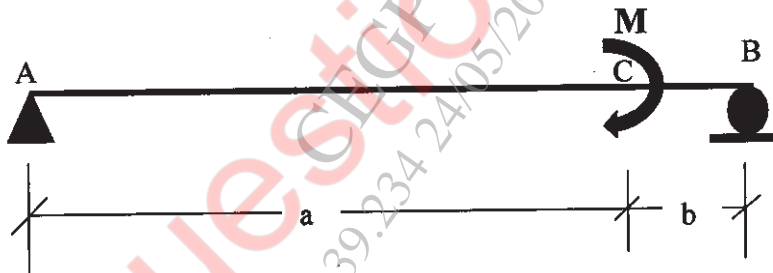
Time : 2 Hours]

[Max. Marks : 50]

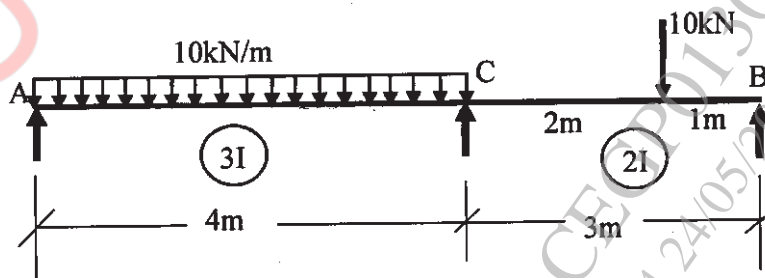
Instructions to the candidates:

- 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 indicates full marks.
- 4) Assume suitable data, if necessary.
- 5) Use of electronic pocket calculator is allowed.

- Q1) a) Derive equation to determine slope at 'A' by Macaulay's method. 'EI' is constant. [L=a+b] [6]

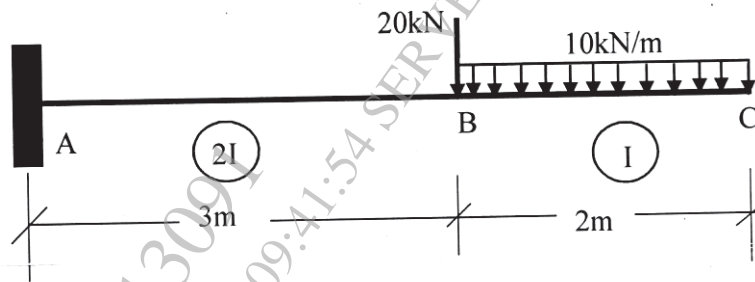


- b) Analyze the continuous beam shown below by Clapeyron's theorem [6]

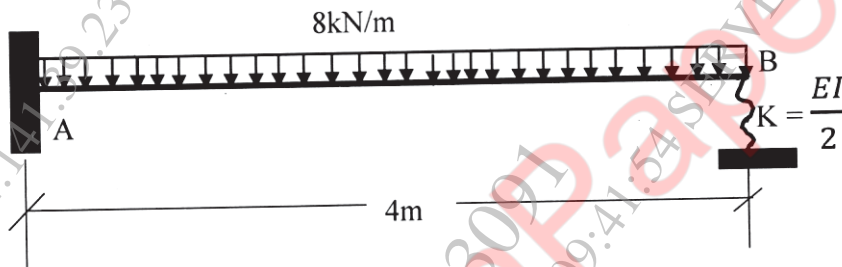


P.T.O.

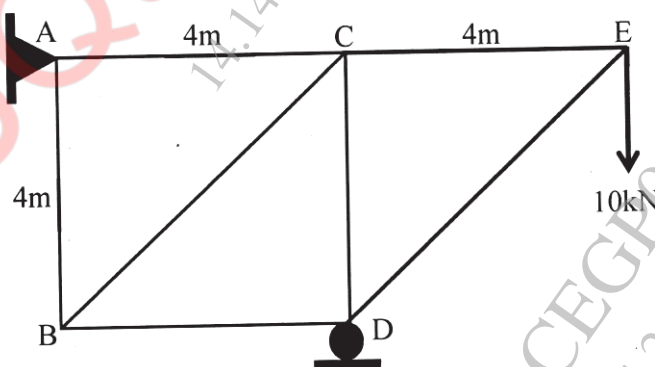
- Q2) a)** Find slope and deflection at point 'B' for cantilever beam by conjugate beam method [6]



- b)** Analyze the beam by Castigliano's second theorem [6]



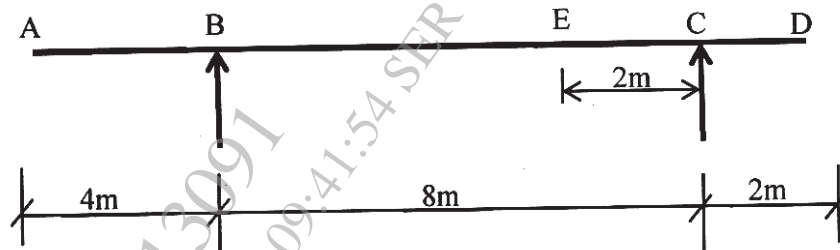
- Q3) a)** A pin jointed truss as shown below is loaded by a vertical load of 104kN. Find the vertical deflection of joint 'E'. The axial flexibility of all members is 0.3mm/kN. [6]



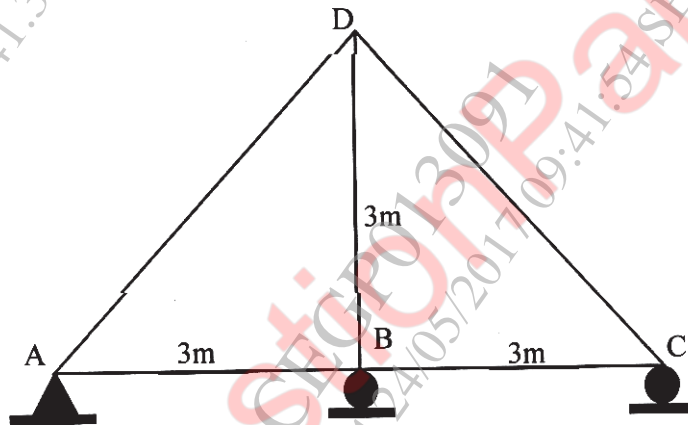
- b)** A beam shown below is subjected to a uniformly distributed load of 100 kN/m which may occupy any position of girder ABCD. Calculate

maximum positive shear force and bending moment at 'E'.

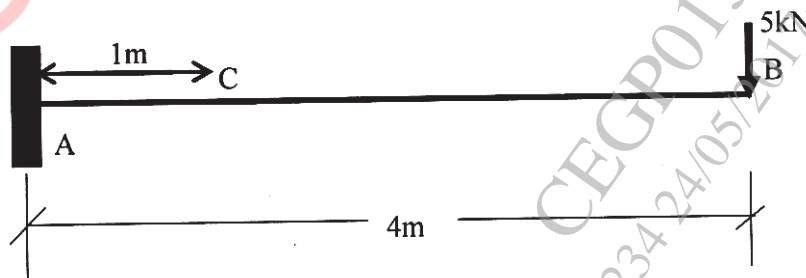
[6]



- Q4) a) Analyze the truss as shown below, if support 'B' sinks by 2mm  
 $A=400\text{mm}^2$ ,  $E=2 \times 10^5 \text{MPa}$ . [6]

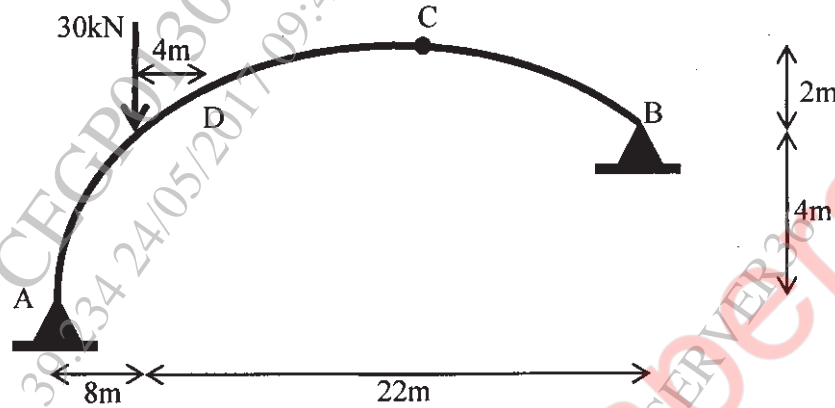


- b) For the cantilever beam shown below, calculate reactions at fixed end and shear force and bending moment at 'C' by influence line diagram method. Also draw influence line diagrams [6]



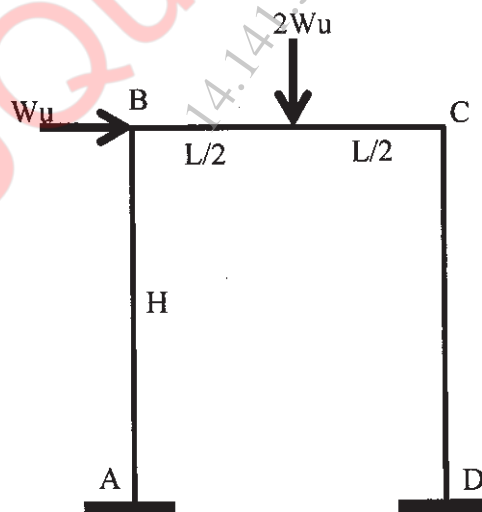
**Q5)** A three hinged parabolic arch is loaded and supported as shown in figure below. Determine [13]

- Support reactions
- Normal thrust and radial shear at a distance of 12m from support 'A'.

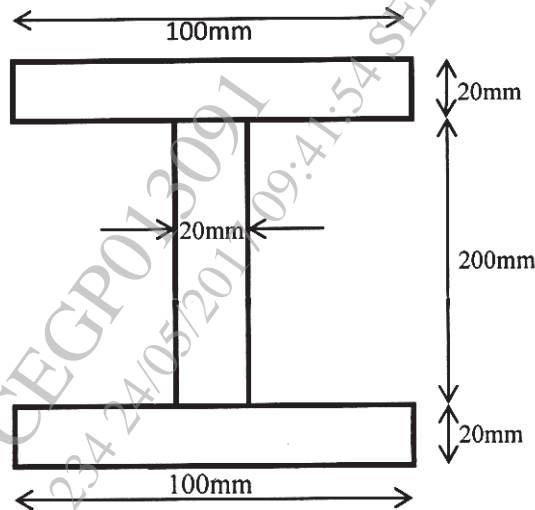


**Q6)** Prove  $H = \frac{\int Myd_s}{\int y^2 d_s}$  and determine horizontal thrust for concentrated load 'W' at crown of two hinged parabolic arch. [13]

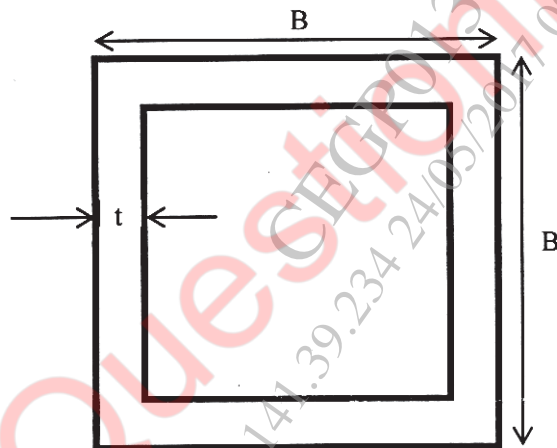
**Q7) a)** For the portal frame shown below draw various mechanisms possible. [4]



- b) For the cross section of the beam shown below find the shape factor and plastic moment if permissible stress in compression and tension is 250MPa. [9]



- Q8) a) For the cross section shown below, find the shape factor [9]



- b) Write a note on elastic-plastic bending [4]

❧❧❧