

Total No. of Questions : 4]

SEAT No. :

P-5376

[Total No. of Pages : 2

[6186]-502

S.E. (Civil) (Insem)

MECHANICS OF STRUCTURE

(2019 Pattern) (Semester - III) (201002)

Time : 1 Hour]

[Max. Marks : 30

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4.
- 2) Neat diagrams must be drawn wherever necessary
- 3) Figures to the right indicates full marks.
- 4) Use of non-programmable electronics calculator is allowed.
- 5) Assume suitable data, if necessary.
- 6) Assessment will be based on complete solution and not on final answer.

- Q1) a) A square bar ABCD of uniform cross section  $30 \times 30$  mm dimension is subjected to loads as shown in Figure 1. Find the total elongation of the bar and the maximum stress in the bar. If  $E = 200$  GPa. Length of members AB = 500 mm, BC = 1100 mm, CD = 900 mm respectively. [7]

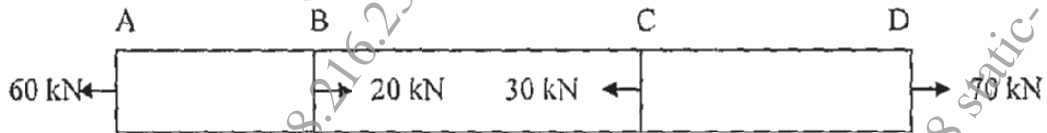


Figure 1

- b) A reinforced cement concrete short column  $700 \text{ mm} \times 600 \text{ mm}$  has eight steel bars of 25 mm diameter as reinforcement. Find the stresses in steel and concrete and the elastic shortening of the column if  $E_s = 210,000 \text{ N/mm}^2$  for steel and  $E_c = 10,000 \text{ N/mm}^2$  for concrete. Load on column is 3000 kN having length of column is 3 m. [8]

OR

- Q2) a) The length of an aluminium bar 20 mm diameter and 500 mm long increases to 500.22 mm when subjected to a tensile force of 3 kN. Find the stress, strain in the bar and the value of E for aluminium. [5]

P.T.O.

- b) A concrete column of size  $400 \text{ mm} \times 400 \text{ mm}$  is reinforced with six bars of  $16 \text{ mm}$  diameter is subjected to rise in temperature by  $50^\circ\text{C}$ . Determine the stresses developed in steel and concrete by assuming  $E_c = 13 \text{ GPa}$ ,  $E_s = 200 \text{ GPa}$  and  $\alpha_c = 5 \times 10^{-6}/^\circ\text{C}$ ,  $\alpha_s = 12 \times 10^{-6}/^\circ\text{C}$ . [10]

- Q3) a) Draw the Shear force diagram and Bending moment diagram for a beam ABCD as shown in figure 2. [7]

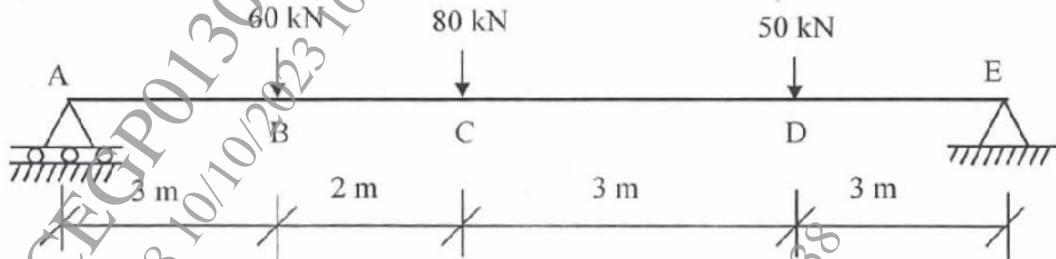


Figure 2

- b) Draw the Shear force diagram (SFD) and Bending moment diagram (BMD) for a beam ABCD as shown in figure 3. [8]

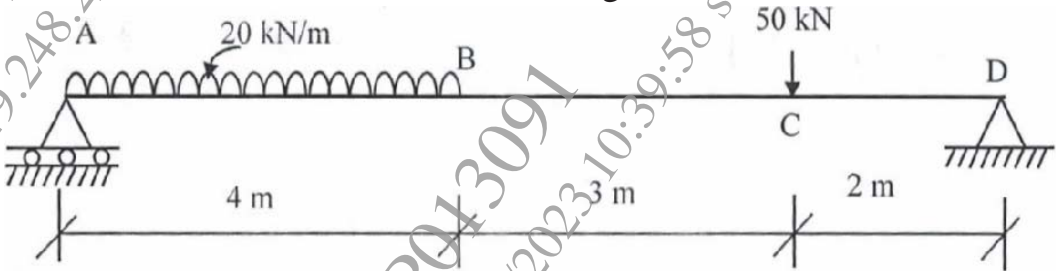


Figure 3

OR

- Q4) a) Draw bending moment diagram and loading diagram from given shear force diagram as shown in figure 4. [8]

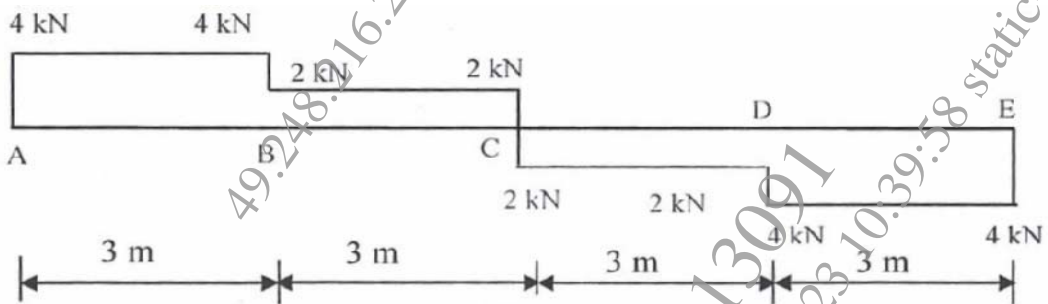


Figure 4

- b) Draw the shear force and bending moment diagram of cantilever beam as shown in figure 5. [7]

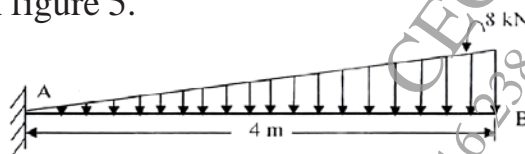


Figure 5