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 × 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]**

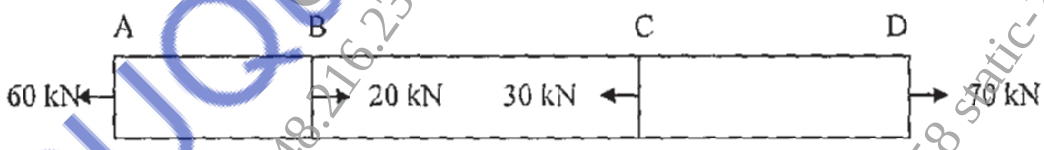

Figure 1

b) A reinforced cement concrete short column 700 mm × 600 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 N/mm^2 for steel and E_c = 10,000 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 mm × 400 mm is reinforced with six bars of 16 mm diameter is subjected to rise in temperature by 50°C. Determine the stresses developed in steel and concrete by assuming E_c = 13 GPa, E_s = 200 GPa and $\alpha_c = 5 \times 10^{-6}$/°C, $\alpha_s = 12 \times 10^{-6}$/°C. **[10]**

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

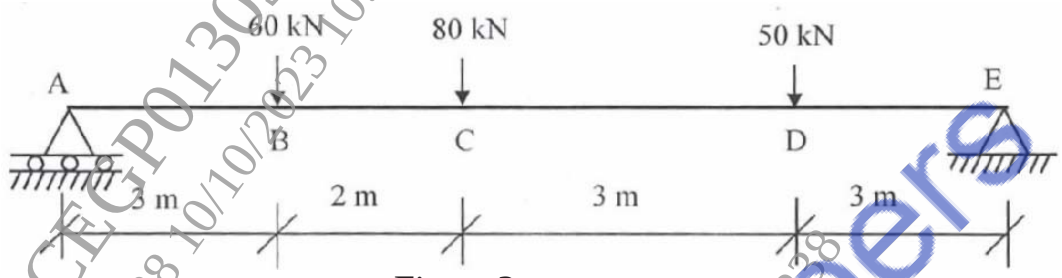

Figure 2

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

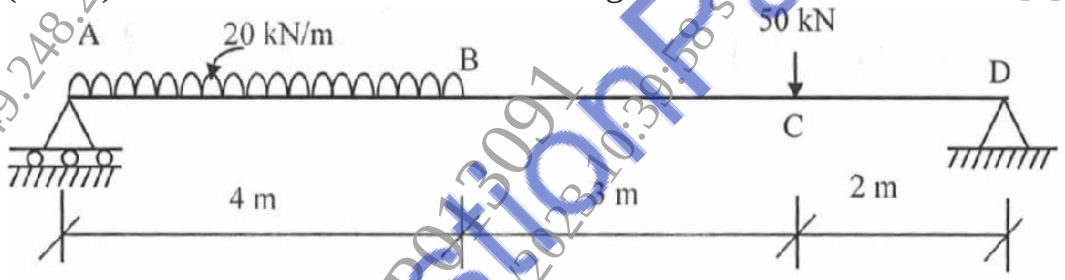

Figure 3

OR

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

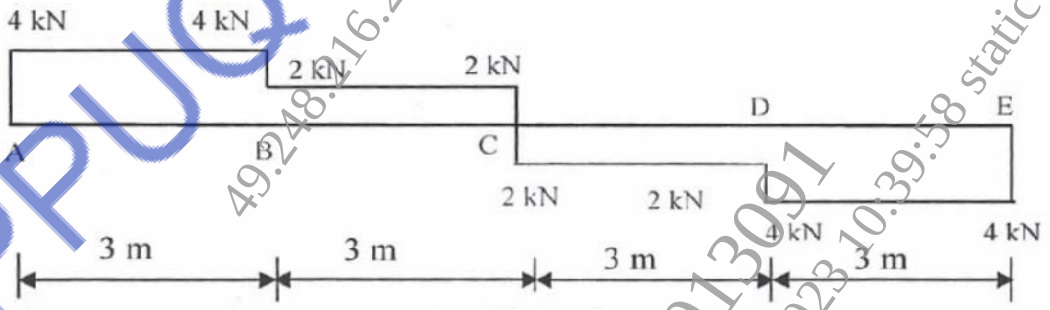

Figure 4

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

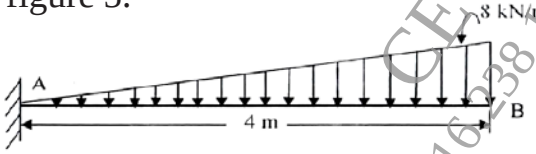

Figure 5