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18ENG25

Second Semester B.Arch. Degree Examination, June/July 2023
Building Structures – II

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1   a. State and explain "Poisson's ratio". **(04 Marks)**
    b. Explain the concept of temperature stresses. **(04 Marks)**
    c. A mild steel bar 2000 mm long and of dia 30 mm is subjected to an axial pull of 30 kN. If $E = 2 \times 10^5 \, N/mm^2$. Calculate stress, elongation of the bar and strain. **(12 Marks)**

OR

2   a. A bar which tapers uniformly from 50 mm diameter to 30 mm diameter in a length of 500 mm, is subjected to an axial pull of 6000 N. $E = 2 \times 10^5 \, N/mm^2$. Calculate the extension of the bar. **(07 Marks)**
    b. A rectangular bar of steel is 3000 mm long and 10 mm thick. The bar is subjected to an axial pull of 50 kN. The width of the bar varies from 70 mm at one end to 28 mm at the other end. If $E = 2 \times 10^5 \, N/mm^2$, calculate the extension of the bar. **(07 Marks)**
    c. State and explain the elastic constants and their relationship. **(06 Marks)**

Module-2

3   a. State and explain the concept of pure bending with illustration. **(04 Marks)**
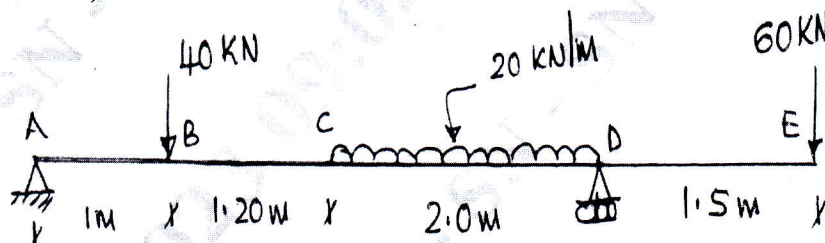   b. Draw SFD and BMD, indicate the salient values. **(16 Marks)**

Fig. Q3 (b)

OR

4   a. State and explain "Point of Contraflexure" with illustration. **(05 Marks)**
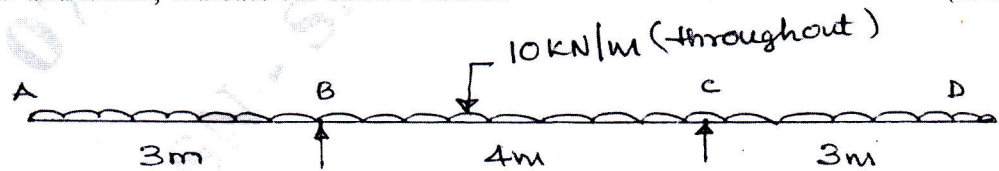   b. Draw SFD and BMD, indicate the salient values. **(15 Marks)**

Fig. Q4 (b)

Module-3

5 a. State and explain simple bending equation with usual notations. **(05 Marks)**

   b. A rectangular beam of width 250 mm and depth 480 mm is subjected to a BM of 200 kNm and SF of 150 kN. Sketch the variation of bending stress and shear stress across the cross section of the beam. **(15 Marks)**

OR

6 a. State and explain the equation to calculate shear stress across the cross section of a beam, with usual notations. **(05 Marks)**

   b. A T-beam of flange 100×15 mm and web 20×120 mm is subjected to a BM of 20 kNm and SF of 18 kN. Sketch the variation of bending stress and shear stress. **(15 Marks)**

Module-4

7 a. With neat sketches explain the effective length of a column for different end conditions. **(08 Marks)**

   b. A hollow mild steel tube 5000 mm long, 40 mm internal diameter and 5 mm thick wall, is used as a strut with both ends hinged. Calculate the crippling load if $E = 2 \times 10^5$ N/mm^2. Also calculate the safe load with a factor of safety 3. **(12 Marks)**

OR

8 a. State the assumptions made in Euler's theory of Long columns. **(06 Marks)**

   b. A hollow circular column of diameter ratio 0.75 is to carry an axial load of 250 kN with a factor of safety of 4. $E = 2.10 \times 10^5$ N/mm^2. Calculate the diameters if the length of the column is 6000 mm with one end fixed and other hinged. **(14 Marks)**

Module-5

9   Calculate the slope at the supports and deflection under the loads for the beam shown in Fig. Q9. $E = 2 \times 10^8$ kN/m^2, $I = 0.0003$ m^4 **(20 Marks)**
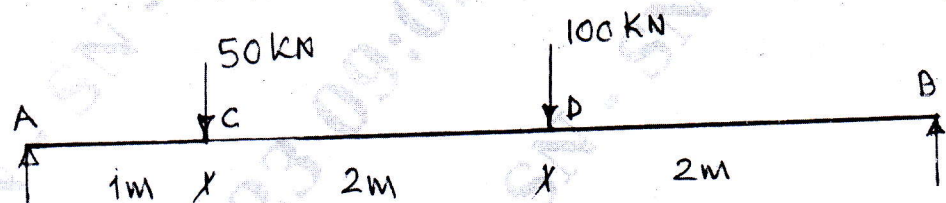

Fig. Q9

OR

10   Calculate the slope at E and deflection at C and D for the beam shown in Fig. Q10. $EI = 15000$ kNm^2. **(20 Marks)**
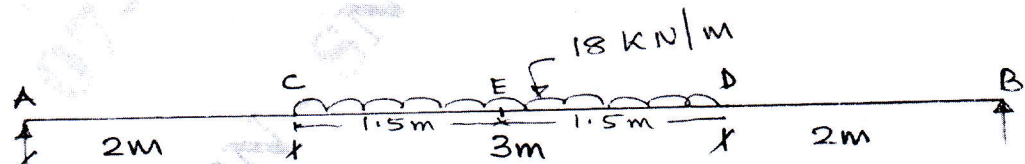

Fig. Q10

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