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18ENG25

Second Semester B.Arch. Degree Examination, July/August 2021
Building Structures II

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions.***

1 a. State and explain 'Poisson's ratio'. **(04 Marks)**

b. A bar 2000mm long and 30mm dia is subjected to an axial pull of 30kN. If E of the material is 2.0×10^5 N/mm^2, calculate:
i) Stress
ii) Elongation of the bar
iii) Strain. **(06 Marks)**

c. An axial pull of 40kN is acting on a bar consisting of three sections of length 300mm, 250mm, and 200mm of dia 20mm, 40mm and 50mm respectively. E = 2×10^5N/mm^2. Calculate:
i) Stress in each section
ii) Total elongation of the bar. **(10 Marks)**

2 a. State the relationship between elastic constants. **(05 Marks)**

b. A rod which tapers uniformly from 50mm dia to 30mm dia in a length of 500mm is subjected to an axial pull of 6000N. E = 200kN/mm^2, calculate the elongation of the bar. **(05 Marks)**

c. Calculate the dia 'D' of the bar shown Fig Q2(c) if the total elongation of the ABCD is 1.65mm. E = 2×10^5N/mm^2, All dimensions in 'mm'

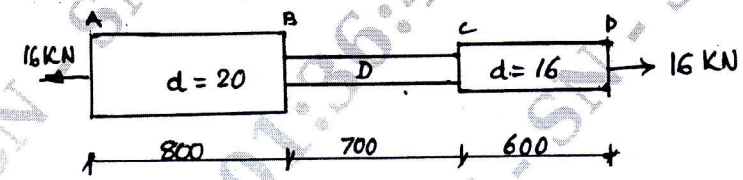

Fig Q2(c) **(10 Marks)**

3 a. Define 'bending moment' and 'Shear Force' at any section of a beam. **(03 Marks)**

b. Draw SFD and BMD for the beam shown in Fig Q3(b)

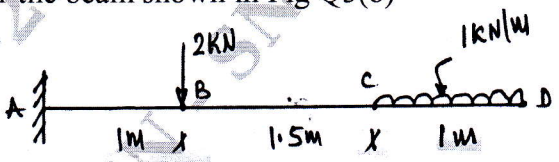

Fig Q3(b) **(07 Marks)**

c. Draw SFD and BMD for the beam shown in Fig Q3(c). Indicate the salient values.

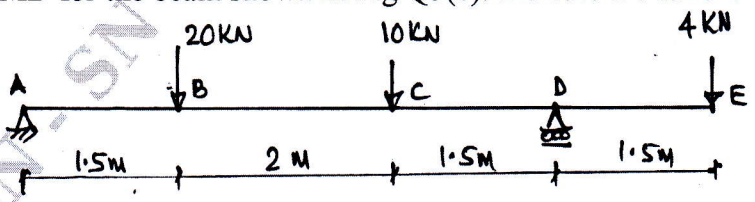

Fig Q3(c) **(10 Marks)**

4 a. Define "Bending moment diagram" "Shear Force" and "point of contrflexture". **(06 Marks)**

b. Draw SFD and BMD for the beam shown in Fig Q4(b). Indicate the salient values.

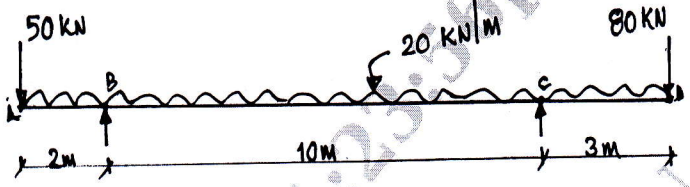

Fig Q4(b) **(14 Marks)**

5 a. State and explain simple bending equations. **(03 Marks)**

b. State and explain shear stress equation. **(03 Marks)**

c. A rectangular beam of width 250mm and depth 480mm is used to support a bending moment of 200kNm and a shear force of 150kN. Sketch the variation of bending stress and shear stress across the cross-section of beam. **(14Marks)**

6 a. Define "Simple bending" with an example. **(04 Marks)**

b. Explain "Section Modulus" with an example. **(04 Marks)**

c. A T-beam of flange 100×15mm and web 20×120mm is subjected to a bending moment of 20kNm and a shear force of 18kN. Sketch the variation of bending stress and shear stress. **(12 Marks)**

7 a. State the expressions for "Effective length of columns" for various end conditions, with neat sketches. (Four standard cases). **(08 Marks)**

b. Calculate the safe load on a hollow cast iron column of 100mm external dia and 70mm internal dia and length 8mt, with one end fixed other end hinged. E = 95kN/mm^2. Factor of safety 4. **(12 Marks)**

8 a. State the assumptions made in the Euler's theory for critical load on long columns. **(06 Marks)**

b. Explain the classification of columns based on "Failure of columns". **(04 Marks)**

c. A column of timber section 100×150mm is 5000mm long with both ends fixed. Calculate :

i) Crippling load on column

ii) Safe load on the column

E = 17.5kN/mm^2, Factor of safety 3. **(10 Marks)**

9 a. Define "Slope" and "Deflection" of a beam with a sketch. **(08 Marks)**

b. Calculate the deflection at the free end of the over – hanging beam shown in Fig Q9(b).

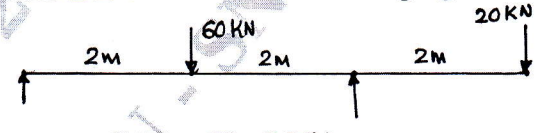

Fig Q9(b) **(12 Marks)**

10 Calculate the slope at the supports and deflection under the loads for the beam shown Fig Q10. E = 2 × 10^8 kN/m^2, I = 0.0003m^4.

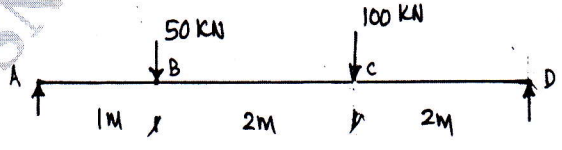

Fig Q10 **(20 Marks)**

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