CBCS SCHEME

USN | | | | | | | | | | |

18ENG25

Second Semester B. Arch. Degree Examination, June/July 2024
Building Structure – II

Time: 3 hrs. Max. Marks: 100

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

Module-1

1 a. Explain stress strain curve for mild steel. **(10 Marks)**

b. A rod of 150mm long and of diameter 2cm is subjected to an axial pull of 20kN. If the modulus of elasticity of the material of the rod is $2 \times 10^5 N/mm^2$, determine: i) stress ii) the strain iii) the elongation of rod. **(10 Marks)**

OR

2 a. Define the following :
i) stress ii) strain iii) Hooke's law. **(06 Marks)**

b. A tensile test was conducted on a mild steel bar. The following data was obtained from the text.
i) Diameter of steel bar = 3cm
ii) Gauge length of the bar = 20cm
iii) Load at elastic limit = 250kN
iv) Extension at a load of 175kN = 0.21mm
v) Max load = 380kN
vi) Diameter of rod at failure = 2.25cm.
Determine : i) Young's modulus ii) Stress at elastic limit iii) Percentage elongation iv) Percentage decrease in area. **(14 Marks)**

Module-2

3 a. Explain BMD and SFD diagram. **(05 Marks)**

b. Define point of contra flexure, point of contra shear. **(05 Marks)**

c. A cantilever beam is subjected to point loads as shown in Fig Q3(c). Draw SFD and BMD.

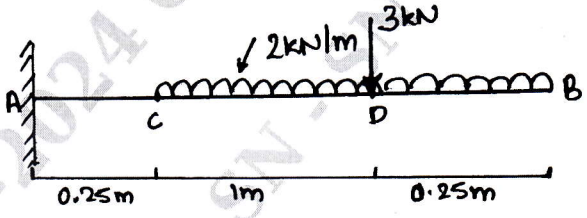

Fig Q3(c) **(10 Marks)**

OR

4 a. Derive the relationship between load intensity, shear force, bending moment. **(10 Marks)**

b. A simply supported beam is subjected to loads as shown Fig Q4(b). Draw SFD and BMD.

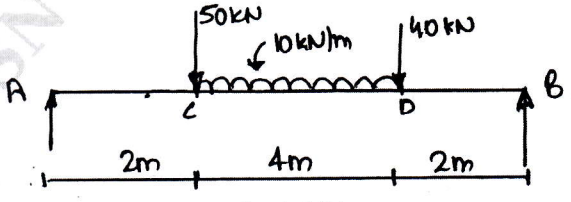

Fig Q4(b) **(10 Marks)**

Module-3

5 a. List the assumption made in Bending theory. **(10 Marks)**

b. The shear force acting on a section of a beam is 50kN. The section of the beam is a T-shaped of dimensions 100mm × 100mm × 20mm as shown in Fig Q5(b). The moment of inertia about the horizontal neutral axis is $314.221 \times 10^4 mm^4$. Calculate the shear at the neutral axis and at the junction of the web and the flange.

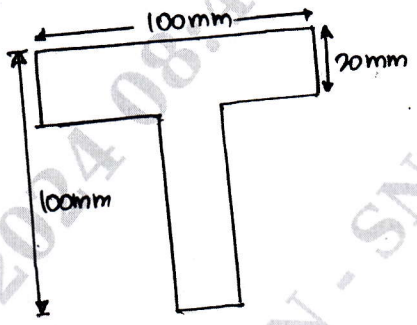

Fig Q5(b) **(10 Marks)**

OR

6 a. Explain theory of simple bending. **(06 Marks)**

b. An I section beam of 150mm × 400mm has a web thickness of 10mm and a flange thickness of 25mm of the shear force acting on the section in 40kN. Sketch the shear stress distribution across the section.

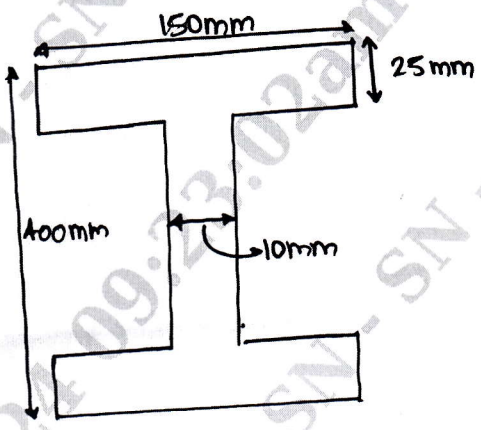

Fig Q6(b) **(14 Marks)**

Module-4

7 a. List the assumption made in Euler's theory of column. **(04 Marks)**

b. Define what is short column and a long column. **(06 Marks)**

c. A solid round bar 3m long and 5cm in diameter is used as a struct with both ends hinged. Determine the crippling load. Take $E = 2 \times 10^5 N/mm^2$. Also find the crippling load when both side are fixed. **(10 Marks)**

OR

8 a. Write expression for crippling load

i) One end fixed other end hinged
ii) Both ends fixed
iii) One end fixed and other pin jointed
iv) Both ends hinged. **(04 Marks)**

b. Define : i) Crushing load ii) Crippling load. **(04 Marks)**

c. A hollow alloy tube 4m long with external and internal diameter of 40mm and 25mm respectively was found to extend 4.8mm under a tensile load of 60kN. Find the buckling load for the tube with both ends pinned. Also find the safe load on the tube, taking a factor of safety of 5. **(12 Marks)**

Module-5

9 a. List the assumption made in deriving equations for moment curvature relationship. **(04 Marks)**

b. Define i) Deflection ii) Slope iii) Deflection curve. **(06 Marks)**

c. A rectangular beam 300mm deep is simply supported over a span of 4m. Determine the UDL which the beam may carry if the bending stress shall not exceed $120 N/mm^2$. Take $I = 8 \times 10^6 mm^4$. **(10 Marks)**

OR

10 a. A beam of uniform rectangular section 200mm wide and 300mm deep is simply supported at its ends. If carries a uniformly distributed load of 9kN/m run over the entire span of 5m. If the value of E is $1 \times 10^4 N/mm^2$, find : i) the slope at the support ii) max deflection. **(12 Marks)**

b. A beam 4m long, simply supported at its ends, carries a point load W at its centre. If the slope at the ends of the beam is not to exceed 1°, find the deflection at the centre of the beam. **(08 Marks)**

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