USN

14ENG2.5

Second Semester B. Arch Degree Examination, June/July 2015

Building Structures - II

Time: 4 hrs. Max. Marks:100

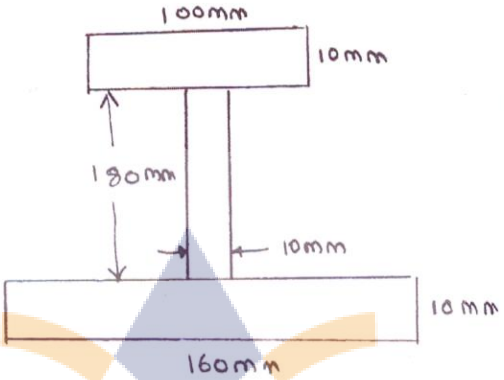
Note: ***Answer any FIVE full questions, Choosing one question from each module.***

MODULE I

1 a. Define centroid and difference between centroid and centre of gravity. **(06 Marks)**

b. Locate the centroid of the beam in Fig. Q1(b).

Fig. Q1(b).

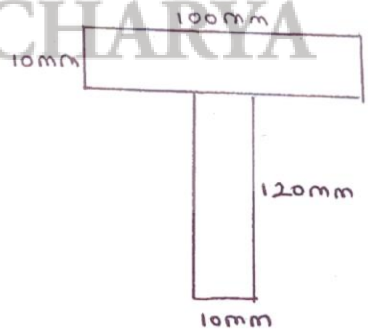


(14 Marks)

2 a. Explain the concept and significance of moment of inertia and the parallel axis theorem of moment of inertia. **(06 Marks)**

b. Find the moment of inertia about centroidal axis in Fig Q2 (b)

Fig. Q2(b).



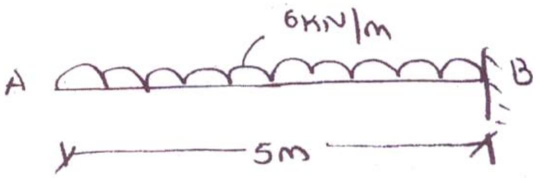
(14 Marks)

MODULE II

3 a. Define shear force and bending moment with sign convention. **(06 Marks)**

b. Compute Reactions and draw shear force and B.M.D in Fig Q3 (b). **(14 Marks)**

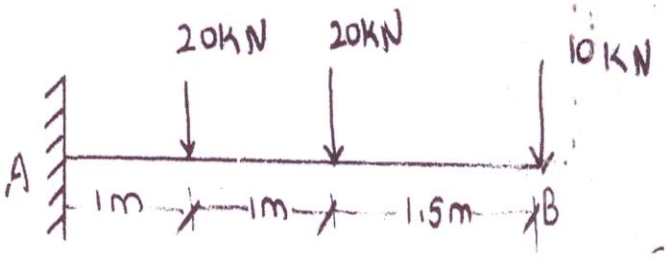
Fig. Q3(b).



Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

4 a. Calculate share force and banding moment. Draw SFD and BMD for Fig Q4(a). **(14 Marks)**

Fig. Q4(a).



b. Draw share stress diagrams for symmetrical I – Section, T – sections of Rectangular sections. **(06 Marks)**

MODULE III

5 a. Define section modules in theory of bending. **(05 Marks)**

b. A beam having hollow rectangular section with dimensions 120 × 120mm with a uniform wall thickness of 10mm and is simply supported for length 6mt. If the beam carries UDL of 1.2 kN/m, determine the maximum bending stress. **(15 Marks)**

6 a. Determine the deflection for a cantilever beam @ free end with concentrated load 'W'@ free end. Given W = 30kN, L = 3m, $E = 2\times10^5$ N/mm^2, $I = 2\times10^8$ mm^4. **(10 Marks)**

b. A cast iron beam 40mm wide and 80mm deep is simply supported on a span of 1.2m. The beam carries a point load of 15kN @ the centre. Find the deflection @ the centre. Take E = 108000 N/mm^2. **(10 Marks)**

MODULE IV

7 a. What is the difference between short column and long column **(06 Marks)**

b. A mild steel tube 4mt long 30mm internal diameter and 4mm thick is used as s strut with both ends hinged. Find the collapsing load $E = 2.1\times10^5$ N/mm^2. **(14 Marks)**

8 a. Define Slenderness ratio. **(06 Marks)**

b. Determine the Euler's crippling load for an I section column 400×200×10mm, having a length of 5mt, which is used as a strut with both ends fixed, Take $E = 2.1\times10^5$ N/mm^2 FS = 3. **(14 Marks)**

MODULE V

9 The cross section of a square concrete column is 500 × 500mm with 8 vertical, 12mm ϕ bars. Determine the strength of column w.r.t steel and concrete separately for the given stresses in steel and concrete. Stresses are

i) $415\,\text{N/mm}^2$ (steel), $20\dfrac{\text{N}}{\text{mm}^2}$ (concrete)

ii) $500\dfrac{\text{N}}{\text{mm}^2}$ (steel), $25\dfrac{\text{N}}{\text{mm}^2}$ (concrete)

iii) $250\dfrac{\text{N}}{\text{mm}^2}$ (steel), $15\dfrac{\text{N}}{\text{mm}^2}$ (concrete) **(20 Marks)**

10 A circular cross section of 350mm diameter size is reinforced with 6 vertical bases of 20mm diameter. Determine the strength of concrete and steel with following data.

i) $fy = 250 N/mm^2$, $fck = 15 N/mm^2$

ii) $fy = 415 \frac{N}{mm^2}$, $fck = 20 N/mm^2$

iii) $fy = 500 \frac{N}{mm^2}$, $fck = 25 N/mm^2$

Fy → stress in steel

Fck → stress in concrete.

(20 Marks)

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