CBCS Scheme

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15ENG2.5

Second Semester B.Arch. Degree Examination, June/July 2018
Building Structures – II

Time: 3 hrs. Max. Marks: 100

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

Module-1

1 a. Define centroid. State and prove parallel axis theorem of moment of inertia. **(08 Marks)**

b. Locate the centroid of the beam in Fig. Q1 (b). **(12 Marks)**

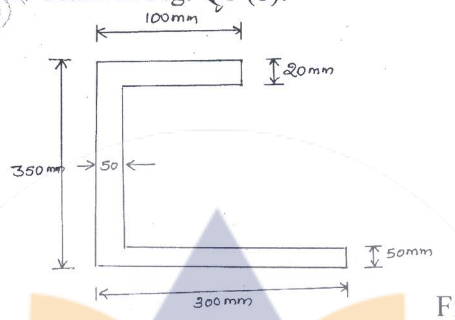

Fig. Q1 (b)

OR

2 a. Explain in brief different types of supports with an example. **(06 Marks)**

b. Find the moment of inertia about centroidal axis in Fig. Q2 (b). **(14 Marks)**

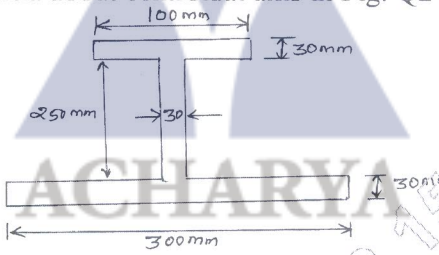

Fig. Q2 (b)

Module-2

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

b. Compute the reactions and draw shear force diagram and bending moment diagram for simply supported beam in Fig. Q3 (b). **(14 Marks)**

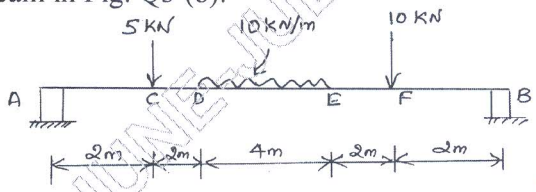

Fig. Q3 (b)

OR

4 a. State the assumptions made in theory of simple bending. Draw shear stress diagram for symmetrical I-section. **(06 Marks)**

b. Calculate the shear force and bending moment. Draw shear force diagram and bending moment diagram in Fig. Q4 (b). **(14 Marks)**

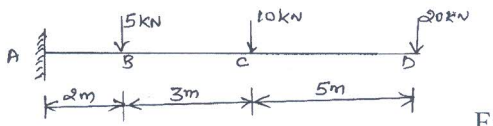

Fig. Q4 (b)

Module-3

5 a. Define moment of inertia with a neat sketch. Also write the expression for section modulus of circular section and I section. **(06 Marks)**

b. A Cast iron bracket, subjected to bending has a cross section of I-shape with unequal flanges, as shown in Fig.Q5(b). If the section is subjected to a shear force of 1600 kN, draw the shear stress distribution over the depth of the section, indicating principal values. **(14 Marks)**

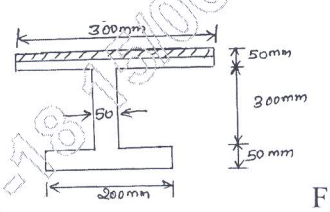

Fig. Q5 (b)

OR

6 a. A beam AB of 8 m span is simply supported at the ends as shown in Fig. Q6 (a). Determine (i) Deflection at 'C' (ii) Maximum deflection. Take $E = 2\times10^5$ N/mm^2 & I = 1000 cm^4. **(14 Marks)**

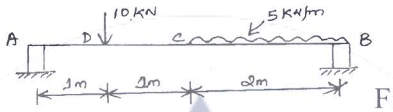

Fig. Q6 (a)

b. Define bending stresses and shear stresses in beams. **(06 Marks)**

Module-4

7 a. Write the difference between short column and long column. **(05 Marks)**

b. Determine the buckling load for a strut of T-section, flange width being 100 mm, overall depth 80 mm and both flange and stem are 10 mm thick. The strut is 3 m long and is hinged at both the ends. Take E = 200 N/mm^2. **(15 Marks)**

OR

8 a. Define slenderness ratio, effective length, buckling load. **(06 Marks)**

b. Determine Euler's crippling load for an I-section column as shown in Fig. Q8 (b), having a length of 6 m which is used as a strut with both ends fixed. Take $E = 2\times10^5$ N/mm^2, Factor of safety = 3. **(14 Marks)**

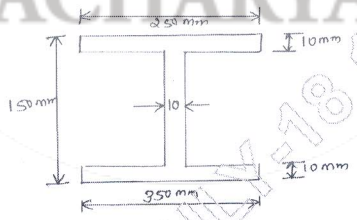

Fig. Q8 (b)

Module-5

9 The cross sectional area of a square concrete column is 400 mm × 400 mm with 6 vertical, 12 mm ϕ bars. Determine the strength of column with respect to steel and concrete separately for the given stresses in steel and concrete. Stresses are :

(i) 415 N/mm^2 (steel), 20 N/mm^2 (concrete)
(ii) 500 N/mm^2 (steel), 25 N/mm^2 (concrete)
(iii) 250 N/mm^2 (steel), 15 N/mm^2 (concrete) **(20 Marks)**

OR

10 A circular cross-section of 300 mm diameter size is reinforced with 6 bars of 16 mm diameter. Determine the strength of concrete and steel with following data:

(i) $f_y = 250$ N/mm^2, fck = 15 N/mm^2 (iii) $f_y = 500$ N/mm^2, fck = 25 N/mm^2

(ii) $f_y = 415$ N/mm^2, fck = 20 N/mm^2

where fck = stress in concrete, f_y = stress in steel. **(20 Marks)**

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