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14ENG2.5

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

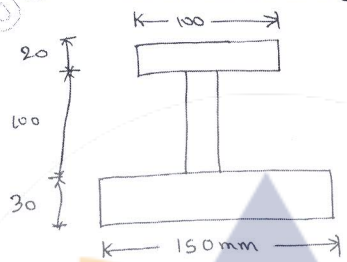
Time: 3 hrs. Max. Marks:100

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

Module – 1

1 a. Explain the method of moments to locate the centroid of plane areas. **(06 Marks)**

b. Locate the centroid at the I-section shown in Fig. Q1 (b). **(14 Marks)**



All dimensions are in mm

Fig. Q1 (b)

2 a. Explain (i) MOI (ii) Radius of gyration (iii) Polar moment of inertia. **(06 Marks)**

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

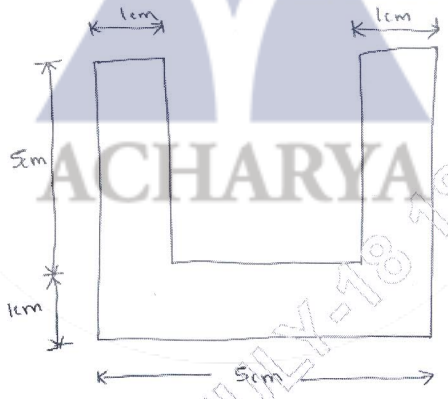


Fig. Q2 (b)

Module – 2

3 a. Explain briefly with a neat sketch different types of supports. **(06 Marks)**

b. Draw SFD and BMD for a Cantilever beam shown in Fig. Q3. **(14 Marks)**

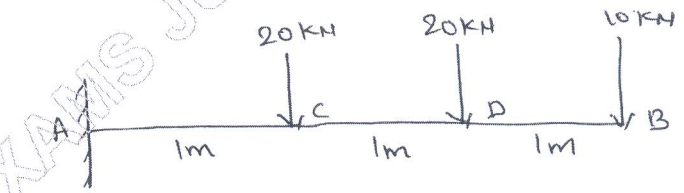


Fig. Q3

4 a. Draw SFD and BMD for simply supported beam shown in Fig. Q4. **(14 Marks)**

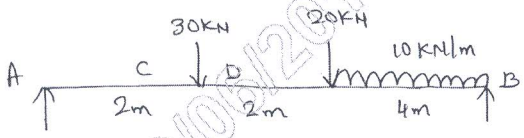


Fig. Q4

b. Explain theory of simple bending. **(06 Marks)**

Module – 3

5 a. What are the assumptions of simple theory of bending? **(06 Marks)**

b. A circular pipe of external diameter 70 mm and thickness 8 mm is used as a simply supported beam over an effective span 2.5 m. Find the maximum concentrated load that can be applied at the centre of the span if the permissible stresses in tube is 150 N/mm^2. **(14 Marks)**

6 a. A Cantilever beam of span 1 m has rectangular cross-section of size 200×400 mm. Determine the concentrated load which placed at the free end produce shear stress of intensity 1.5 N/mm^2. Hence compute maximum bending stresses in the cross section at the fixed end of Cantilever. **(14 Marks)**

b. Explain the limitation of simple bending theory. **(06 Marks)**

Module – 4

7 a. State the limitations of Euler's theory. **(06 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 10 mm thick. The strut is 3 m long and is hinged at both end. Take E = 200 GH/m^2. **(14 Marks)**

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

b. Determine the section of a cast iron hollow cylindrical column 3 m long with both ends firmly built in, if it carries an axial load of 800 KN. The ratio of internal to external diameter is 5/8. Use factor of safety is 4. Take f_c = 550 N/mm^2 and Rankine's constant for both ends hinged case = $\frac{1}{1600}$. **(14 Marks)**

Module – 5

9 Design a circular column with ties to carry an ultimate load of 2500 KN. The unsupported length of the column is 3 m. The ends of the column are effectively held in position but not against rotation. The grade of concrete and steel are,

(i) M20 and Fe415 respectively.

(ii) M25 and Fe500 respectively. **(20 Marks)**

10 a. What are the assumptions made for design of axially loaded short columns? **(06 Marks)**

b. Design the reinforcement in a circular column of diameter 300 mm to support a service load of 800 KN. The column has an unsupported length of 3 m and is braced against side sway. The column is reinforced with helical ties. Adopt M20 grade concrete and Fe415 Hgsd bars. **(14 Marks)**

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