CBCS SCHEME

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

15ENG25

Second Semester B.Arch. Degree Examination, Aug./Sept. 2020
Building Structures – 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 the following briefly:
(i) Centroid (ii) Moment of inertia (iii) Section modulus
(iv) Radius of gyration **(10 Marks)**

b. Locate the centroid for the figure shown below: **(10 Marks)**

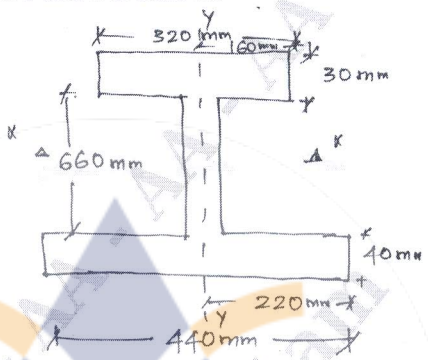

Fig. Q1 (b)

OR

2 a. Derive parallel axis theorem. **(10 Marks)**

b. Find moment of inertia along X-X axis as indicated in the Fig. Q2 (b). **(10 Marks)**

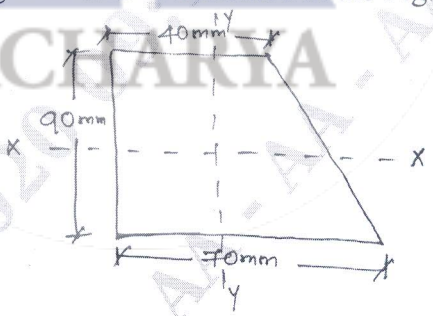

Fig. Q2 (b)

Module-2

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

b. Draw shear force diagram and bending moment diagram for the following figure Fig. Q3(b). **(14 Marks)**

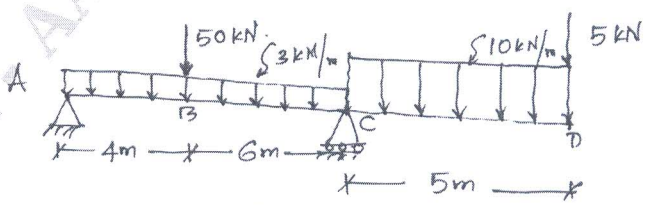

Fig. Q3 (b)

OR

4 a. Derive bending equation. **(10 Marks)**

b. A Cantilever is 3 m long with 150×230 mm rectangular cross-section carries a concentrated load of 40 kN at the end. What maximum bending stress will be developed at the base of the cantilever? **(10 Marks)**

Module-3

5 a. A simply supported beam spans 4 m and carries Udl of 2 kN/m. Compare stresses for the following sections taking moment of inertia along X-X axis as indicated. **(14 Marks)**

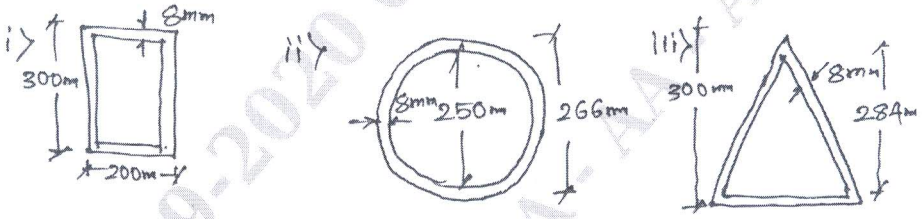

Fig. Q5 (a)

b. Find the section modulus for the above figures at maximum compressive stress level. **(06 Marks)**

OR

6 a. A timber beam spans 4 m carries a Udl of 4 kN/m, 100×200 mm timber section is used if the modulus of elasticity in the timber is $E = 0.125 \times 10^5$ N/mm^2. Find the maximum deflection in the timber beam. **(10 Marks)**

b. A simply supported steel beam shown in Fig. Q6 (b) is used to span 5 m and carries a load of 25 kN/m including its own weight. Calculate the maximum deflection in the beam. If modulus of elasticity is $E = 2.1 \times 10^5$ N/mm^2 **(10 Marks)**

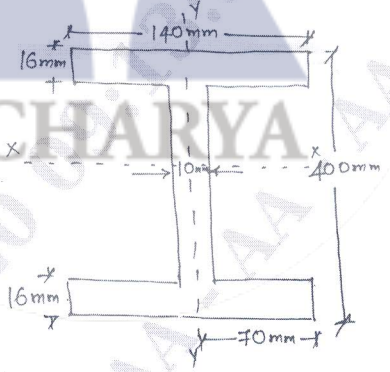

Fig. Q6 (b)

Module-4

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

b. Determine Euler's crippling load for an I-section column $400 \times 200 \times 10$ mm having length of 5 m. Which is used as strut with both ends fixed. Take $E = 2.1 \times 10^5$ N/mm^2. **(14 Marks)**

OR

8 a. What is slenderness ratio? How does this affect the design of column? **(06 Marks)**

b. Determine the section of a cast iron hollow cylindrical column 3 m long with both ends firmly built in. It carries a working Axial load of 800 kN. The ratio of internal to external diameter is $5/8$. Use factor of safety as 4. **(14 Marks)**

Module-5

9 The cross section of a short axially loaded square concrete column is 500×500 mm with 8 vertical bars of 12 mmϕ. Determine the strength of column with respect to steel and concrete separately for the given stresses in steel and concrete.
Stresses are ,

(i) $f_y = 415\,N/mm^2$, $f_{CK} = 20\ N/mm^2$

(ii) $f_y = 500\,N/mm^2$, $f_{CK} = 25\ N/mm^2$

(iii) $f_y = 250\,N/mm^2$, $f_{CK} = 15\ N/mm^2$

f_y - Stress in steel, f_{CK} - Stress in concrete **(20 Marks)**

OR

10 A short axially loaded circular column of 350 mm diameter is reinforced with 6 longitudinal bars of 20 mmϕ. Determine the strength of concrete and steel with the following data:

(i) $f_y = 250\,N/mm^2$, $f_{CK} = 15\ N/mm^2$

(ii) $f_y = 415\,N/mm^2$, $f_{CK} = 20\ N/mm^2$

(iii) $f_y = 500\,N/mm^2$, $f_{CK} = 25\ N/mm^2$

f_y - Stress in steel, f_{CK} - Stress in concrete **(20 Marks)**

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