

Second Semester B.Arch. Degree (CBCS) Examination, Dec.2016/Jan.2017
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. Define centroid and centre of gravity. (06 Marks)
 b. Locate centroid of the following I section shown in Fig.Q1(b). (14 Marks)

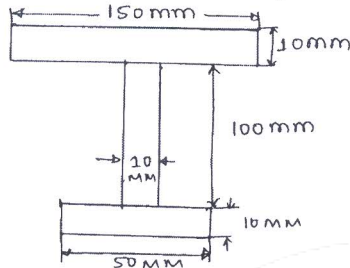


Fig.Q1(b)

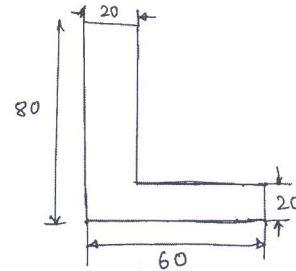


Fig.Q2(b)

- 2 a. State parallel axis theorem of moment of inertia. (04 Marks)
 b. Find the moment of inertia about centroidal axis Fig.Q2(b). (16 Marks)

Module-2

- 3 a. Define i) Bending moment ii) Shear force and explain sign conventions. (06 Marks)
 b. Draw shear force diagram (SFD) and bending moment diagram (BMD) for given beam in Fig.Q3(b). (14 Marks)

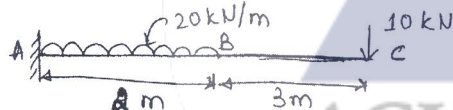


Fig.Q3(b)

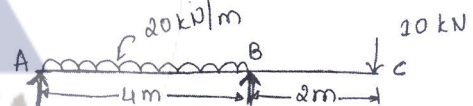


Fig.Q4

- 4 Draw shear force diagram and bending moment diagram for given beam Fig.Q4. (20 Marks)

Module-3

- 5 a. Define section modulus. Write expression for section modulus for (i) rectangular section (ii) circular section. (06 Marks)
 b. Compute bending stress for a simply supported hollow pipe with outer diameter of 60 mm and inner diameter of 20 mm. The pipe carries a uniformly distributed load (UDL) of 1 kN/m on over all span of 4 m. (14 Marks)
- 6 a. A cantilever beam of length 5 m. carries a uniformly distributed load (UDL) of 2 kN/m on entire span. Find out deflection at free end. The cross section of beam is rectangular with size (200mm × 400mm) with $E = 1 \times 10^4 \text{ N/mm}^2$. (12 Marks)
 b. A fixed beam of span 4 m carries a concentrated load of 4 kN at midspan. Find maximum deflection if $E = 2 \times 10^5 \text{ N/mm}^2$, $I = 2 \times 10^8 \text{ mm}^4$. (08 Marks)



Module-4

- 7 a. Define : (i) Crushing load (ii) Crippling load. (04 Marks)
- b. A solid round bar of 3 m long and 50 mm in diameter is used as strut and $E = 2 \times 10^5 \text{ N/mm}^2$. Determine crippling load/crushing load when (i) Both the ends are hinged (ii) One end is fixed and other end is free. (16 Marks)

- 8 a. Define (i) Effective length (ii) Slenderness ratio. (04 Marks)
- b. Determine crippling load for an I-section with $400 \times 200 \times 10 \text{ mm}$ size having length of 6 m used as strut with both ends fixed. $E = 2.1 \times 10^5 \text{ N/mm}^2$ and Factor of safety (FS) = 3. (16 Marks)

Module-5

- 9 a. Define short column and long column according to IS 456:2000. (04 Marks)
- b. Calculate ultimate load carried by a RCC column of size $500 \text{ mm} \times 500 \text{ mm}$ and reinforced with 8 bars of 16 mm diameter. Grade of steel and concrete used are Fe415 and M20 respectively. (16 Marks)

- 10 Calculate ultimate load carried by the circular column of diameter 300 mm and reinforced with 6 bars of 16 mm diameter. Grade of concrete and steel used are
 - (i) M20 and Fe415
 - (ii) M15 and Fe500.(20 Marks)

