# 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.

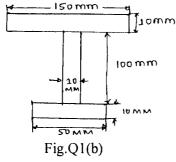
# Module-1

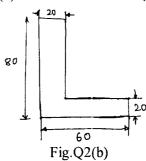
1 a. Define centroid and centre of gravity.

(06 Marks)

b. Locate centroid of the following I section shown in Fig.Q1(b).

(14 Marks)





2 a. State parallel axis theorem of moment of inertia.

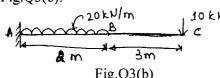
(04 Marks)

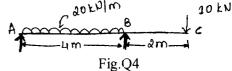
b. Find the moment of inertia about centroidal axis Fig.Q2(b).

(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)





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 sum 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  $\times$  400mm) with  $E = 1 \times 10^4$  N/mm<sup>2</sup>. (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  $400 \times 200 \times 10$ 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 500mm × 500mm 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)

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