BACHELOR OF ARCHITECTURE (B.Arch.)

Term-End Examination

□□□63   **June, 2018**

BAR-044 : THEORY OF STRUCTURES – V

Time : 3 hours   *Maximum Marks : 70*

Note : *Attempt any* **four** *questions. All questions carry equal marks. Use of calculator and IS : 456 code is permitted.*

1. An RCC rectangular beam of width 350 mm and effective depth 600 mm is simply supported with effective span of 5·5 m. The beam carries an imposed UDL of 20 kN/m in addition to self weight. Design the shear reinforcement for the beam if it is reinforced with 4 bars of 28 mm diameter in tension zone. Adopt Fe 415 grade of steel and M 20 grade of concrete. $17\frac{1}{2}$

2. Design a roof slab simply supported on all four edges. The slab has effective size of 4 m × 9 m and carries an imposed UDL of 2 kN/m² in addition to its self weight. Use M 20 grade of concrete and Fe 415 grade of steel. $17\frac{1}{2}$

3. Design a rectangular beam of effective span 6·5 m. The beam is simply supported and carries an imposed UDL of 15 kN/m in addition to its own weight. Adopt M 20 grade of concrete and Fe 415 grade of steel. $17\frac{1}{2}$

4. Determine the moment of resistance of doubly reinforced beam as shown in figure 1.
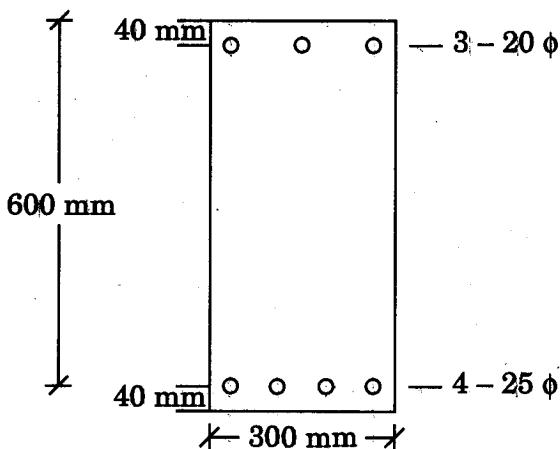

Figure 1

Adopt Fe 500 grade of steel and M 20 grade of concrete. $17\frac{1}{2}$

5. Design the longitudinal and transverse reinforcement for a column of size 300 mm × 450 mm carrying 1400 kN under service dead and live loads. The column has unsupported length of 3 m with both ends effectively held in position but restrained against rotation at one end only. Adopt steel of grade Fe 415 and concrete of grade M 25. $17\frac{1}{2}$

6. Write short notes on the following :

    (a) The necessity of earthquake resistant structures   6

    (b) Punching shear in foundation design $5\frac{1}{2}$

    (c) Requirement of corner reinforcement in two-way slabs if corners are held down   6

7. Design an isolated footing for a rectangular column of size 400 mm × 600 mm. The column carries an axial load of 1800 kN and is reinforced with 6 bars of 25 mm diameter. Use M 20 grade concrete and Fe 500 grade steel. Safe bearing capacity of the soil is 250 kN/m^2. $17\frac{1}{2}$