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BAR-044

BACHELOR OF ARCHITECTURE (B.Arch.)

Term-End Examination

December, 2015

BAR-044 : THEORY OF STRUCTURES – V

Time : 3 hours

Maximum Marks : 70

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

1. A rectangular RCC beam is simply supported on two masonry walls, each 230 mm thick with clear span 6 m. The beam has to carry a live load of 10 kN/m and a dead load of 5 kN/m in addition to its own weight. Design the beam section for maximum moment adopting M-25 grade concrete and Fe 415 grade of steel.

$17\frac{1}{2}$

2. Design the slab of an office floor having effective size of 3 m × 6.5 m. The slab has to carry an imposed load of 4 kN/m² and is simply supported on 250 mm thick masonry walls on all four sides. Assume a suitable floor finish load and adopt M-20 grade of concrete and Fe 415 grade of steel. $17\frac{1}{2}$

3. An RCC beam has effective depth of 550 mm and width of 300 mm. Shear force at critical section is 400 kN. Design the shear reinforcement for the beam, if it contains 4 bars of 25 mm diameter. Adopt M-20 grade of concrete and Fe 415 grade of steel. $17\frac{1}{2}$

4. Design the longitudinal and transverse reinforcement for a column of size 300 mm × 450 mm carrying a factored axial load 2500 kN. The unsupported length of the column is 3.0 m with both ends effectively held in position but restrained against rotation at one end only. Use concrete of grade M-20 and steel of grade Fe 415. $17\frac{1}{2}$

5. A rectangular RC beam, 300 mm × 500 mm (overall depth), is reinforced with 4 bars of 25 mm and in tension with a cover of 30 mm. If the effective span is 5.0 m, calculate the UDL it can support. Use M-20 grade concrete and Fe 500 grade of steel. $17\frac{1}{2}$
6. Design an isolated reinforced concrete footing having uniform thickness for a square column of 400 mm × 400 mm. The column carries an axial load of 1600 kN and is reinforced with 6 bars of 20 mm ϕ . Safe Bearing Capacity of soil is 300 kN/m². Adopt Fe 415 grade of steel and M-25 grade of concrete. $17\frac{1}{2}$
7. Write short notes on the following :
- (a) Principles for Earthquake Resistant Buildings 6
- (b) Need of corner reinforcement in two-way slab if corners are prevented from lifting 6
- (c) Reasons for not designing over reinforced section $5\frac{1}{2}$
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