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BACHELOR OF ARCHITECTURE
(B. ARCH.)
Term-End Examination
June, 2019

BAR-044 : THEORY OF STRUCTURE-V

Time : 3 Hours *Maximum Marks : 70*

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

1. Design a R. C. C. slab of clear span 4 m × 4.5 m. The slab is simply supported on all four edges on 230 mm thick masonry walls and carries a live load of 3 kN/m². Adopt Fe-415 grade of steel and M-20 grade of concrete and assume corners are free to lift. $17\frac{1}{2}$

2. A cantilever beam has span of 4.5 m and uniform width of 250 mm. Design the beam for maximum moment if the beam carries UDL live load of 25 kN/m. Assume width of support as 300 mm and use Fe500 grade of steel and M-20 grade of concrete. $17\frac{1}{2}$

3. A RCC rectangular beam has width of 250 mm and effective depth of 450 mm. Design the shear reinforcement if shear force at critical section is 350 kN. The beam is reinforced with 20 mm diameter bars in tension zone. Use M-25 grade of concrete and Fe-415 grade of steel. $17\frac{1}{2}$

4. Determine the moment of resistance of a doubly reinforced beam section with the following data :

    $b = 250$ mm, $d = 500$ mm, $d' = 40$ mm, $A_{st} = 3$ bars of 25 mm ϕ, $A_{sc} = 2$ bars of 20 mm ϕ, $f_{ck} = 25$ N/mm², $f_y = 415$ N/mm².

    Assume compressive stress in the beam as $0.7 f_y$. $17\frac{1}{2}$

5. A RCC column of size 400 mm × 600 mm has unsupported length of 3 m and is braced against sidesway in the both directions. Design the reinforcement for the column if it is subjected to factored axial load of 3000 kN. Adopt M-20 grade of concrete and Fe-415 grade of steel. $17\frac{1}{2}$

6. A RCC square column of size 450 mm × 450 mm transmits a factored load of 3000 kN to an isolated footing. Design the footing if safe bearing capacity of soil is 200 kN/m². Use M-25 grade of concrete and Fe-415 grade of steel. $17\frac{1}{2}$

7. Write short notes on the following :

   (a) Necessity of doubly reinforced beam section. $5\frac{1}{2}$

   (b) Discuss considerations for earthquake resistant design. 6

   (c) Why are underreinforced sections desirable in Limit State Design Method ? 6