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B.E. / B.Tech. DEGREE EXAMINATION, APRIL 2019

Fifth Semester

Civil Engineering

14UCE501 - DESIGN OF REINFORCED CEMENT CONCRETE AND MASONRY STRUCTURES

(Regulation 2014)

(Use of IS456-2000, IS 1905-1987 and SP16-1980 are permitted)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. Analysis of reinforced concrete can be done by

    (a) straight line theory   (b) elastic theory
    (c) ultimate load theory   (d) all the above

2. The modular ratio is the ratio of

    (a) Young's modulus of steel to the Young's modulus of concrete
    (b) Young's modulus of concrete to the Young's modulus of steel
    (c) load carried by steel to the load carried by concrete
    (d) load carried by concrete to the load carried by steel

3. In singly reinforced beams, steel reinforcement is provided in

    (a)tensile zone   (b) compressive zone
    (c) both (a) and (b)   (d) neutral zone

4. The design bond stress of plain bars in tension in M30 grade of concrete is

    (a) 1.5   (b) 1.2   (c) 1   (d) 1.4

5. If plain bars are used, the area of distribution reinforcement in slabs should not be less than

    (a) 0.12 % of the gross area of concrete
    (b) 0.15 % of the gross area of concrete
    (c) 0.18 % of the gross area of concrete
    (d) 0.21 % of the gross area of concrete

6. The analysis of slab spanning in one direction is done by assuming it to be a beam of

    (a) $l\,m$ length   (b) $l\,m$ width
    (c) $1\,m^2$ area   (d) none of these

7. The slenderness ratio of a RCC long column is greater than

    (a) 20   (b) 15   (c) 12   (d) 16

8. When the ratio of effective length of the column to its least lateral dimension does notexceed12, it is termed as a

    (a) long column   (b) short column
    (c) plain column   (d) none of these

9. The Name of the code used for the design of masonry structures is

    (a) IS 456   (b) SP 16   (c) IS 1905   (d) IS 800

10. Which of the following expression is/are wrong for determining the effective height of masonry pier/wall?

    (a) 0.5 L   (b) 1.5 L   (c) 1 L   (d) none of these

PART - B (5 x 2 = 10 Marks)

11. What is the concept of limit state of design.

12. State the expression for effective flange width for simply supported T beams.

13. Distinguish between one way slab and two way slab.

14. Sketch the critical section of one way shear in footing.

15. Define slenderness ratio of masonry wall.

PART - C (5 x 16 = 80 Marks)

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16. (a) Explain the procedure for design of Re-structures by using limit states method. (16)

Or

(b) A doubly reinforced rectangular concrete beam is to be designed to have overall dimensions of 250*mm* by 600*mm* with an effective span of 6*m*. The beam is simply supported and has to support an uniformly distributed load of 25*kN/m*. Adopting M25 and Fe 500, design the suitable reinforcements in the beam by working stress method. (16)

17. (a) Design the reinforcements required for a rectangular beam section with the following data:
    Size of the beam section=*350mm* * 800*mm*
    Factored shear force=150 *kN*
    Factored torsion moment=105*kNm*
    Factored bending moment=215*kNm*
    Materials to be used are M20 and Fe 415 steel. (16)

Or

(b) A reinforced concrete beam 250 mm wide and 400 mm effective depth is subjected to ultimate design shear force of 150 kN at the critical section near supports. The tensile reinforcement at the section near supports is 0.5 percent. Design the shear stirrups near the supports. Also, design the minimum shear reinforcement at the mid span. Assume concrete of grade M20 and mild steel bars of Fe415 grade. (16)

18. (a) Design a two way slab for the following data: Size = 7*m* x 5*m*; Width of the supports = 300*mm*; Edge condition = Two short edges are discontinuous; Live load = 5 kN/m^2; Floor finish = 1 kN/m^2. Use M20 concrete and Fe415 steel. (16)

Or

(b) Design a dog-legged staircase for an office building, given the following data:
    Height between floor = 3.2*m*;
    Riser = 160mm, Tread = 270*mm*;
    Width of flight = landing width = 1.25*m*;
    Live load = 5kN/m^2;
    Finishes load = 0.6kN/m^2
    Assume the stairs to be supported on 230mm thick masonry walls at the outer edges of the landing, parallel to the risers. Use M20 concrete and Fe415. (16)

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19. (a) Design the longitudinal and lateral reinforcement in a rectangular reinforced concrete column of size 300mmx400mm subjected to a design ultimate load of 1200kN and an ultimate moment of 200kNm with respect to the major axis. Adopt M20 grade of concrete and Fe415 steel. (16)

Or

(b) Design a suitable footing for the column of size 300 mm x 500 mm supporting a service load of 1000 kN. Assume SBC of soil as 200 kN/m^2. Use M20 concrete and Fe415 steel. (16)

20. (a) What are the factors to be considered while designing the brick masonry with respect to stability and lateral supports on the structure? Explain them in detail. (16)

Or

(b) Design the exterior wall of a building to carry 100 mm thick RC slab of 3 m ceiling height and support conditions is fixed, restrained. Live load on roof is 2 kN/m^2. Assume crushing strength of brick unit as 10 N/mm^2. Mortar type is M_1 mortar. (16)

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