Reg. No. : | | | | | | | | | | |

Question Paper Code: 35101

B.E. / B.Tech. DEGREE EXAMINATION, DEC 2021

Fifth Semester

Civil Engineering

01UCE501 – DESIGN ON REINFORCED CEMENT CONCRETE AND MASONRY STRUCTURES

(Regulation 2013)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

(Use of M20, Fe415, IS 456:200 and SP 16 design Aids are permitted, assume data for any other)

PART A - (10 x 2 = 20 Marks)

1. What are the advantages of elastic method of design?
2. State the limit state of philosophy.
3. Define the modes of cracking under shear.
4. Differentiate the singly and doubly reinforced beam.
5. Write the few types of staircases.
6. List the classification of stair.
7. Explain in shortly braced and un-braced columns.
8. Differentiate between uniaxial and biaxial bending.
9. Explain how the permissible stress on brick masonry is calculated.
10. Define slenderness ration of a masonry wall.

PART - B (5 x 16 = 80 Marks)

11. (a) (i) Explain the advantages of limit state method over other methods. (10)

(ii) List the assumptions of working stress method. (6)

Or

(b) Design a rectangular beam section subjected to a moment of 100 *kNm*. Consider concrete of grade M20 and steel of grade Fe415. (16)

12. (a) Design a *T*-beam for an office floor using following data: Effective span = 8*m*, spacing between *T* beams = 3*m*, live load and floor finish are $4kN/m^2$ and 0.6 kN/m^2 respectively and also slab thickness = 150*mm*. Draw a reinforcement details. (16)

Or

(b) A RC beam of size 200 *mm* x 400 *mm* deep is cast monolithically with slab 110 *mm* thick. The beam is simply supported over a span of 4.2 *m* and spaced 2 *m c/c*. Concrete mix M20 and yield strength deformed bars having yield stress of 415 N/mm^2 have been used. Calculate the maximum uniformly distributed load of the beam can carry and the corresponding area of steel. Assume effective cover of 65 *mm*. (16)

13. (a) Design a slab for an office building of size 4 *m* x 6 *m*, live load = 5 kN/m^2, floor finishes = 1.5 kN/m^2 and edge conditions are two adjacent edges discontinuous. Draw a reinforcement detailing for the slab. (16)

Or

(b) Design and draw a suitable doglegged stair for a public building in which the vertical distance between floors is 3.6*m*. The stair hall measures 5 *m* x 2.5 *m*. The live load on the stair is 4 kN/m^2. (16)

14. (a) Design a combined footing with strap beam for two reinforced concrete column of size 300 *mm* x 300 *mm* spaced 4 *m* centre to centre, and each supporting a service axial load of 500 *kN*. The safe bearing capacity of soil at site is 150 kN/m^2. Draw reinforcement detailing for the footing. (16)

Or

(b) Design and draw the reinforcement in a short column 400 *mm* x 600 *mm* subjected to an ultimate axial load of 1600 *kN* with ultimate moment of 120 *kNm* and 90 *kNm* about major and minor axis respectively. (16)

15. (a) Design an interior cross wall to two storied building to carry 100 *mm* thick RCC slab with 3.0 *m* ceiling height. The wall is un-stiffened and its supports a 2.65 *m* wide slab. The live load on roof – 1.50 kN/m^2, live load on floor – 2.0 kN/m^2, weight of 80 *mm* thick terrace – 1.96 kN/m^2. Weight on floor finish - 0.20 kN/m^2. (16)

Or

(b) Design a solid square masonry column of height 2000 *mm* to carry an axial load of 150 *kN*. The column is tied at top and bottom. Include the self-weight of the column for the design. (16)
