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

Question Paper Code: 35101

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

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. Define limit state method. State the different limit states considered in the design.2. State the limit state of philosophy.
3. Differentiate the singly and doubly reinforced beam.
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. Write any two situations in which combined footings are preferred to isolated footing.
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 briefly about the concept of ultimate load method and limit state method. (12)

(ii) Write the advantage of limit state method over elastic and ultimate load method of design. (4)

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) Discuss briefly about the design requirement for bond and anchorage in RC beam design as per IS code and also write note briefly on serviceability requirements. (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 rectangular slab 5 *m* by 4 *m* in size and simply supported at the edges to support a service load of 4 kN/m^2. Assume coefficient of orthotropy (μ) as 0.7. Adopt M-20 grade concrete and Fe-415 HYSD bars. (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 the reinforcements in a circular column of diameter 300 *mm* to support a service axial of 800 *kN*. The column has an unsupported length of 3 *m* and is braced against side away. The column is reinforced with helical ties. Adopt M-20 grade concrete and Fe-415 HYSD bars. (16)

Or

(b) 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)

15. (a) Design of brick column 3 *m* high to carry an axial load of 110 *kN*. Width of the pier is limited to 1.5 nominal brick size for architectural reasons. Assume cement lime mortar 1:1:6 and first class brick 10 *Mpa* strength; column may be taken as fixed restrain. (16)

Or

(b) Design a solid wall of a single story mill building that is 3000 *mm* in height , securely tied with floor and floor units and supporting two beams on either side of it. That exerts reactions of 30 *kN* and 20 *kN*. The thickness of the wall is 230 *mm*. The beam on the wall is 115 *mm*. Assume uniform bearing stress. (16)

35101