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

Question Paper Code: 45101

B.E. / B.Tech. DEGREE EXAMINATION, NOV 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. In working stress method, the modular ratio '*m*' for M20 grade of concrete is

   (a) 11 (b) 9.33 (c) 13.33 (d) 18.67

2. Partial safety factor for concrete in limit state method is

   (a) 1.2 (b) 1.15 (c) 1.4 (d) 1.5

3. The maximum spacing of vertical shear reinforcement in beams shall not exceed

   (a) 0.5 times effective depth (b) 0.75 times effective depth
   (c) 0.4 times effective depth (d) 0.6 times effective depth

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. The behaviour of one way slab of unit width in flexure is similar to the behaviour of

   (a) column (b) footing (c) beam (d) wall

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. Define under reinforced section.

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

14. What is axially loaded column?

15. Define slenderness ratio of masonry wall.

PART - C (5 x 16 = 80 Marks)

16. (a) A R.C beam of size 250 *mm* x 500 *mm* is provided with 3 bars of 10 *mm* dia and a cover of 50 *mm*. The beam is subjected to a moment of 30 *kNm*. The concrete and steel used in the beam are M20 concrete and Fe415 HYSD bars respectively. Determine the stresses in concrete and steel. (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) Find the moment of resistance of a singly reinforced concrete beam of 200 *mm* wide and 400 *mm* effective depth, reinforced with 3 bars of 16 *mm* dia. of Fe 415 steel. Take M20 concrete. (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 the interior span of a continuous one way slab for an office floor continuous over T beams spaced at 4 *m* centres. Assume Fck=25 N/mm^2 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)

19. (a) Design a short column of size 300 *mm* x 300 *mm* and is subjected to a service load of 2000 *kN*. Use M20 concrete 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) Determine the allowable axial load on the column of size 30 cm x 60 cm constructed in first class brick work in 1:6 mortar using modular brick size of 200x100x200 mm, height of pier between the footing and the slab 5.1 *m*. Strength of unit may be taken as 10 Mpa. (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)