Reg. No. : ☐☐☐☐☐☐☐☐☐☐☐

## Question Paper Code : 55251

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2011.

Seventh Semester

Civil Engineering

CE 2401 — DESIGN OF REINFORCED CONCRETE AND BRICK MASONRY STRUCTURES

(Regulation 2008)

Time : Three hours

Maximum : 100 marks

Use of IS 456 and SP 16 permitted.

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are the types of retaining walls?

2. What are the stability checks in case of retaining wall?

3. How will you classify the water tanks?

4. List the conditions to be considered while designing a underground tank.

5. What are the different types of stairs?

6. What are the limitations of direct design method for flat slab?

7. What are the assumptions made in yield line analysis of slabs?

8. What are the characteristic features of yield lines?

9. How the brick masonry walls are classified?

10. How will you determine the permissible stress in masonry?

PART B — (5 × 16 = 80 marks)

11. (a) Design the stem of a cantilever retaining wall to retain an earthen embankment with a horizontal top 3.5 m above ground level. Density of earth is 18 kN/m³. Angle of internal friction is 30°. SBC of soil = 200 kN/m². The coefficient of friction between soil and concrete is 0.5. Adopt M20 concrete and Fe415 steel.

Or

(b) Design a counterfort retaining wall, if the height of the wall is 5.5m above ground level. SBC of soil is 180 kN/m². Angle of friction is 30° Unit weight of backfill is 18 kN/m³. Keep spacing of counterforts as 3 m. Coefficient of friction between soil and concrete = 0.5. Adopt M20 concrete and Fe415 steel. Check the stability and design the stem of the retaining wall.

12. (a) Design an underground water tank of size 3m × 8m × 3m for the following data.

Type of soil : Submerged sandy soil
Unit weight of soil : 16 kN/m³
Angle of friction : 30°
Water table can raise upto Ground level
Adopt M25 concrete and Fe415 steel
Design the side walls of the tank.

Or

(b) Design a flat bottom circular water tank of diameter 10m and total height 4m which is to be supported by ring beam of 7.5m diameter. The ring beam is to be supported by six columns equally spaced. Use M25 concrete and Fe415 steel. Design the following components. (i) Top dome (ii) Top ring beam (iii) Cylindrical wall.

13. (a) Design a dog legged stairs for an office building in a room measuring 2.8m × 5.8m clear. Vertical distance between the floors is 3.6m. Width of flight is to be 1.25 m. Allow live load of 3 kN/m². Use M20 concrete and Fe415 steel. Assume the stairs are supported on 230 mm walls at the end of outer edges of landing slab.

Or

(b) Design an interior panel of a flat slab with panel size 6m × 6m supported by columns of size 500mm × 500mm. Provide suitable drops. Take live load as 4 kN/m². Use M20 concrete and Fe415 steel.

14. (a) Design a rectangular slab of size 4m × 6m which is simply supported along the edges and has to carry a service live load of 4 kN/m². Assume coefficient of orthotropy as 0.75. Use M20 concrete and Fe415 steel.

Or

(b) A square slab of size 6 m × 6 m is reinforced with 10 mm diameter Fe415 steel bars at a spacing of 180 mm in both directions. The avenge effective depth may be taken as 120 mm and overall depth as 150 mm. Determine the permissible service load if it is simply supported all around. Adopt M20 concrete.

15. (a) A brick masonry wall of a single room building is 20 cm thick and it is supported by 10 cm thick RC slab at it top and bottom. The wall carries a vertical load inclusive of its own weight of 80 kN/m at the base at an eccentricity ratio of 0.1. The length of the wall is 3 m between cross walls. The clear height of the storey is 3 m. Determine the required crushing strength of brick and type of mortar to be used.

Or

(b) Explain the following terms :

    (i)   Effective length of brick masonry wall

                                                              (4)

    (ii)  Effective height of brick masonry wall

                                                              (4)

    (iii) Permissible stresses for brick masonry

                                                             (4)

    (iv)  Lateral support to a wall.

                                                              (4)