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Question Paper Code : 20187

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2012.

Seventh Semester

Civil Engineering

CE 2401/CE 71/CE 1351 — DESIGN OF REINFORCED CONCRETE AND BRICK MASONRY STRUCTURES

(Regulation 2008)

Time : Three hours Maximum : 100 marks

IS 456 and SP 16 design charts and tables are permitted.

Answer ALL questions.

PART A — ($10 \times 2 = 20$ marks)

1. What are the requirements to be satisfied for stability of retaining wall?

2. How the vertical stem of a counter fort retaining wall is designed?

3. How are the water tanks are classified?

4. For what conditions the underground tanks are designed and checked?

5. What are the types of stair cases?

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

7. List the assumptions made in yield line analysis of slabs.

8. What are the characteristics of yield lines?

9. How permissible stress on brick masonary is calculated?

10. List the classification of walls.

PART B — (5 × 16 = 80 marks)

11. (a) Design the stem of a cantilever retaining wall to retain an earth embankment with a horizontal top 3.5 m below ground level. Density of earth = 18kN/m^3. Angle of internal friction $\Phi = 30^\circ$. Safe bearing capacity of soil = 200kN/m^2. Coefficient of friction between soil and concrete = 0.5.

Or

(b) Design the vertical stem of a counter fort retaining wall if the height of the wall above the ground level is 5.5m. SBC of the soil = 180kN/m^2. Angle of internal friction $\Phi = 30^\circ$ Unit weight of back fill = 18kN/m^3. Spacing of counter forts = 3m. Coefficient of friction between soil and concrete is 0.5.

12. (a) Design an underground water tank of size 3m × 8m × 3m for the following data. Type of soil : Submerged sandy soil with density = 16kN/m^3 and angle of internal friction $\Phi = 30^\circ$. The water table can rise upto ground level. Design the side walls of the tank.

Or

(b) Design a flat bottom circular elevated water tank of diameter 10m and total height 4m which is to be supported by a ring beam of 7.5m diameter. The ring beam is to be supported by six columns equally spaced. Design

(i) Dome

(ii) Top ring beam and

(iii) Cylindrical wall.

13. (a) Design a dog legged staircase 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 1.25m. Live load = 3kN/m^2. The stairs are supported on 230mm walls at the end of outer edges of landing slab.

Or

(b) Design a RC wall of 4.6m height to support a factored load of 650kN/m and factored moment of 30kNm at right angles to the length of wall. The distance between cross wall is 4m. Sketch the reinforcement details.

14. (a) Design a rectangular slab of size 4m × 6m which is simply supported along the edges and to carry a service live load of $4kN/m^2$. Assume coefficient of orthotropy as 0.75.

Or

(b) Derive an expression relating yield line moment and ultimate load intensity in the following isotropically reinforced slabs ;

(i) square slab simply supported all around and

(ii) fixed square slab.

15. (a) Calculate the safe axial load on a brick pier of size 200mm × 200mm × 3m height constructed using first class bricks having a compressive strength of $7.5N/mm^2$ and cement mortar 1:3.

Or

(b) Calculate the safe axial load per metre length of a solid wall 230mm thick and the height of the wall is 3.5m. The wall is continuous and its length between the cross wall is 6m. M1 mortar and bricks of strength $5N/mm^2$ are used.

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