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Question Paper Code : 33241

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2013.

Seventh Semester

Civil Engineering

CE 1401/CE 1351/070100059 — DESIGN OF REINFORCED CONCRETE AND BRICK MASONRY STRUCTURES

(Regulation 2004/2007)

(Common to B.E. (Part-Time) Sixth Semester, Regulation 2005)

Time : Three hours Maximum : 100 marks

Special Instruction: Use of IS 456, IS 3370 (Parts I, II and IV) IS 1905, IRC6 and IRC21 is permitted

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Name the stability checks required in a retaining wall design.

2. What is the function of a shear key in a retaining wall?

3. Why cover domes are more structurally efficient than a flat cover slab, for a circular water tank?

4. Name the design forces in the bottom ring beam, supporting the water retaining portion, of a cylindrical water tank.

5. When is a mat foundation resorted to, for a building?

6. What is a safety kerb in the deck of a bridge?

7. Name the forces acting along a yield line of a slab.

8. Why is yield line theory provide an upper bound solution?

9. State any two parameters that affect the permissible stresses of a brick masonry.

10. What are the equivalent end conditions for a brick pier (square cross section) about its principal axes, when it supports a RCC slab?

PART B — (5 × 16 = 80 marks)

11. (a) A RCC cantilever retaining wall 6 m above the foundation level has base slab width 3.25 m. Toe projection is 0.9m. The thickness of stem, heel and toe is 300 mm through out. Earth fill is level at top. Density of earth is 15 kN/m^3, angle of repose of soil is 30° . Calculate the pressure under the base of the retaining wall.

Or

(b) A counter fort retaining wall retains earth to a height of 8 m from foundation level. The counter forts are spaced at 3 m centre to centre with a thickness (width) of 300 mm. Top level of earth fill is horizontal. Density of soil is 15 kN/m^3 and its angle of response of soil is 30° . Design the stem slab for bending moment along for maximum earth pressure. Use M_{20} concrete and Fe_{415} steel

12. (a) A cylindrical water tank (open at top) has an inner diameter of 3 m and height of 3m. Assume the wall to be fixed with the base slab. Design the wall for design forces at the bottom of the wall, in the vertical direction only. Use M_{20} concrete and Fe_{415} steel.

Or

(b) A square water tank open at the top has inner dimensions 3m×3m×3m in height. The base slab of the tank is supported by beams (width = 300mm) all long its edges. Assuming the base slab to be continuous with the wall, design the base slab section for maximum moment at edges of the slab. Use M_{20} concrete and Fe_{415} steel.

13. (a) An intermediate flight of a dog legged staircase is simply supported by walls 230mm thick, and the flight spans between the walls. Width of flight and landing slab is 1.25m. Live load = 3kN/m^2. Surface finish is 0.5 kN/m^2. Use M_{20} concrete and Fe_{415} steel. Tread of a step is 250 mm. Rise of a step is 160mm. Total number of rises in the flight is 11. Sketch a longitudinal section of the flight showing the arrangement. Design the flight for maximum bending moment.

Or

(b) The panel dimensions of a flat slab floor is 6m×6m . The diameter of each supporting circular column is 450 mm. Choose suitable dimension for column head and drop. Live load is 3 kN/m^2 and surface finish is 1 kN/m^2. Use M_{20} concrete and Fe_{415} steel. The overall thickness of slab is 250 mm with effective cover 25 mm. Check the safety of the thickness of the slab for punching shear considerations around the drop of an interior column.

14. (a) A circular interior slab, isotropically reinforced, is subjected to an all inclusive ultimate uniformly distributed load with intensity of loading 'w'. Derive a general expression relating the applied load 'w' and maximum moment of resistance of the slab 'mu' per unit width, using yield line theory.

Or

(b) A rectangular simply supported floor slab of effective dimension 4m × 5m is subjected to a live load of 2.5 RN/m^2 with a finish of 1 kN/m^2. Calculate the maximum design moment using yield line theory, from first principles.

15. (a) The brick masonry wall under consideration is the ground floor wall of a two storied residential building. The thickness of ground floor, first floor and parapet wall is 230 mm. Clear height of ground floor wall above floor level is 3 m. Clear height of first floor wall is 3m. Floor and root slab thickness is 125 mm. Parapet height is 0.75 m. Load transferred from floor slab to the wall is 9 kN/m length of the wall and from roof is 9 kN/m length of wall. The wall is an intermediate wall between cross walls. Clear length between cross wall is 3 m. Thickness of cross wall is 230 mm. Nominal bricks with brick strength 5 N/mm^2 and cement mortar 1 : 5 is used. Check the safety of the wall. Assume there are no openings in the main wall and cross wall.

Or

(b) A wall of a single storied room is made of brick masonry made of nominal bricks (unit strength 5N/mm^2) with cement mortar 1 : 5. The inner dimension of the room is 4m × 4m and clear height of wall above floor level is 3 m. RCC roof slab thickness is 125 mm. Parapet thickness 230 mm with a height of 750 mm is provided all around. Live load an roof is 1.5 kN/m^2 and finish is 1.5 kN/m^2. Assuming no opening in the wall under consideration and in the connecting walls, design the thickness of the wall.
