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Question Paper Code : 31016

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2015.

Seventh Semester

Civil Engineering

080100048 – DESIGN OF REINFORCED CONCRETE STRUCTURES

(Regulation 2008)

Time : Three hours

Maximum : 100 marks

(Use of IS 1343 and IRC codes are permitted)

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are the assumptions made in the design of toe slab of a cantilever retaining wall?
2. List the conditions that demand the provision of temperature steel in the stem slab of a retaining wall.
3. When is a section designed as uncracked section in a water tank design?
4. Why is a bracing provided in a staging of a water tank?
5. What is the principle of prestressed concrete?
6. What are the disadvantages of flat slabs?
7. State the principle of virtual work.
8. Draw the different yield line patterns for rectangular slabs.
9. What are the various forces on the walls of the Box Culvert?
10. What do you mean by effective width?

PART B — (5 × 16 = 80 marks)

11. (a) A cantilever retaining wall retains earth with horizontal fill. Height of the stem from the top of the base slab is 4 m. Density and angle of internal friction of earth retained is 15 kN/m³ and 30° respectively. Design the stem of the retaining wall.

Or

- (b) A counterfort type retaining wall retains earth to a height of 7m from foundation level. The top level of earth fill is horizontal. The density and angle of repose of soil is 15 kN/m^3 and 30° respectively. Coefficient of friction between the foundation earth and concrete surface is 0.4. Counterforts are spaced at 3m centre to centre. Assuming the thickness of all the elements of the retaining wall as 300 mm, find out the dimensions of the base slab, satisfying stability conditions of the retaining wall. Allowable safe bearing capacity of the foundation soil is 200 kN/m^2 .

12. (a) Design the side walls of an underground water tank of size $3\text{m} \times 8\text{m} \times 3\text{m}$ for the following data:

Type of soil - Submerged sandy soil with unit weight 16 KN/m^3 and angle of repose 30° .

Water table is at ground level.

Or

- (b) Design the cylindrical walls and bottom slab of a flat bottom circular elevated water tank of diameter 10 m and height 4 m. The diameter of the ring beam supporting the water tank is 7.50 m. The ring beam is supported by six columns. Use M 25 concrete and Fe 415 steel.

13. (a) Design the stair case of a multistoreyed building for the following data using M 25 and Fe 415. Size of stair room = $5.70 \times 3.10 \text{ m}$, Width of walls and beams = 230 mm, width of waist slab = 1.50 m and height of floors = 3.0 m.

Or

- (b) (i) Explain the step by step design procedure of RC concrete wall. (6)
(ii) Explain the design principle of mat foundation. (6)
(iii) State the merits and demerits of pre-tensioning and post-tensioning systems. (4)

14. (a) Design a circular slab of diameter 5 m which is simply supported at the edges. Live load on the slab is 4 kN/m^2 . Assume the load factors according to IS 456.

Or

- (b) A right angled triangular slab is simply supported at the adjacent edges AB and BC. The side $AB = BC = 4 \text{ m}$ and $CA = 6 \text{ m}$. The slab is isotropically reinforced with 10mm diameter bars at 100 mm centres both ways, at an average effective depth of 120 mm. The overall depth of slab is 150 mm. Calculate the safe permissible service load on the slab.

15. (a) The clear span of solid slab bridge for class a loading is 4.5 m. The clear width of roadways is 7.00 m. The thickness of wearing loading is 80 mm. Use M 20 mix. Determine the maximum live load bending moment using effective width method.

Or

- (b) What are the various IRC loadings? Explain.