Reg. No. : ☐☐☐☐☐☐☐☐☐☐☐☐

Question Paper Code : 98022

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2017.

Seventh Semester

Civil Engineering

080100048 — DESIGN OF REINFORCED CONCRETE STRUCTURES

(Regulations 2008)

Time : Three hours   Maximum : 100 marks

Use of IS 456-2000 and other relevant codes permitted.

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. When do you prefer counter fort type retaining wall?

2. Draw a sketch showing the reinforcement details of the connection of heel, toe and stem in cantilever retaining wall.

3. State the combination of loads considered in the design of underground water tanks.

4. What are the forces experienced by the ring beam of a dome?

5. What are the disadvantages of flat slabs?

6. What are the various types of pre stressing?

7. What are the characteristic features of yield lines?

8. Sketch the yield line pattern for rectangular slab fixed on all four sides.

9. When is IRC class AA loading adopted in a bridge design?

10. What are the different loading conditions considered while designing a box culvert?

PART B — (5 × 16 = 80 marks)

11. (a) Find the dimensions of a cantilever retaining wall and design the stem slab for the following data. Height of soil to be retained above ground level = 4.60m, unit weight of soil = 18kN/m³, angle of repose = 30°. Also show the detailing of reinforcements.

Or

(b) Find the dimensions of a counter-fort retaining wall and design the stem slab for the following data. Height of soil to be retained above ground level = 6.50m, unit weight of soil = 18kN/m^3, angle of repose = 30° and spacing of counter forts = 3.0 m c/c. Also show the detailing of reinforcements.

12. (a) Design a circular tank with domical top for a capacity of 4,00,000 litres. The depth of water is 4 m with a free board of 20 cm. The tank is supported on masonry tower and bottom of the tank consists of a dome having a central rise of 2.20 m.

Or

(b) A rectangular water tank 4.50 m long, 2.25 m wide and 2.25 m high has its wall rigidly jointed at the vertical edges and pin jointed at their horizontal edges. Design the tank if it is supported on all sides under the wall.

13. (a) Design a dog-logged stair for a building in which the vertical distance between the floors is 3.5m. The stair hall measures $2.60 m \times 5.20 m$. Use M_{20} concrete and Fe 415 steel.

Or

(b) A flat slab foor of size 5m × 5m supports a live load of 4KN/m² and floor finish of 1kN/m². Determine the design moments for an end panel. Assume that the slab thickness as 250 mm and columns to be circular with diameter 460 mm each.

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

Or

(b) Derive an expression relating yield line moment and ultimate load intensity for the isotropically reinforced square slab with following support conditions.

   (i) Simply supported all around and

   (ii) Fixed on all four edges.

15. (a) A slab simply supported on two opposite sides, supports a concentrated load of contact area 500 mm × 500 mm and magnitude of the load is 50 kN. Thickness of the surface finish of the slab is 50mm. Calculate the maximum moment due to the concentrated load using effective width method.

Or

(b) Design a box culvert having a clear vent 4m × 4m when it is empty. The box culvert is subjected to a super imposed dead load of 12 kN/m² and a live load on the culvert is 45 kN/m². Density of soil at the site is 18kN/m³ and the angle of repose is 30°.

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