Reg. No.

**Question Paper Code : 91016**

**B.E/B.Tech. DEGREE EXAMINATION, MAY/JUNE 2016**

**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 reasons for not using rectangular underground tanks for large capacity.
4. Define a Dome.
5. How will you differentiate between pedestal, wall and column ?
6. What are the different methods of inducing pre-stress in a tendon ?
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 = 4.60 m, unit weight of soil = 18k $N/m^3$, 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 = 6.50 m, unit weight of soil = 18 $kN/m^3$, angle of repose = 30° and spacing of counter-forts = 3.0m c/c. Also show the detailing of reinforcements.

12. (a) Design an underground rectangular tank 4 m × 6 m × 2 m. The subsoil consists of dune sand having unit weight of 16000 $N/m^3$ and angle of friction of 34°. The subsoil water level is at great depth.

**OR**

(b) Design a rectangular over head water tank of capacity of one million litres, supported on an elevated tower comprising 8 columns. The base of the tank is 14 m above ground level and the depth of foundation is 1.2 m below ground level.

13. (a) Determine the dimensions of a flat-slab system with drops for a four-storey building with 5 spans of 7.5 m in the longer direction, 5 spans of 6 m in the shorter directions and a storey height of 3 m.

**OR**

(b) Design a dog-legged stair for a building in which the vertical distance between the floors is 3.60 m. The stair hall measures 2.5 m × 5.00 m. The live load may be assumed as 3000 $N/m^2$. Use M20 concrete and HYSD bars.

14. (a) An isotropically reinforced square slab of side 'a' is simply supported over its edges. The ultimate moment capacity per unit width is 'mu' in both span directions. Determine the ultimate uniformly distributed load the slab can carry under given conditions.

**OR**

(b) A square slab of side 4m is simply supported at the ends and carries service live load of 3 $kN/m^2$. Design the slab using yield line theory.

15. (a) Design an RC slab culvert for the following data :

Clear span : 5 m

Clear width of road way : 6.8 m

Width of support : 400 mm

Width of kerbs : 600 mm

Thickness of wearing coat : 80 mm

Loading : IRC Class AA

Materials : M25 concrete and Fe415 steel.

**OR**

(b) (i) Explain briefly the IRC loading standard for highway bridges. **(8)**

(ii) Explain the design procedure for RC box culverts. **(8)**

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