Question Paper Code	12177

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2023
Seventh Semester

Civil Engineering

20CEPC702 - ADVANCED REINFORCED CONCRETE STRUCTURES

(Use of IS 456:2000, IS 800:2007, IS 3370, Steel Table are permitted)

(Regulations 2020)

Duration: 3 Hours   Max. Marks: 100

PART - A (10 × 2 = 20 Marks)
Answer ALL Questions

Marks,
K-Level, CO

1. What are the forces acting on a retaining wall?   *2,K1,CO1*

2. When is the design of shear key necessary?   *2,K1,CO1*

3. Choose the factors that must be considered while designing a RCC tank.   *2,K3,CO2*

4. Find out the diameter of a circular tank which is having a flexible base for capacity of 200000 liters. The depth of water is to be 4m, including a free board of 200mm.   *2,K2,CO2*

5. Define the terms drop and column head.   *2,K1,CO3*

6. List out the various methods available for the analysis of flat slab.   *2,K1,CO3*

7. Organize the characteristics of yield line.   *2,K3,CO4*

8. Differentiate between yield line and strip line.   *2,K2,CO4*

9. Classify the types of shear wall.   *2,K2,CO5*

10. Examine the possible shear wall failure modes due to horizontal loads.   *2,K3,CO5*

PART - B (5 × 13 = 65 Marks)
Answer ALL Questions

11. a) Design a stem of cantilever retaining wall for the following data: Height of the wall above ground = 4m Depth of foundation = 1.5m, Unit weight of earthfill=17kN/m^3, Safe Bearing Capacity of the Soil=130kN/m^2, Angle of internal Friction of Soil=20°. The Coefficient of friction between base slab and concrete=0.45. Use M20 & Fe415 steel.   *13,K3,CO1*

OR

b) Design stem and counterfort portion of a retaining wall for the following data. Height of the wall = 8.7m, Density of soil = 18kN/m^3, spacing of counterfort = 3.5m, Angle of internal friction of soil = 30°. safe bearing capacity of the Soil=170kN/m^2. Adopt M20 grade   *13,K3,CO1*

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create   **12177**

concrete and Fe415 grade steel. Sketch the reinforcement details. Stability check is not necessary.

12. a) Design a circular water tank with fixed base for capacity of 400000litres. The depth of water is to be 4m. Free board = 200mm. Use M20 concrete and Grade I mild steel. Permissible stress in concrete and steel are 1.2N/mm^2 and steel 100 N/mm^2 respectively. Sketch the details of reinforcement. *13,K2,CO2*

OR

b) Design a rectangular RC water tank (resting on ground) with an open top for a capacity of 80000 litres. The inside dimension of the tank may be taken as 6m x 4m. Use M20 grade of concrete and Fe250 grade I mild steel. Sketch the reinforcement details. *13,K2,CO2*

13. a) Design an interior panel of a flat slab of size 5m x 5m without providing drop and column head. Size of column is 500 x 500 mm and the live load on the panel is 4 kN/m^2. Take floor finishing load as1kn/m2. Use M20 concrete and Fe415 steel. *13,K3,CO3*

OR

b) Design a dog legged stair for a building in which vertical distance between floors is 3.6m. Assume any relevant data. *13,K3,CO3*

14. a) Design a rectangular slab 6m x 4m simply supported on its all edges. The live load is 5 kN/m^2. The load factors are 1.5 and 2.2 for dead and live load respectively. The ultimate moment in the longer direction is half of the short side. Use M20 concrete and Fe415 steel. *13,K2,CO5*

OR

b) Derive from principles the ultimate design moments for a rectangular simply supported slab panel using yield line approach. *13,K2,CO5*

15. a) Design a reinforced concrete wall with height of 3m and thickness of 200mm. The loads applied to wall is 200KN/m^2 length of the wall is 3m. Adopt M20 grade of concrete and Fe415 steel. *13,K3,CO6*

OR

b) Explain briefly about bar bell type (simple rectangular type) shear wall with sketches. *13,K3,CO6*

PART - C (1 × 15 = 15 Marks)

16. a) Explain the design principles of Mat foundation. *15,K2,CO1*

OR

b) Construct the principles of design of box culvert. *15,K3,CO4*