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Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (CE) (Sem.-6)  
DESIGN OF CONCRETE STRUCTURES II  
Subject Code : CE-310  
Paper ID : [A0622]

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY.
2. Attempt any FOUR questions from SECTION-B.
3. Attempt any TWO questions from SECTION-C.

SECTION-A (10 × 2 = 20 Marks)

1. Write short notes on :

- (a) What are the main requirements of a foundation system for a structures?
- (b) What are the situations in which combined footings are preferred to isolated footings?
- (c) What is meant by eccentric loading on footing, and under what circumstances does this occur?
- (d) What are different types of concrete retaining wall?
- (e) Briefly describe the behavior of various elements of cantilever retaining wall.
- (f) Define the term meridional thrust.
- (g) Differentiate between spherical dome and conical dome.
- (h) What is the basic design criteria followed for the design of water tank?
- (i) What is the difference between elevated circular tank and intz tank?
- (j) What types of forces are acting at any section of curved beams?

SECTION-B (4 × 5 = 20 Marks)

2. Design a square isolated footing of uniform thickness for a reinforced concrete square column of size 450 × 450 mm reinforced with 8-25 $\phi$  bars and carrying an axial load of 2300 kN. The safe bearing capacity of the soil at the site is 300 kN/m<sup>2</sup> and the material to be used are M20 grade concrete and HYSD steel of Fe 415.

3. The bottom ring beam of a circular overhead water tank is supported over eight 400 × 400 mm size uniformly spaced columns with their centres lying on a circle of radius of 3.0 m. Design the beam using M20 grade concrete and HYSD steel of Fe 415. The ring beam supports a uniformly distributed load of 200 kN/m under tank full condition.
4. Design a reinforced concrete conical roof for a cylindrical container of 21.0m diameter. The rise of roof is 4.2 m. The superimposed load may be taken as 1.0 kN/m<sup>2</sup>. The material to be used M20 grade concrete and HYSD steel of Fe 415. Draw reinforcement details.
5. Design a reinforced concrete section for a circular water tank wall subjected to a hoop tension of 145 kN per meter height. Design the section when the M30 grade concrete and HYSD steel reinforcement of grade Fe415 are to be used.
6. Determine suitable dimensions of a cantilever retaining wall, which is required to support a bank of earth 4.0m high above the ground level on the toe side of wall. Consider the backfill level with horizontal having a surcharge of 40 kN/m<sup>2</sup>. Take safe bearing capacity of soil under the wall base at a depth of 1.25 m is 160 kN/m<sup>2</sup>. The back fill has following properties :  
Unit weight : 16.0 kN/m<sup>3</sup> ;  
Angle of repose : 30° ;  
Coefficient of friction between base and soil : 0.5

SECTION-C (2 × 10 = 20 Marks)

7. Design a strap footing for two columns A and B spaced 5 m centre to centre. The column A is of size 460 × 460 mm and carries a load of 750 kN is located on property line. The size of column is 550 × 550 mm and carries a load of 1100 kN. The safe bearing capacity of the soil is 125 kN/m<sup>2</sup>. The material to be used are M20 grade concrete and HYSD steel of Fe 415.
8. Design a rectangular tank resting on ground and having a capacity of 110 kiloliters. Overall height of the tank is restricted to 4m with free board of 300 mm. The bearing capacity of the site is 150kN/m<sup>2</sup>. The material to be used are M25 grade concrete and HYSD steel of Fe415.
9. Design a T shaped reinforced concrete wall to retain earth 5.0 m high with top surface being horizontal behind the wall but subjected to a surcharge of 16.0 kN/m<sup>2</sup>. The soil behind the wall is well drained medium dense sand having a unit weight of 16 kN/m<sup>3</sup> and an angle of internal friction of 30°. The soil at the site has the same properties as that of backfill with a safe bearing capacity of the 150 kN/m<sup>2</sup>. The coefficient of friction between the base and the soil is 0.4. The materials to be used are M20 grade concrete and HYSD steel of Fe 415.