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**Question Paper Code : 21215**

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2013.

Seventh Semester

Civil Engineering

CE 2401 / CE 71/ CE 1351 – DESIGN OF REINFORCED CONCRETE AND BRICK  
MASONRY STRUCTURES

(Regulation 2008)

Time : Three hours

Maximum : 100 marks

IS 456 and SP 16 design charts and tables are permitted

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is the structural action between cantilever and counter fort type retaining wall?
2. What is the function of weep hole in retaining wall construction?
3. What are the forces acting on the domes?
4. What are the conditions to be considered for the cylindrical tank situated under ground?
5. What is flat slab and give the different types.
6. What is the thickness of flat slab with drops and without drops?
7. Define yield line theory.
8. Give any four assumptions in yield line theory.
9. What is effective length of brick wall when the wall is continuous?
10. What is allowable compressive stress in brick masonry?

PART B — (5 × 16 = 80 marks)

11. (a) Design a cantilever retaining wall to retain earth embankment 4.5m above ground level. The density of earth is  $18 \text{ kN/m}^3$  and its angle of repose is  $30^\circ$ . The Embankment is horizontal at its top. The safe bearing capacity may be taken as  $200 \text{ kN/m}^2$  and the coefficient of friction between soils and concrete is 0.5. Use M20 concrete and Fe 415 grade steel reinforcement.

Or

- (b) Design a cantilever retaining wall with surcharge to retain earth embankment 4.0m above ground level. The density of earth is  $18 \text{ kN/m}^3$  and its angle of repose is  $30^\circ$ . The sand fill slopes at the rate of 1 vertical to 2 horizontal at its top. The safe bearing capacity may be taken as  $175 \text{ kN/m}^2$  and the coefficient of friction between soils and concrete is 0.5. Use M20 concrete and Fe 415 grade steel reinforcement.
12. (a) A reinforced concrete dome of 6m base diameter with a rise of 1.25m is to be designed for a water tank. The uniformly distributed live load including finishes on dome may be taken as  $2 \text{ kN/m}^2$ . Adopting M20 concrete and Fe415 grade steel, design the dome and the ring beam.

Or

- (b) Design an RC tank of internal dimensions  $10 \text{ m} \times 3 \text{ m} \times 3 \text{ m}$ . The tank is to be provided under ground. The soil surrounding the tank is likely to get wet. Angle of response of soil in dry state is  $30^\circ$  and in wet state is  $6^\circ$ . Soil weights  $20 \text{ kN/m}^3$ . Adopt M20 concrete and Fe415 grade steel.
13. (a) Design a dog – legged stair case (waist slab type) for an office building to suit the following data using working stress method.

Height between floor = 3.2m

Risers = 160 mm, tread = 270mm

Length of landing = 1.25m

Width of flight = landing width = 1.25 m

Assume stair to be supported on 230 mm thick masonry walls at the outer edges of the landing parallel to the risers. Adopt M20 grade concrete and Fe415 HYSD bars. Assume a live load of  $5 \text{ kN/m}^2$ .

Or

- (b) Design an interior panel of a flat slab for a live load of  $5 \text{ kN/m}^2$ . The panel size is  $6 \text{ m} \times 6 \text{ m}$ . The diameter of the column is 500mm. Drops may be provided. Use M20 concrete and Fe415 steel. Sketch the details of reinforcement.

14. (a) Design a rectangular slab of size 4 m × 6 m continuous on all the four sides using yield line analysis. Assume a live load of 3 kN/m<sup>2</sup> and floor finish of 1 kN/m<sup>2</sup>. Use M20 concrete and Fe415 steel. Sketch the details.

Or

- (b) Design circular slab of diameter 4m which is simply supported at the edges. Adopt service live load as 4 kN/m<sup>2</sup> and M20 grade concrete with Fe415 HYSD bars. Assume load factors according to IS456-2000 code.
15. (a) Design an interior cross wall a two storeyed building to carry 125 mm thick RCC slabs with 3.10 m ceiling height. The wall is un stiffened and its supports a 2.65 m wide slab.

Live load on roof : 2.0 kN/m<sup>2</sup>

Live load on floor : 2.0 kN/m<sup>2</sup>

Weight of 80 mm thick terrace: 2.0 kN/m<sup>2</sup>

Weight on floor finish : 0.2 kN/m<sup>2</sup>.

Or

- (b) Design an exterior wall of a workshop building 3.75 m high carrying steel trusses at the top at 5.0 m spacing. The wall is securely tied at the roof and floor level. Thickness of wall and piers shall be assumed suitably.

The loading shall be assumed as follows :

- (i) Concentrated reaction from the roof trusses = 30 kN acting at the center of the wall
- (ii) Roof loading = 10 kN/m
- (iii) Ignore wind load.