Reg. No. : ⬛⬛⬛⬛⬛⬛⬛⬛⬛⬛⬛⬛

Question Paper Code : 52776

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2019.

Sixth Semester

Civil Engineering

CE 6601 — DESIGN OF REINFORCED CONCRETE AND BRICK MASONRY
STRUCTURES

(Regulation 2013)

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Recall the types of retaining walls.

2. Name the two theories for calculating earth pressure on retaining walls.

3. List the factors to be considered while designing a R.C.C water tank.

4. Mention the three categories of movement joints in water tank.

5. Rewrite the types of stairs.

6. Write the advantages of flat slabs.

7. Say the basic assumptions in yield line theory.

8. Recall the methods of analysis of slabs.

9. Specify the general condition of stability of masonry structures.

10. Recall the types of masonry walls used in building construction.

PART B — (5 × 13 = 65 marks)

11. (a) Design a stem of 5m tall reinforced concrete cantilever type retaining
         wall. The wall retains soil level with its top. The soil weighs
         $18000 \, \text{N/m}^3$ and has an angle of repose of 30°. The safe bearing capacity
         of the soil is $200 \, \text{kN/m}^2$. Use M20 concrete and Fe 415 steel.

Or

(b) Analyze the stability of a counterfort retaining wall to the following particulars.

Overall height of the wall = 7m

Weight of soil = 16000 N/m^3

Safe bearing capacity of the soil = 180 kN/m^2

Angle of repose of the soil = 35°

Surcharge angle = 15°, Use M20 concrete and Fe 415 steel.

12. (a) A reinforced concrete water tank is 6m × 3m with a maximum depth of 2.50m. 150mm × 150mm splays are provided at the junction of walls and base slab. The tank is supported on brick masonry walls all round. Design the long wall of the tank.

Or

(b) Design the wall thickness of an underground tank of internal dimensions 12m × 3.5m × 3.5m. The soil weighs 18000 N/m^3. Use M25 concrete and Fe 415 steel.

Conditions:

(i) Tank is full and the surrounding soil is dry

(ii) Tank is empty and the surrounding soil is water — logged.

13. (a) Design the stairs of a residential building measuring 3.5m × 5.5m. The vertical distance between the floors is 3.75m. Live load is 3000 N/m^2. Use M20 concrete and Fe 415 steel.

Or

(b) Recall the design principles of road bridge as per IRC.

14. (a) Design a circular slab 6m in diameter simply supported all around. Take live load as 5000 N/m^2 and load factors as 1.5 and 2.2 for dead and live loads respectively. Use M20 concrete and Fe 415 steel.

Or

(b) (i) List the characteristics of yield line. (5)

(ii) A triangular slab PQR is simply supported along PQ = 6m, QR = 4m and is free along the edge PQ. The horizontal and vertical reinforcements at the bottom of the slab provide ultimate moment capacities as 60 KNm/m each. Determine the yield line pattern and the uniformly distributed collapse load. (8)

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15. (a) Design the brick masonry 230mm thick wall which is subjected to compressive load from floor / roof slabs and its self-weight of 100 kN/m run. Minimum eccentricity of 1/24 of thickness of wall may be considered. Effective height of wall = 3m. Net SBC of soil = $100 \, kN/m^2$.

Or

(b) Design a brick masonry pier / column which carry a superimposed axial compressive load of 100kN at base of column. Take effective height of column as 3m. Design the footing if net SBC of soil = $100 \, kN/m^2$.

PART C — (1 × 15 = 15 marks)

16. (a) A cantilever type retaining wall has a 5.5 m tall stem. It retains earth level with its top. The soil weighs $18500 \, N/m^3$ and has an angle of repose of 30°. The safe bearing capacity of the soil is $200 \, kN/m^2$. Design the stem, toe slab and heel slab. Use M20 concrete and Fe 415.

Or

(b) Design an interior panel of a flat slab in a hotel carrying a superimposed live load of $3000 \, N/m^2$. The weight of floor finishes on the slab may be taken as $2000 \, N/m^2$. The panel is supported on 300mm diameter columns. Drops may be provided. Size of panel is 5m × 7m. Use M20 concrete and Fe 415.

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