

Reg. No. : 9 2 0 2 1 4 1 0 3 0 4 2

**Question Paper Code : 71583**

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2017.

Sixth Semester

Civil Engineering

CE 6601 — DESIGN OF REINFORCED CONCRETE AND BRICK MASONRY  
STRUCTURES

(Regulations 2013)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What factors govern the spacing of counterforts?
2. How a toe slab of a counterfort retaining wall is designed?
3. Name the joints which are provided between the circular water tank wall and the floor. Explain any one.
4. Why the uplift pressure is critical on the floor of the underground tanks?
5. How the load is distributed in the case of an open-well stairs?
6. What is the main disadvantage of a flat slab?
7. What are Isotropic and orthotropic slabs?
8. State the limitations on yield line theory.
9. List out any two factors which affect the permissible stress of a masonry.
10. List the factors which contribute for eccentricity on brick walls.

PART B — (5 × 16 = 80 marks)

11. (a) Design the stem of a retaining wall to retain earth embankment 3 m high above ground level. The unit weight 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 of soil is  $100 \text{ kN/m}^2$  and the coefficient of friction between soil and concrete is 0.5. Adopt M20 concrete and Fe415 steel. Take factor of safety against overturning and sliding as 1.40.

Or

- (b) Explain the steps involved in the design of counter fort retaining wall.
12. (a) A spherical cover dome is to be provided for a circular water tank with inner diameter of 6 m. Choose the rise for the dome as 1 m. Live load as the dome is  $1 \text{ kN/m}^2$ . Design the cover dome and its supporting ring girder.

Or

- (b) Design the sidewalls of a square RCC tank of capacity 80,000 litres of water. Depth of water tank = 3.8 m, free board = 0.2 m. Adopt M20 concrete and Grade — I steel. Tensile stresses in steel is limited to  $100 \text{ N/mm}^2$  at water face and  $125 \text{ N/mm}^2$  away from face. Sketch the details of reinforcements in the walls of the tank.

13. (a) A flight of a dog-legged staircase has the following details:

Going = 2.25 m

Landing width = 1.25 m

Rise of a flight = 1.5 m

Support width = 300 mm.

Choosing appropriate dimensions for rise and tread and taking the flight to span longitudinally between the supports, design the flight. Assume live load as  $3 \text{ kN/m}^2$ .

Or

- (b) Design the interior panel of a flat slab with drops for an office floor to suit the following data:

Size of office floor = 20 m by 20 m

Size of panels = 5 m by 5 m

Loading class =  $4 \text{ kN/m}^2$

Materials : M20 grade concrete, Fe415 HYSD bars.

14. (a) A square slab of size  $6\text{ m} \times 6\text{ m}$  is reinforced with  $10\text{ mm}$  diameter Fe 415 steel bars at a spacing of  $180\text{ mm}$  in both directions. The average effective depth may be taken as  $120\text{ mm}$  and overall depth as  $150\text{ mm}$ . Determine the permissible service load if it is simply supported all around. Adopt M20 concrete.

Or

- (b) Design a circular slab of  $4.5\text{ m}$  diameter, simply supported along the edges, to carry a service load of  $5\text{ kN/m}^2$ . Adopt M20 grade concrete and Fe 415 grade steel. Use equilibrium method for analysis.
15. (a) A masonry wall is subjected to an axial load of  $180\text{ kN}$ . The height of wall is  $3.6\text{ m}$ . Design the wall.

Or

- (b) Design a solid square masonry column of height  $2000\text{ mm}$  to carry an axial load of  $150\text{ kN}$ . The column is tied at the top and bottom. Include the self weight of column for the design.