

13/6/16 FN

Reg. No.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|

**Question Paper Code : 51263**

**B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2016**

**Seventh Semester**

**Civil Engineering**

**CE 2401/CE 71/CE 1351/10111 CE 701 – DESIGN OF REINFORCED CONCRETE AND  
BRICK MASONRY STRUCTURES**

**(Regulations 2008/2010)**

**(Common to PTCE 2401/10111 CE 701 – Design of Reinforced Concrete and  
Brick Masonry Structure for B.E. (Part-Time) Fifth Semester Civil Engineering –  
Regulations 2009/2010)**

**Time : Three Hours**

**Maximum : 100 Marks**

**(IS 456-2000, IS 1905 – 1987, SP 16 – 1980 and IS : 3370 (Part 2 and 4)  
– 1967 Design Charts tables are permitted)**

**Use of relevant BIS standard and hand book is permitted.**

**Answer ALL questions.**

**PART – A (10 × 2 = 20 Marks)**

1. State the stability requirements of a retaining wall.
2. Describe the structural action of a counter fort in a counter fort retaining wall.
3. What are the factors considered for design of tank ?
4. What are the types of joints in water tank ?
5. When a mat foundations is resorted to a structure ?

6. What are the advantages of a box culvert over slab culvert ?
7. Sketch the yield line pattern in a rectangular slab fixed on all edges and subjected to a uniformly distributed load.
8. State the principle used in the virtual work method of yield line analysis.
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) A cantilever retaining wall is to be provided to retain earth 5 m high above the ground level. The top surface is horizontal behind the wall. The unit weight of back fill and its angle of repose are  $17.5 \text{ kN/m}^3$  and  $30^\circ$  respectively. Assume the coefficient of friction between soil and concrete to be 0.5. The safe bearing capacity of the soil at site is  $175 \text{ kN/m}^2$ . The materials used are M20 grade concrete and Fe415 grade steel. Estimate the preliminary dimensions of retaining wall. Check its stability and design the stem.

**OR**

- (b) Design a suitable counter fort retaining wall to support difference in ground elevation of 7 m. The foundation depth may be taken as 1.5 m below ground level, with a safe bearing capacity of  $160 \text{ kN/m}^2$ . Assume a level backfill with a Unit weight of  $16 \text{ kN/m}^3$  and an angle of shearing resistance of  $30^\circ$ . Assume the Co-efficient of friction between soil and concrete as 0.42.
12. (a) Design a circular tank for a capacity of 400 kiloliters with flexible base. Use M 25 for concrete and Fe 415 for reinforcement.

**OR**

- (b) Design a rectangular tank resting on the ground for a capacity 100 kilolitres. Use M 25 for concrete and Fe 415 for reinforcement.

13. (a) Design one of the flights of stairs of a school building spanning between landing beams to suit the following data.

Type of staircase : waist slab type.

Number of steps in flight = 12.

Tread = 300 mm and rise = 160 mm.

Width of landing beams = 400 mm.

Materials used are M20 concrete and Fe 415 steel reinforcement bars.

**OR**

- (b) Design a reinforced concrete wall of 3 m height, 100 mm thick and 4 m long between the cross walls. The factored load to be carried by the wall is 600 kN/m. Materials used are M20 grade of concrete and Fe415 steel reinforcement bars.

14. (a) Design a rectangular slab 4 m × 6 m which is simply supported at all the four edges at subjected to a service live load of 4 kN/m<sup>2</sup>. Assume  $\mu = 0.5$ ,  $f_{ck} = 20 \text{ N/mm}^2$ ,  $F_y = 415 \text{ N/mm}^2$ .

**OR**

- (b) Consider a rectangular slab of 4 m × 3 m with one of its longer side free and other three side are simply supported. The reinforcements in the two perpendicular direction are such that  $M_x = 10 \text{ kNm}$ ,  $M_y = 15 \text{ kNm}$ . Find the collapse load.

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 unstiffened and it supports a 2.65 m wide slab.

Live load on roof :  $2.0 \text{ kN/m}^2$

Live load on floor :  $2.0 \text{ kN/m}^2$

Weight of 80 mm thick terrace :  $2.0 \text{ kN/m}^2$

Weight on floor finish :  $0.2 \text{ kN/m}^2$ .

**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.