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 Reinfroced 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 kN/m^3 and 30° 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 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 kN/m^2. Assume a level backfill with a Unit weight of 16 kN/m^3 and an angle of shearing resistance of 30°. 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/m². Assume μ = 0.5 , fck = 20 N/mm², F_y = 415 N/mm².

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 kNm, M_y = 15 kNm. Find the collapse load.

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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 kN/m^2

Live load on floor : 2.0 kN/m^2

Weight of 80 mm thick terrace : 2.0 kN/m^2

Weight on floor finish : 0.2 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.

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