Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 11199

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2012.

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 gravity retaining wall?

2. What are the stability requirements for retaining wall?

3. What theory is used to design
   (a) the members under direct tension
   (b) the members under bending tension.

4. Name the types of movement joints.

5. List the classification of staircases.

6. What do you mean by the column strip and middle strip in flat slab?

7. Draw any two yield line patterns for a rectangular slab.

8. Define :
   (a) Isotropically reinforced slabs.
   (b) Orthotropically reinforced slabs.

9. What is meant by slenderness ratio of a masonry wall?

10. Name the various types of masonry walls used in building construction.

PART B — (5 × 16 = 80 marks)

11. (a) Design the vertical stem of a reinforced concrete T-shaped retaining wall to retain 4.5 m high earth with horizontal surface at the top. The unit weight of soil is 16.5 kN/m^3 and angle of repose of 30°. The safe bearing capacity of the soil is 160 kN/m^2. The coefficient of friction between the base and the soil is 0.55. Use M20 concrete and Fe415 steel. (16)

Or

(b) A counterfort retaining wall is to retain the earth 6.0 m high above the ground level. The unit weight of the retained earth is 18 kN/m^3 and angle of repose of 30°. The horizontal surface of backfill is subjected to a live load surcharge of 20 kN/m^2. The safe bearing capacity of soil is 200 kN/m^2. The coefficient of friction between the base slab and soil is 0.53. M20 concrete and Fe415 HYSD bars are used. Carry out the stability analysis and design the shear key if necessary. (16)

12. (a) Design a cylindrical water tank of capacity 500 m^3 (500,000 litres) resting on the ground and having a flexible base. The overall height of the tank is restricted to 5 m with a free board of 300 mm. The bearing capacity of the soil at site is 150 kN/m^2. (16)

Or

(b) The roof of a 100 kilo litre capacity overhead circular water tank consists of a spherical dome of 8.0 m base diameter with rise of 1.25 m. The superimposed load may be taken equivalent to vertical load of 1.0 kN/m^2 of the dome surface. Design the top dome and its top ring beam. Show reinforcement details by neat sketches. Use M20 concrete and Fe415 HYSD bars. (16)

13. (a) Design a straight stair for a residential building consisting of individual steps projecting 950 mm from the face of the wall. The rise and tread of the stairs are 180 mm and 260 mm respectively. The live load may be taken as 3 kN/m^2. Use M20 concrete and Fe415 HYSD bars. (16)

Or

(b) A flat slab floor system consisting of six panels in each direction supports dead and live loads of 7.5 kN/m^2 and 6.25 kN/m^2 respectively. The supporting columns are of 550 mm diameter with storey height of 3.0 m. Design an interior panel of size 5.7 × 6.5 m using IS 456 for the direct design method, when no column head or drop is provided. Use M25 concrete and Fe415 HYSD bars. (16)

14. (a) An isotropically reinforced equilateral triangular slab is subjected to uniformly distributed load W/m (or) W_u/area. Any restraining moment is equal to positive moment. Calculate ultimate load when the slab is (i) simply supported on all the three edges (ii) completely fixed on all edges (iii) simply supported on two edges and free on the third. (16)

Or

(b) Design a simply supported reinforced concrete circular roof slab for an assembly hall of 11.00 m inside diameter. The slab is supported on a 600 mm diameter column at its centre. The slab carries a total uniformly distributed load of 4.0 kN/m^2 inclusive of self weight at service conditions. Design the slab using yield line analysis. Use M20 concrete and Fe415 HYSD bars. (16)

15. (a) A masonry wall is subjected to an axial load of 150 kN and bending moment of 30 kNm. The height of the wall is 4 m. Design the wall. (16)

Or

(b) Design a solid square masonry column of height 2000 mm to carry an axial load of 150 kN. The column is tied at top and bottom. Include the self weight of the column for the design. (16)

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