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Question Paper Code : 21263

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2015.

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 Structures 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 advantages of domes?
4. Write the requirements of minimum reinforcements against shrinkage and temperature for reinforced concrete water tank walls.
5. How a flat slab fails by shear?
6. Under what circumstances mat foundation is preferred?
7. What are the assumptions made in yield line theory?
8. Brief the virtual work method for calculating collapse load of a slab.
9. What is the effective height of a masonry wall (actual height is 'h') which has lateral restraint as well as rotational restraint (that is, full restraint) at bottom but has no restraint at the top?
10. What is meant by basic stress of a masonry wall?

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 an underground rectangular tank of size 2.8 m × 5 m × 3 m deep including a free board of 300 mm. The dry density of soil is 16 kN/m^3 and angle of repose of soil is 30°. The outside soil which is 300 mm below the top of tank wall may be taken as fully saturated up to its full height. Use M 35 grade concrete and Fe415 grade steel.

Or

(b) A circular reinforced concrete water tank of 5 m diameter and 3 m height is supported by a tower consisting of six reinforced concrete columns spaced equally on a circle of 5 m diameter. The tower height is 8 m with a bracing at a height of 4 m above the ground. The tank is designed to hold water up to a depth of 2.75 m. The self weight of tank with water is estimated to be 1000 kN. Intensity of wind pressure on tank is 1.5 kN/m^2. Using M 20 grade Concrete and Fe415 grade steel design the supporting tower for the tank.

13. (a) Design an interior floor slab panel of 4.5 m × 6 m (inner dimensions) of a reinforced concrete building. Assume live load as 4 kPa and finish load as 1 kPa. Sketch the reinforcement details. Concrete of grade M20 concrete and HYSD steel of grade Fe415 are used. Adopt limit State method of design.

Or

(b) Design a reinforced concrete wall 3.2 m high, 4.5 m long and 110 mm thickness to carry a factored load of 620 kN/m. Use M20 Concrete and Fe415 steel.

14. (a) Determine the collapse load of an orthotropically reinforced rectangular slab which is fixed all edges and uniformly loaded over the entire area using principle of virtual work.

Or

(b) Determine the collapse load of an isotropically reinforced square slab which is simply supported on three sides and free on one side when it is uniformly loaded over the entire area.

15. (a) An interior wall of a two storied building is 5 m long. The height of each storey is 3.2 m. The span of slabs on one side of the wall is 4.6 m and the other side is 3.2 m. The total load on each slab is 9 kPa (including self weight of slab). Design the wall at base level of the building.

Or

(b) Determine the safe axial load per metre length of a solid brick masonry wall of 230 mm thick. The height of the wall is 3.3 m. The wall is continuous at both ends between the cross walls of spacing 6 m. M1 mortar and bricks of compressive strength 7.5 MPa are used.

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