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Question Paper Code : 60263

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 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 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. What is the structural action between cantilever and counter fort type retaining wall?

2. What is the function of weep hole in retaining wall construction?

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. Distinguish between one-way shear and punching shear in flat slabs.

6. What are the load cases for which a box-culvert should be designed to remain safe?

7. What are the assumptions of yield line theory?

8. What are the yield patterns of slabs?

9. Define slenderness ratio of a masonry wall.

10. List out any two factors which affect the permissible stress of a masonry.

PART B — (5 × 16 = 80 marks)

11. (a) Design the main bars of 16 mm diameter and the distribution bars of 8 mm diameter required at the bottom section of the stem of a cantilever retaining wall to retain a horizontal backfill level with its top for the following data.

Height of the stem = 4.5 m.

Thickness of stem at top and bottom : 200 mm and 450 mm respectively.

Density of soil is 18 kN/m^3 and angle of repose is 30°.

Materials used in the construction are M25 grade of concrete and Fe415 steel reinforcement.

Or

(b) Design the main bars of 12 mm diameter and distributors of 8 mm diameter required at the bottom section of the stem of a counter fort retaining wall to suit the following data.

Nature of backfill : Horizontal

Height of stem = 6.5 m

Thickness of stem at top and bottom : 250 mm and 450 mm respectively.

Density of soil is 18 kN/m^3 and angle of repose is 30°.

Centre to centre spacing of counter forts = 3 m.

Materials used are M25 grade of concrete and Fe415 steel reinforcement.

12. (a) A reinforced concrete dome of 6 m base diameter with a rise of 1.25 m is to be designed for a water tank. The uniformly distributed live load including finish on dome may be taken as 2 kN/m^2. Adopting M20 concrete and Fe415 grade steel, design the dome and the ring beam.

Or

(b) Design an RC tank of internal dimensions 10 m × 3m × 3m. The tank is to be provided under ground. The soil surrounding the tank is likely to get wet. Angle of response of soil in dry state is 30° and in wet state is 6°. Soil weights 20 kN/m^3. Adopt M20 grade concrete and Fe415 grade steel.

13. (a) Design the roof slab over a car porch simply supported on opposite sides at a distance of 3 m. Use M20 for concrete and Fe500 for reinforcement.

Or

(b) Design a reinforced box culvert with inside dimension of 3 m height and 4.5 m width. The box culvert has to carry a super imposed dead load of 10 kN/m^2 and a live load of 50 kN/m^2. The density of the earth is 18 kN/m^3. Angle of repose 30°. Use M20 for concrete and Fe415 for reinforcement.

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) Determine the allowable axial load on column 300 mm × 60 mm constructed in first class brick work in CM 1 : 6 using modular bricks 200 mm × 10 mm × 100 mm the height of pier between the footing and top of slab is 5.2 m. The strength of units may be assumed as 10.5 MPa.

Or

(b) Write short note on :

(i) Classification of walls. (5)

(ii) Effective length and effective height of walls. (5)

(iii) Permissible stress in brick masonry. (6)
