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Question Paper Code : 91253

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2014.

Seventh Semester

Civil Engineering

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

(Regulation 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 – Regulation 2009/2010)

Time : Three hours

Maximum : 100 marks

(IS 456-2000, IS 1905 - 1987 and SP 16 Design Charts tables are permitted)

Use of relevant BIS standards and hand book is permitted.

(Assume any other data if necessary and indicate them clearly)

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. ✓ Differentiate Active and Passive earth pressure.
2. ✓ What is the function of Counterforts in a retaining wall?
3. What are the essential requirements for an impervious water tank?
4. Give the advantages and disadvantages of approximate method of analysis in water tank design.
5. ✓ How will you calculate the load effects on a stairs waist slab spanning in the longitudinal direction?
6. ✓ What are the limitations in direct design method for flat slab?
7. ✓ State the assumptions of yield line theory.
8. State upper and lower bound theorems.
9. What are reinforced masonry walls?
10. ✓ What are the factors affecting the design of masonry wall buildings?

PART B — (5 × 16 = 80 marks)

11. (a) Design a Cantilever retaining wall to retain earth embankment with a horizontal top 4 m above ground level. Density of earth = 18 kN/m^3 . Angle of internal friction $\phi = 30^\circ$. SBC of soil is 200 kN/m^2 . Take coefficient of friction between soil and concrete as 0.55. Adopt M_{20} grade concrete and Fe_{415} HYSD bars.

Or

- (b) Design the stem of a counterfort retaining wall if the height of wall above ground level = 6 m. SBC of soil is 170 kN/m^2 . Angle of internal friction $\phi = 32^\circ$. Density of soil = 18 kN/m^3 . Spacing of counterfort 3 m c/c. Take coefficient of friction between soil and concrete as 0.5. Adopt M_{20} grade concrete and Fe_{500} HYSD bars.

12. (a) Design the Top dome, Ring beam and Cylindrical tank wall of R.C circular tank resting on ground with flexible base and spherical dome for a capacity of 5 Lakhs litres. The depth of storage is to be 4 m allow free board of 200 mm use M_{20} concrete and Fe_{415} steel.

Or

- (b) A rectangular RCC water tank with an open top is required to store 1 Lakhs litres of water. The inside dimensions of the tank may be taken as $6 \text{ m} \times 4 \text{ m}$. The tank rests on wall on all the four sides. Design the side walls of the tank using M_{20} grade concrete and Fe_{500} HYSD bars.

13. (a) Design a dog legged stair for a building in which the vertical distance between the floors is 3.5 m. The stair hall measures $3.5 \text{ m} \times 5.5$. The live load may be taken as 3 kN/m^2 . Use M_{20} grade concrete and Fe_{415} steel.

Or

- (b) Design a reinforced concrete slab culvert for class AA loading for the following data. Clear span = 6 m. Clear width of road ways = 6.8 m. Thickness of wearing coat = 80mm. Width of kerbs = 600 mm. Grade of concrete M_{30} . Grade of steel Fe_{500} .

14. (a) Explain the guidelines to draw the possible yield patterns and locate the axes of rotations.

Or

- (b) Design a rectangular slab of size $4 \text{ m} \times 6 \text{ m}$ which is simply supported along the edges and has to carry a service live load of 4 kN/m^2 . Assume coefficient of orthotropy = 0.75. Use M_{25} Grade concrete and Fe_{415} HYSD bars. The design may be restricted to bending only.

15. (a) What are the factors to be considered while designing the brick masonry with respect to stability and lateral supports on the structure? Explain in detail.

Or

- (b) Design a brick column of height 3.5 m to carry an axial load of 120 kN width of brick column is limited to 460 mm for architectural reason. Adopt cement lime mortar of proportion 1:1:6 and first class brick with 10 N/mm^2 strength the column may be taken as tersed restrain.