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Question Paper Code : 80216

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2016.

Sixth Semester

Civil Engineering

CE 6601 – DESIGN OF REINFORCED CONCRETE AND BRICK MASONRY STRUCTURES

(Regulations 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is the structural action between cantilever and counterfort type retaining wall?

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

3. Why domes for a circular water tank are economical that a flat cover slab?

4. What is the use of bracings in the staging of water tanks?

5. When are mat foundations recommended?

6. What are the advantages of box culvert over slab culvert?

7. Define Yield line theory.

8. Give any four assumptions in yield line theory.

9. Obtain the stress reduction factor for an eccentrically loaded masonry member with slenderness ratio of 12 and eccentricity to thickness ratio of 1/12.

10. Why is it intended to limit the slenderness of the load bearing masonry walls?

PART B — (5 × 16 = 80 marks)

11. (a) Design a cantilever retaining wall to retain earth embankment 4.5 m above ground level. The density of earth is 18kN/m^3 and its angle of repose is 30°. The embankment is horizontal at its top. The safe bearing capacity may be taken as 200 kN/m^2 and the coefficient of friction between soils and concrete is 0.5. Use M20 concrete and Fe415 grade steel.

Or

(b) A counterfort retaining wall is to retain the earth 6m high above the ground level. The unit weight of the retained earth is 18 kN/m^3 and the angle of repose is 30°. The horizontal surface of back fill 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. Carryout the stability analysis and design the shear key is necessary.

12. (a) A reinforced concrete dome of 6 m base diameter with a rise of 12.5 m is to be designed for a water tank. The uniformly distributed liveload including finishes on dome may be taken as 2kN/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 underground. The soil surrounding the tank is likely to get wet. Angle of repose of soil in dry state is 30° and in wet state is 6. Soil weighs 20 kN/m^3 Adopt M20 concrete and Fe415 Grade steel.

13. (a) Design an dog legged stair case (Waist slab type) for an office building to suit the following data.

Height between floor = 3.2 m

Risers = 160 mm Tread = 270 mm

Length of landing = 1.25m

Width of flight = landing width = 1.25 m

Assume Stair to be supported on 230 mm thick masonry walls at the outer edges of the landing parallel to the risers. Adopt M20 grade concrete and Fe415 HYSD bars. Assume a live load of 5 kN/m^2.

Or

(b) Design an interior panel of a flat slab for a live load of 5 kN/m^2. The Panel size is 6 m × 6 m. The diameter of the column is 500 mm. Drops may be provided. Use M20 concrete and Fe415 steel. Sketch the details of reinforcement.

14. (a) Using Virtual work method. Obtain the expression for ultimate moment per unit length of the yield line in the case of isotropically reinforced square slab fixed on all edges and subjected to an uniformly distributed load.

Or

(b) Design a rectangular slab of 6m × 4 m simply supported at the edges carrying a service load of 4 kN/m^2. Assume the coefficient of orthotropy as 0.7. Materials used are M20 grade concrete and Fe415 steel bars.

15. (a) In the wall of a room, 5 m long 300 mm thick and 3.5m high there are three openings 0.9m wide and 1.5 m high. The portion of backwork between the windows is 200 mm Wide each. If the load/m length of the wall at the lintel level is 40 kN/m, determine what minimum mortar strength must be used in the wall. Strength of bricks may be taken as 9 MPa.

Or

(b) Determine the allowable axial load a column 300 mm × 600 mm constructed in First class brickwork in 1.6 cm. Using modular bricks 200 mm × 100 mm × 100 mm . The height of the column between the footing and top slab is 5.1 m. The strength of the brick units may be taken as 10 MPa.
