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Question Paper Code : X 20310

B.E./B.Tech. DEGREE EXAMINATIONS, NOV./DEC. 2020

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 are the types of retaining walls ?
2. Define Active Earth Pressure.
3. What are the methods available for the analysis of circular tank ?
4. What are the types of reinforced concrete water tanks.
5. What is a flight ?
6. Define flat slab.
7. What is meant by yield lines ?
8. State the principle of virtual work.
9. How do you calculate the effective height of masonry wall ?
10. What is Stress reduction factor in masonry element ?



PART – B

(5×13=65 Marks)

11. a) Design the stem of a cantilever retaining wall (T type) to retain earth for a height of 4 m. The backfill is horizontal. The density of soil is 18 kN/m^3 . Safe bearing capacity of soil is 200 kN/m^2 . Take the co-efficient of friction between concrete and soil as 0.6. The angle of repose is 30 degrees. Use M20 concrete and Fe415 steel.

(OR)

- b) A R.C.C. retaining wall with counterforts is required to support earth to a height of 7 m above the ground level. The top surface of the backfill is horizontal. The trial pit taken at the site indicates that soil of bearing capacity 220 kN/m^2 is available at a depth of 1.25 m below the ground level. The weight of earth is 18 kN/m^3 and angle of repose is 30° . The coefficient of friction between concrete and soil is 0.58. Use concrete M20 and steel grade Fe 415. Design the toe slab and do the usual stability check.
12. a) Design a circular water tank of capacity 400 kl resting on the ground and having a fixed base condition due to rigid joint between the wall and the base slab. The materials to be used are M25 grade concrete and HYSD steel grade Fe415. Use IS method.

(OR)

- b) Design the dome and top ring beam of a circular tank of capacity of 400 kl. The depth of water is to be 4m, including a free board of 200 mm. The tank is to be supported on masonry tower.
13. a) A longitudinal type of staircase spans a distance of 3.75 m centre to centre of beams. The rise $R = 175 \text{ mm}$, going $G = 250 \text{ mm}$, tread $T = 270 \text{ mm}$. The tread have 15 mm granolithic finish and consist of 15 steps. Design the stair case for a live load of 5 kN/m^2 . Assume breadth of staircase as 1.5 m. Use M25 and Fe415 steel.

(OR)

- b) Design the interior panel of a flat slab floor system for a warehouse $24 \text{ m} \times 24 \text{ m}$ divided into panels of 6 m. Loading class = 5 kN/m^2 . Materials = M25 grade concrete, Fe 415 grade steel, Column size = 400 mm dia.
14. a) Derive the ultimate design moments for a square slab fixed on all edges using yield line approach.

(OR)

- b) A rectangular slab $3.5 \times 4.5 \text{ m}$ is isotropically reinforced with 8 mm dia bars spaced at 150 mm both ways. The average effective depth may be taken as 80 mm and the total depth of the slab is 100 mm. If Fe 415 steel and concrete grade M20 are used, determine the safe service live load. The dead load of floor finishing may be assumed as 1.5 kN/m^2 .



15. a) A load bearing brick masonry wall of a building is 20 cm thick, is laterally supported by RCC slabs at top and bottom, which are 12 cm thick each and clear height between slabs is 3.0 m. If the wall has an axial load of 71.5 kN/m at the base, inclusive of self-weight, what should be the crushing strength of bricks and grade of mortar for the wall. Wall is 4 m long between cross walls and bricks used are of modular size. Assume that there are no openings in the wall within $H/8$ of its junction with cross walls and there are no openings in cross walls within $H/5$ of their junctions with the load bearing wall under consideration. Assume that two ends of wall are discontinuous and joints are not raked.

(OR)

- b) A 23 cm thick brick masonry wall carries an axial load of 12 kN per meter length and eccentric load of 27 kN per meter length acting at a distance of 7.33 cm from the axis of the wall. Design the masonry for the wall if its Slenderness ratio is 16, assume that joints are not raked.

PART – C

(1×15=15 Marks)

16. a) Design a dog legged stair for a building in which the vertical distance between the floors is 3.6 m. The stair hall measures 2.5 m × 2.5 m. The live load may be taken as 2500 N/m². Use M15 concrete and Fe 250 reinforcement.

(OR)

- b) A circular room has 5 m diameter from inside. Design a circular roof slab for the room to carry a super imposed load of 3800 N/m². Assume that the slab is simply supported. Use M15 mix and Fe 250 steel.
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