Q.P. Code : 619200

(4 Hours)   Total Marks: 100

N.B. (1) Question No. 1 is compulsory.

      (2) Solve any three questions from remaining questions.

      (3) Use of IS 456 and IS 3370 is permitted.

      (4) Assume suitable data if required and state it clearly.

1. (a) Design a rectangular open water tank of clear plan dimensions 6 m x 4 m resting on the ground. The depth of water is 3 m and free board is 0.3 m. Adopt M25 grade concrete and Fe 415 steel. Use approximate method for the design. Draw following views showing reinforcement details (i) vertical cross section through the base slab and short wall and (ii) vertical cross section through the base slab and long wall.   32

    (b) Explain the various types of joints provided in water tanks with sketches.   08

<div align="center">OR</div>

Figure 1 shows a layout of a floor of a building. All the beams carry 230 mm thick brick wall. Floor to floor height is 3 m. Assume live load = 3 kN/m², floor finish = 1 kN/m². Use M20 grade concrete and Fe 415 grade steel.

(i) Design the slab S1 and S2, and draw reinforcement details for the sectional elevation and plan.

(ii) Design beam A3B3D3 and draw reinforcement details of longitudinal section and cross section at mid span and supports.   40


FIGURE 1
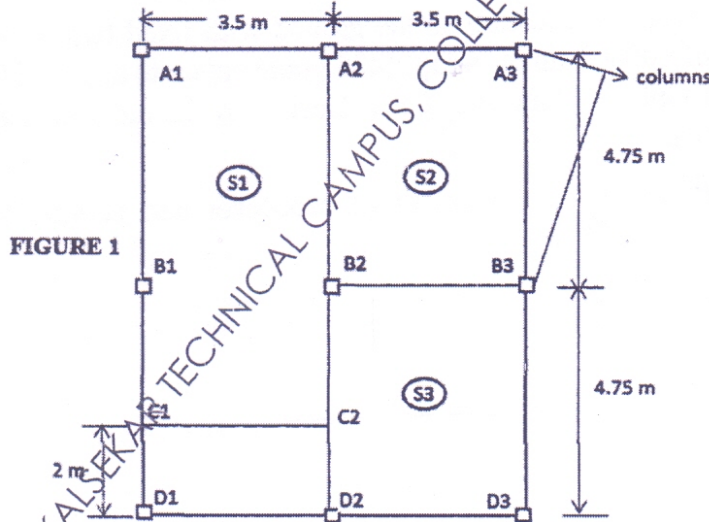
2. A main stair of an office R.C.C building has to be located in a room measuring 3.0 m x 5.75 m. The vertical distance between the floors is 3.5 m. Design the two flights of doglegged stairs. Live load = 5 kN/m². Show the reinforcement details for both the flights with sketches. Use M20 grade concrete and Fe 415 grade steel.   20

<div align="right">[Turn over]</div>

3. Design a suitable raft slab for the layout shown in Figure 2. Net bearing capacity of soil is 90 kN/m². Column size is 300mm x 300mm and height is 3.5 m. Grade of concrete M20 and Grade of steel Fe 415.　　20

FIGURE 2
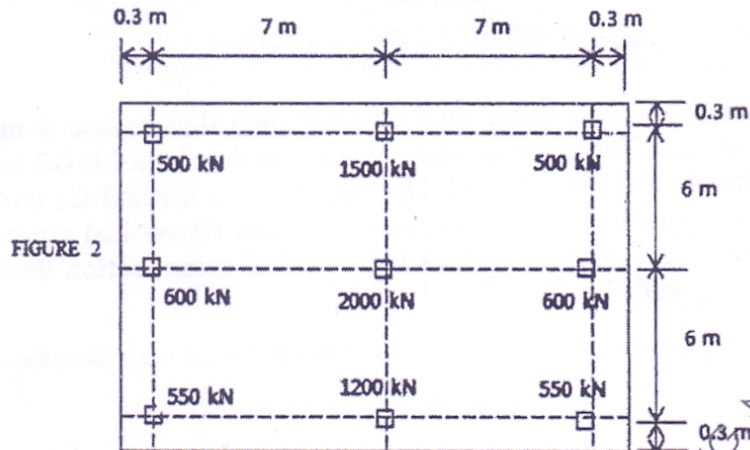
4　Design and draw the reinforcement details of the stem and heel slab of cantilever type retaining wall to retain soil of height 4 m above the ground level. Safe bearing capacity of soil = 125 kN/m². Unit weight of soil = 19 kN/m³. Angle of shearing resistance of soil = 30⁰. Friction coefficient between soil and concrete = 0.6. Grade of concrete M20 and Grade of steel Fe 415.　　20

5　(a) Design a circular water tank resting on the ground with fixed base and free at top for a capacity of 600000 litres. Adopt M25 grade concrete and Fe 415 steel. The height of the tank is limited to 4.5m. Design by IS method. Draw the reinforcement details.　　15

(b) Explain the difference in the behaviour of cantilever and counterfort type retaining wall.　　05