4 Hours [Total Marks : 80]

PLEASE NOTE:
1. Question **No 1** is **Compulsory.**
2. Attempt any **three** questions out of remaining questions.
3. Use of **IS 456** is **Permitted.**

Q1. The framing plan of a residential building is shown in Figure 1. The design live load is 3 kN/m^2 and floor finish load is 1.5 kN/m^2. All external walls are 230 mm thick and internal walls are 150 mm thick. Floor to floor height is 3.2 m. Grade of concrete is M20 and steel is Fe 415. All columns are 300mm ×300 mm in size.
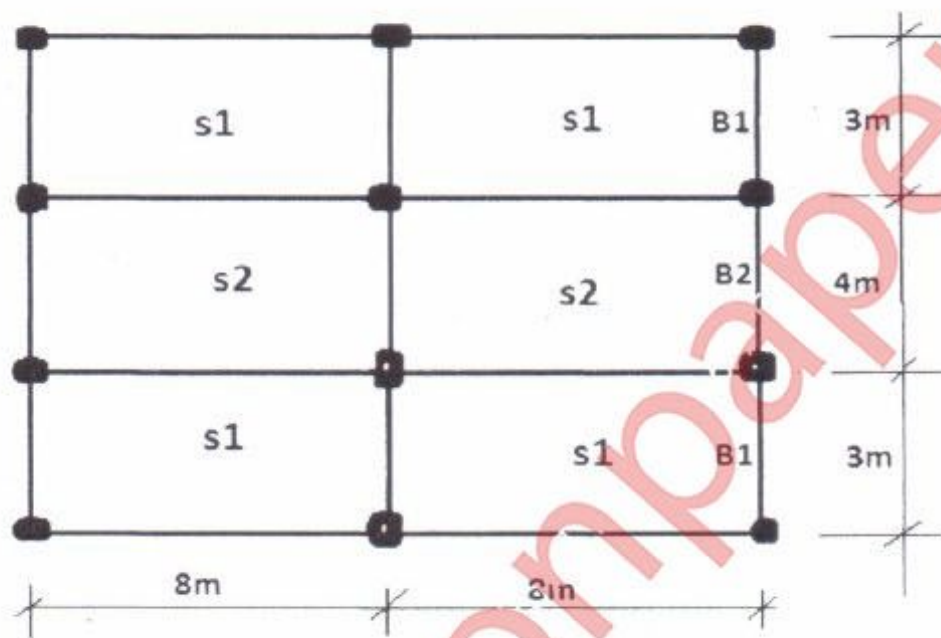

Figure 1

Design the following
   a) Slab S1 and S2 [12]
   b) Beam B1-B2 [12]
   Draw neat sketches showing the reinforcement details. [08]

OR

Q1 (a) Design by approximate method a rectangular tank 6 m × 4 m in plan and 3.5 in height. Tank is resting on firm ground. Grade of concrete is M25 and steel is Fe 415.check the design for safe stresses. Design the following.

   a) Side walls [14]
   b) Base slab [06]
   Draw neat sketches showing the reinforcement details [06]

Q1 (b). State the conditions under which the following foundations are preferred. [06]

   (a) Isolated b) Combined c) raft

TURN OVER

Q2. A building having floor to floor height as 3.2 m is to be provided a dog legged staircase The stair hall is 3m×5m. Grade of concrete is M20 and steel is Fe 415.
a) Design a dog legged staircase. [12]
b)Draw the plan showing flight details, mid landing etc. and [02]
 Draw Reinforcement details in a flight [02]

Q3. A reinforced concrete cantilever retaining wall is supporting a backfill of height 4.5 m above ground. Take density of soil = 18 kN/m^3. Angle of repose =30^0. SBC of soil = 200 kN/m^3 and coefficient of friction between concrete and soil =0.45. Grade of concrete is M20 and steel is Fe 415.
a) Design the stem and toe of wall and show all stability checks. [12]
b) Draw reinforcement details of toe and stem with curtailment of reinforcements. [04]

Q4. Design a raft foundation for the layout of the columns of a building as shown in [12]
figure 2. Working loads are given below. Net bearing capacity = 80 kN/m^3. [04]
Load on columns C1 and C3 = 700 kN.
Load on columns C2 and C4 = 900 kN.
Load on columns C5   =1100 kN.
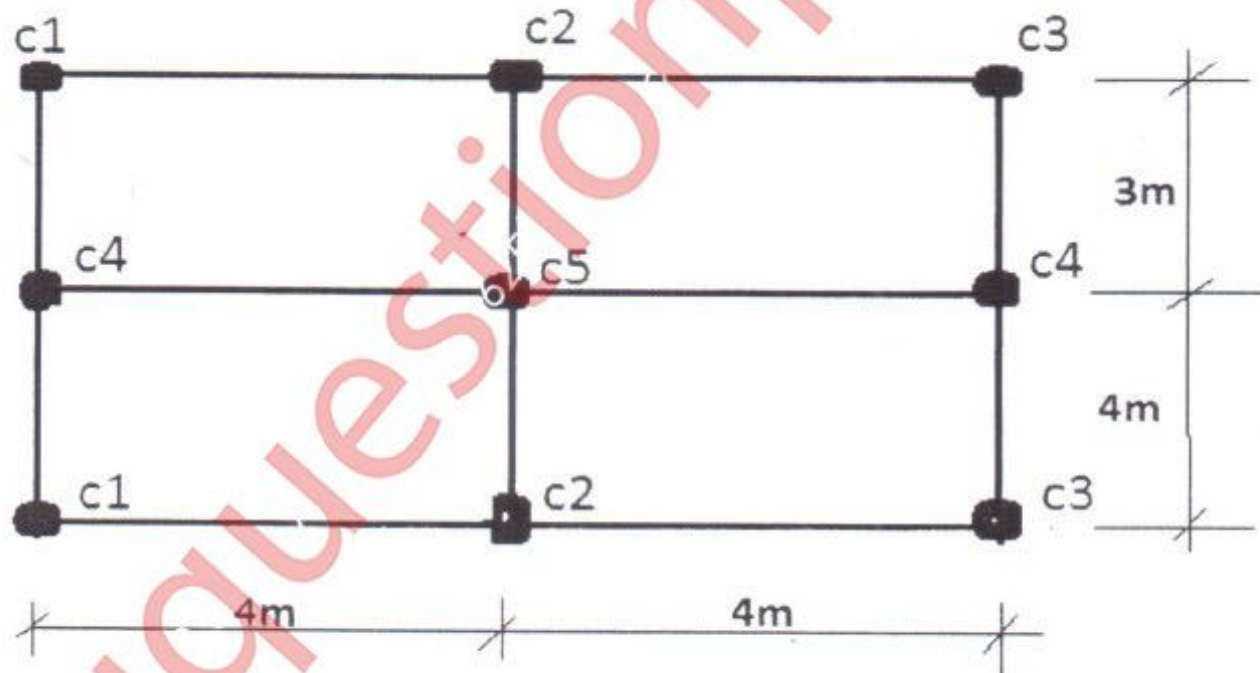Draw a neat sketch showing reinforcement details

Figure 2

Q5. (a) Explain with neat sketches different types of joints for water tanks. [08]
b) Explain the difference between structural behavior of cantilever and counter fort [08]
retaining wall