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Q.P. Code: 11751

(CBSGS)

[TIME 4 HRS]

[MARKS 80]

1. Question **No 1** is **Compulsory**.
2. Attempt any **three** questions out of remaining questions.
3. Use of IS **CODES** is **Permitted**.
4. **Assume** suitable data if required and **state** it clearly.

- Q 1 Attempt the following 20
- a. Explain the statement "Limit state method combines best of working stress method and ultimate load theory".
  - b. Write a note on types of water tanks and explain how their design requirements change.
  - c. Explain difference in behavior of cantilever and counter fort retaining walls.
  - d. What is the purpose of using following types of steel in RC members.
    - i. Lateral tie in column.
    - ii. Main steel and distribution steel in slab
    - iii. Stirrups in beams.

- Q 2 The framing plan of a residential building is shown in Figure 1. The design live load is  $3 \text{ kN/m}^2$  and floor finish load is  $1.5 \text{ kN/m}^2$ . 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 450mm x 450 mm in size. 20

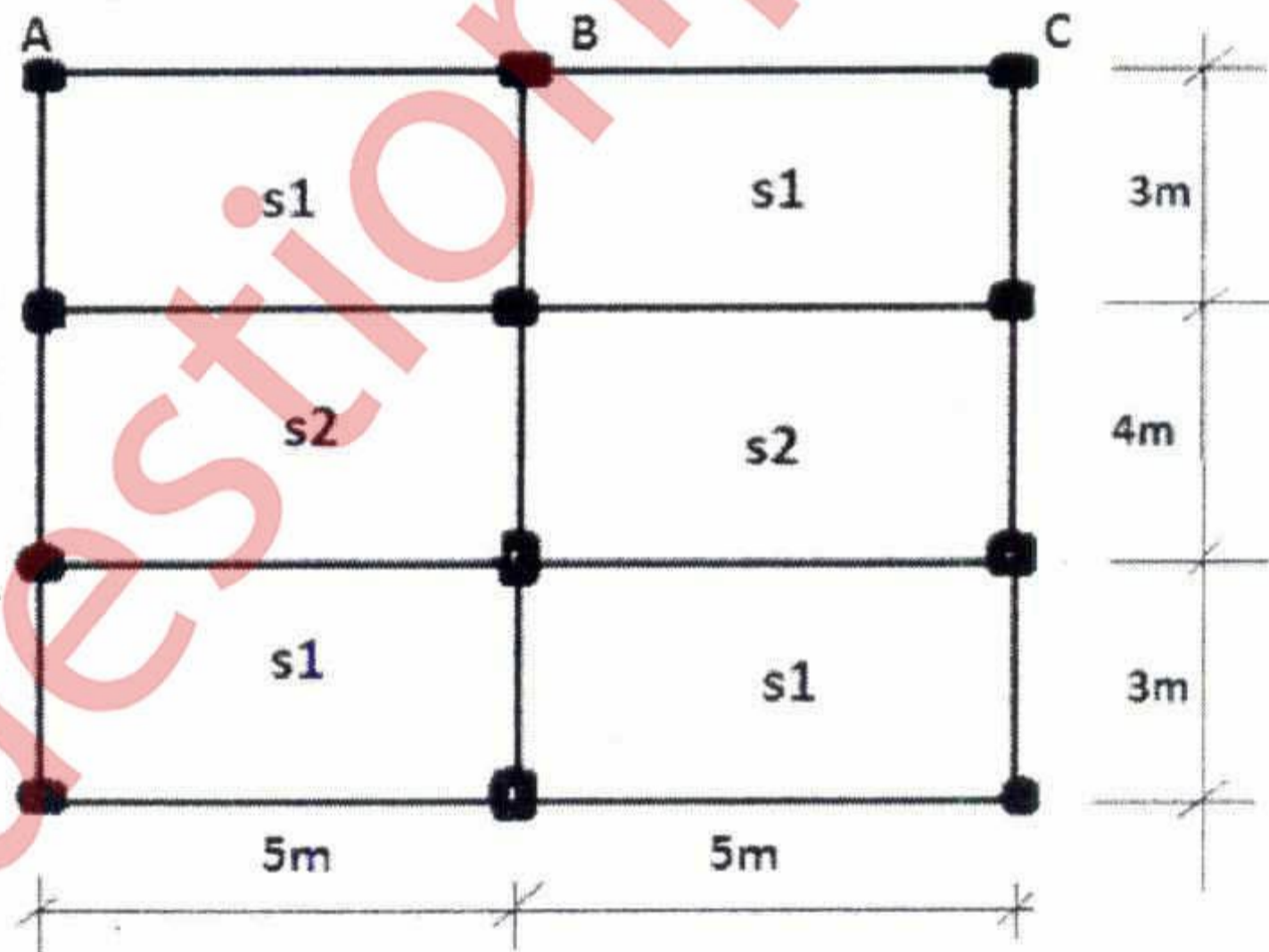


Figure 1

Design the following and draw neat sketches showing the reinforcement details.

- i. Slab S2
- ii. Beam ABC

- Q 3 Design by approximate method a rectangular tank 5 m × 4.5 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 and Draw neat sketches showing the reinforcement details
- Side walls
  - Base slab
- Q 4 A building having floor to floor height as 3.1 m is to be provided an open well staircase. Design the open well staircase. Draw the plan showing flight details, mid landing etc. and draw Reinforcement details in a flight. Use materials concrete is M20 and steel Fe 415
- Q 5 Design a reinforced concrete cantilever retaining wall supporting a backfill of height 4.5 m above ground. Take density of soil =  $19 \text{ kN/m}^3$ . Angle of repose =  $30^\circ$ . SBC of soil =  $200 \text{ kN/m}^3$  and coefficient of friction between concrete and soil = 0.55. Grade of concrete is M20 and steel is Fe 415. Design the stem and toe of wall and show all stability checks. Draw reinforcement details of toe and stem with curtailment of reinforcements.
- Q 6 a. Following figure shows the layout plan of the columns of a building. Design a raft foundation for the building . Working loads acting on columns are given below. Take net bearing capacity =  $100 \text{ kN/m}^3$ .  
 Load on columns C1 and C3 = 750 kN.  
 Load on columns C2 and C4 = 1000 kN.  
 Load on columns C5 = 1200 kN.  
 Draw a neat sketch showing reinforcement details

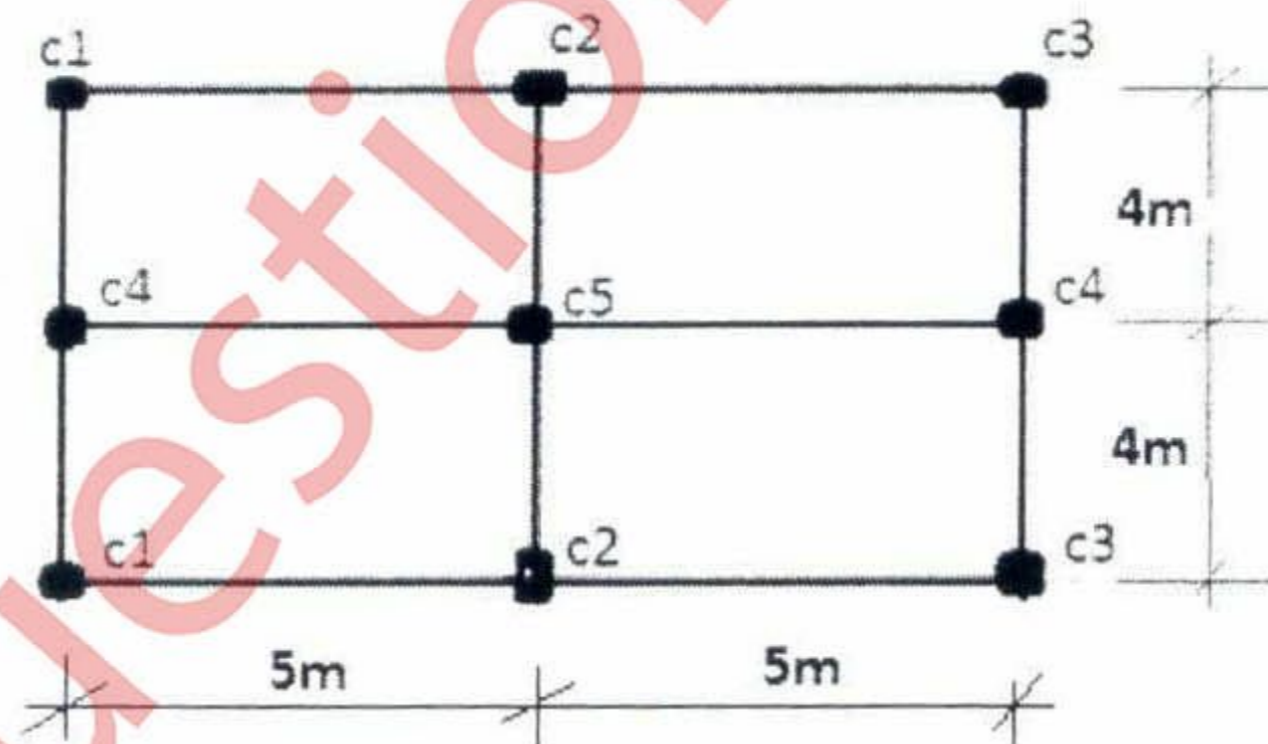


Figure 2

- b. Explain types of foundations (with neat sketches) that can be provided for following conditions.
- Black cotton soil up to depth of 10 m.
  - Foundation of column close to boundary
  - Multistoried building on soil having low bearing capacity.