

**BACHELOR OF ENGINEERING (CIVIL ENGINEERING)**  
**FOURTH YEAR, 2<sup>ND</sup> SEMESTER 2024**  
**DESIGN OF STRUCTURES-III**

Time : 3 hours

Full Marks : 100

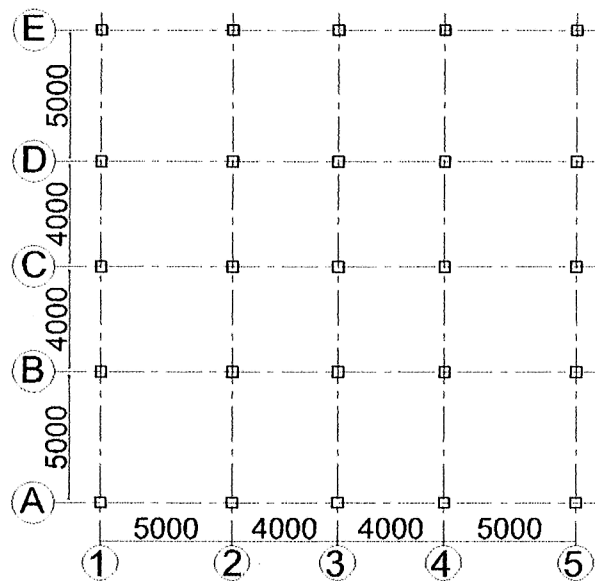
**The figures in the margin indicate full marks**

**Assume reasonable value of any data if required.**

**IS code No.1893(Pt. 1), 875 (Pt. 3), 456 & SP 16, IS 3370 (Pt.2 & 4) are allowed in examination hall**

**Answer any four question**

1. A six storied Institutional building is located in Kolkata. Center line plan as given below



Floor to floor height = 4m, Plinth height = 0.6m, Column size = 400mm x 400mm, Beam size = 450mm (depth) x 250mm (wide)

Outer wall = 250mm thick brick wall all round.

Calculate designed wind force of the building and calculate joint loads in each storey for frame C1-C5.

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1. Design a cantilever retaining wall (T type) to retain earth for a height of 3m. The backfill is horizontal. The density of soil is  $20 \text{ kN/m}^3$ . Safe bearing capacity of soil is  $200 \text{ kN/m}^2$ . Take the co-efficient of friction between concrete and soil as 0.6. The angle of repose is  $30^\circ$ . Use M25 concrete and Fe500 steel.

Draw the reinforcement arrangement of retaining wall

25.

[ Turn over

3. Design a suitable pile cap for a RCC column of size 400mm x 400mm with total vertical load – 1200 KN, moment in both X and Y direction = 75 KNM  
Pile dia – 450 mm, Vertical capacity – 400KN, Lateral capacity – 60KN  
Uplift capacity - 100 KN  
Apply 'Limit State Method' as per IS 456. Grade of concrete M25 and  
Grade of steel Fe 500  
Draw the reinforcement arrangement of pile cap.

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4. A cylindrical tank of capacity 5,00,000 lits is resting on good unyielding ground.  
The depth of tank limited to 4m. A free board of 300 mm may be kept.  
The wall and base slab are casted integrally. Design the tank using IS code method.  
Grade of concrete M25 and Grade of steel Fe 500.  
Draw the detail of reinforcement of the tank.

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5. Two columns of size 500mm x500mm and column and 400mm x400mm placed at 3m center to center distance, carrying a load of 750kN and. 600 kN respectively. Design a rectangular combined footing for the above two columns. Safe bearing capacity of soil is 150 kN/sqm.  
Grade of concrete M25 and Grade of steel Fe 500.  
Draw the reinforcement arrangement of foundation.

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