

EX/CE/5/T/406/2023

BACHELOR OF ENGINEERING (CIVIL ENGINEERING)
FOURTH YEAR, 2ND SEMESTER 2023
DESIGN OF STRUCTURES-III

Time : 3 hours

Full Marks : 100

The figures in the margin indicate full marks

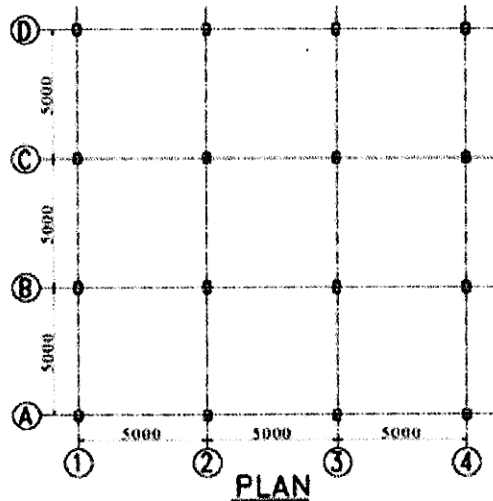
Assume reasonable value of any data if required.

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 five storied Institutional building of 15m x 15m as shown in fig.



Floor to floor height = 3.5m, Plinth height = 0.6m, Column size = 400mm x 400mm

Outer wall = 250mm thick brick wall, Consider 125mm brick wall over all internal beams. Slab weight including finishing = 5.2 KN/sqm for typical floor, 6.1 KN/sqm for Roof, Water tank at roof level = 200KN

Live load : 4 KN/sqm for typical floor, 1.5 KN/sqm for Roof.

Consider seismic zone II and soil type – Medium.

Calculate design seismic base shear and design lateral forces to different floor level.

25

2. Design a suitable pile cap for a RCC column of size 500mm x 500mm with total vertical load – 1000 KN, moment in both X and Y direction = 30 KNM
Pile dia – 450 mm, Vertical capacity – 350KN, Horizontal capacity – 60KN, Uplift capacity - 100 KN.

[Turn over

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. 25

3. A rectangular tank of size 5m x 4m with depth 3m is resting on good unyielding ground. The walls and base slab are casted integrally. Design the tank using IS code method. Grade of concrete M25 and Grade of steel Fe 415.

Draw the detail of reinforcement of the tank. 25

4. Design a cantilever T type retaining wall to retain earth for a height of 3.5m. The backfill is horizontal. The density of soil is 19 kN/m³. Safe bearing capacity of soil is 200 kN/m². Take the co-efficient of friction between concrete and soil as 0.6. The angle of repose is 30°. Use M25 concrete and Fe500 steel.

Draw the reinforcement arrangement of retaining wall. 25

5. Design a rectangular combined footing with two column 'A' of size 350mm x 350mm and column 'B' 300mm x 300mm. A load of 700kN is acting on column A and 500 kN load is applied on column B. Column center to center distance 3000mm. 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. 25