

EX/CE/5/T/406/2022

BACHELOR OF ENGINEERING (CIVIL ENGINEERING)
FOURTH YEAR, 2ND SEMESTER 2022
DESIGN OF STRUCTURES-III

Time : 3 hours

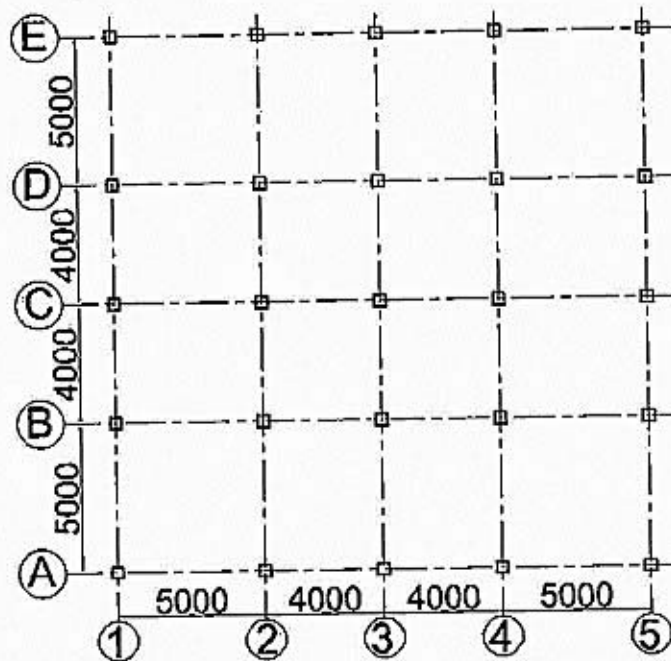
Full Marks : 100

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) and IRC 6 & 21 are allowed in examination hall

Answer any four question

1. Center line plan of a six storied Institutional building as shown in fig.



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.

25

2. Design a cantilever retaining wall (T type) to retain earth for a height of 4m. The backfill is horizontal. The density of soil is 18 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.

3. Design a suitable pile cap for a RCC column of size 400mm x 400mm with total vertical load – 1000 KN, moment in both X and Y direction = 65 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. 25
4. A RCC slab culvert for a state highway with following data:
Carriage way = 7.5m wide (two lane), Kerb = 600mm wide, clear span = 6.0m,
wearing coat = 80mm, width of bearing = 400mm.
Loading – IRC Class A or AA whichever gives the worst effect.
Design the RCC deck slab. Grade of concrete M25 and Grade of steel Fe 415
Draw the detail of reinforcement of the deck slab. 25
5. A cylindrical tank of capacity 7,00,000 lits is resting on good unyielding ground.
The depth of tank limited to 5m. 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 M20 and Grade of steel Fe 500.
Draw the detail of reinforcement of the tank. 25
6. Design a rectangular combined footing with two column 'A' of size 500mm x 500mm and column 'B' 400mm x 400mm. A load of 750kN is acting on A column and 600 kN load is applied on B column. Column center to center distance 3000mm. Safe bearing capacity of soil is 150 kN/sqm. Boundary line is 300mm away from column B.
Grade of concrete M25 and Grade of steel Fe 500.
Draw the reinforcement arrangement of foundation. 25