

B.E. / Civil / Sem-VII / 'C' Scheme / Sub: - D&DR / Date: - 10/11/2025
S.H. 2025

(Time: 4 Hours)

(Total Marks: 80)

Q.P. Code: - 10095149

- Note: 1. Question number 1 is compulsory;
2. Attempt any three out of the remaining five questions.
3. Use of relevant IS codes is permitted.
4. Assume suitable data wherever necessary.

1. Attempt any four

20

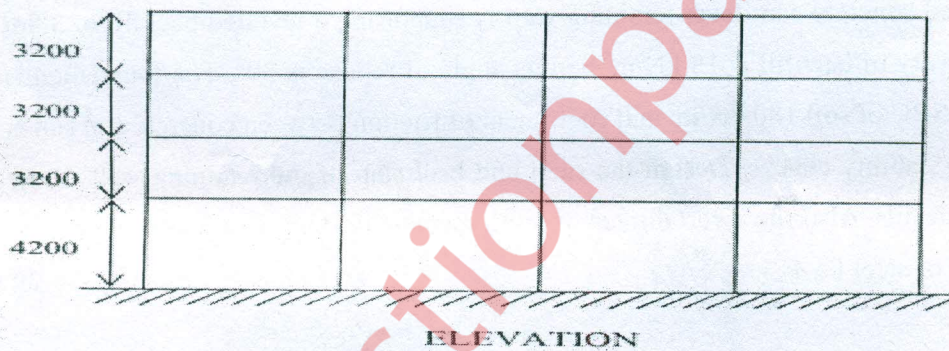
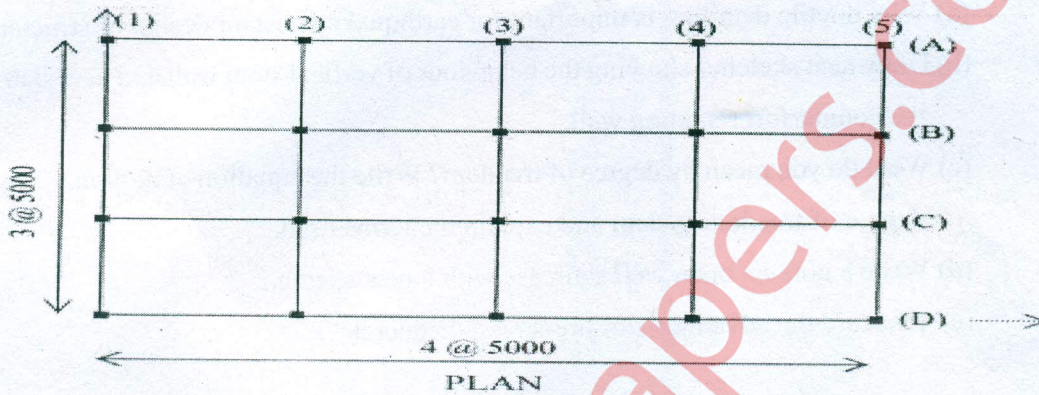
- Why ductile detailing is important for earthquake resistant design of structures?
- Draw neat sketches showing the behaviour of vertical stem wall and heel slab of the counterfort retaining wall.
- What do you mean by degree of freedom? Write the equation of motion for a single degree of freedom system and explain the terms used.
- Write a note on open well staircase with a neat sketch.
- What are the advantages of pre-stressed concrete?

2. A reinforced concrete cantilever retaining wall is supporting a levelled backfill of 3.8m above GL. Density of backfill is 18 kN/m^3 and its angle of repose is 30° . The foundation is 1m below GL. SBC of soil 180 kN/m^2 and coefficient of friction between concrete and soil is 0.45. Show all stability checks. Design the stem and heel slab of the retaining wall. Draw reinforcement details. Also show curtailment of reinforcement in stem. Use grade of concrete M25 and grade of steel Fe 415. 20

3. Design a dog- legged stair for a building in which the vertical distance between floors is 3.2m. The stair hall measures 2.6m x 3.8m. The L.L may be taken as 2.0 kN/m^2 . Use M20 concrete and Fe415 steel bars. Draw reinforcement details. 20

4. Design a circular water tank by working stress method which is open at the top. It is having a flexible base. It rests on the ground. The capacity of tank is 6,25000 litres. M30 concrete and Fe415 steel are to be used. Permissible stress in concrete in direct tension is 1.5 MPa and permissible stress in steel is 130 MPa. Draw detailed reinforcement sketches. 20

5. a) The building shown in figure is located in Bhopal. The soil conditions are hard and the entire building is supported on a raft foundation. The R. C. frames are infilled with brick-masonry. The lumped weight due to dead loads is 10 kN/m^2 on floors. The floors are to cater for a live load of 2 kN/m^2 on floors. Determine design seismic load on the structure as per IS:1893(Part1)2016. 14



b) In a post-tensioned beam cable is subjected to a stress of 1200 N/mm^2 . If the slip is found to be 3 mm . find the percentage loss due to this cause. The beam is 15 m long. Take $E_s = 200 \text{ kN/mm}^2$. 6

6. Design ($4 \times 5 \text{ m}$) interior panel of a two-way continuous slab for a live load of 3000 N/m^2 . Use M20 concrete and Fe415 steel. Draw neat sketch showing reinforcement details. Use limit state method.) 20
