B.Tech-7th-CE
Concrete Structure-II

Full Marks : 70

Time : 3 hours

Answer any six questions including **Q. No. 1**
which is compulsory

The figures in the right-hand margin indicate marks

Relevant IS codes are permitted in the Examination

1. Answer *all* the following questions :   2 × 10

   (a) Explain the behavior of reinforcing steel with high intensity repeated axial cyclic loads.

   (b) State the advantages of ductility in reinforced concrete structures.

   (c) Write are the objectives of earthquake resistant design of structures.

(*Turn Over*)

(2)

(d) Explain the one way and two way shears of foundation slabs.

(e) State the requirements of raft foundations.

(f) Comment on the stability requirements of retaining walls.

(g) How the forces and moments acting on slab, column and foundation of a rectangular portal frame are determined ?

(h) What are the steps for the design of under-ground water tank ?

(i) Give reasons for special confining reinforcement for full height of columns is provided when stiffness of columns changes significantly along the height in RCC members subjected to seismic forces.

(j) How the design of hinged base portal frame is different from the fixed base portal frame ?

2. The doubly reinforced beam having width = 300 mm, overall depth = 600 mm, effective cover of tension steel = 60 mm, effective cover of compression steel = 50 mm, 3 bars of 28 mm diameter Fe415 steel in the compression zone, 6 bars of 28 mm diameter Fe415 steel in the tension zone is to be analysed. Compare the ductility with respect to the curvature of the cross section of the beam using (a) M25 and Fe 415 and (b) M25 and Fe415.   10

3. The five storey building is having 20 columns. There are five rows of columns. Each row consists of 4 columns. The spacing between columns in y direction is 8 m and Four columns are situated at a distance of 0 m, 8·5m, 11·5m and 20m respectively from the corner of the building. Dead load including self weight of slab, finishes, partitions etc can be assumed as 6 kN/m² and live load as 4 kN/m² on each floor and as 2 kN/m² on the roof. The building is a RCC frame in-filled with brick masonry. The storey height is 3·5 m. The soil condition is hard, rocky foundation. The building is situated in Seismic zone III. Determine the lateral forces and shears at different storey levels.   10

(4)

4. Design a combined footing for two columns each 450 mm × 450 mm 6m apart and each carrying a load of 1500 kN. The available width is restricted to 2·5 m. The safe bearing capacity of soil may be taken as 180 kN/m². Use M20 concrete and Fe 415 steel.   10

5. Design a trapezoidal combined footing for the following requirements : Column A = 450 mm × 450 mm, Column B = 500 mm × 500 mm. Axial load on column A = 500 kN, Axial load on column B = 700 kN. Distance between centre of columns = 3 m, safe bearing capacity of soil = 180 kN/m². The footing is not to project more than 0·5 m beyond the outer face of the column. Use M 20 and Fe 415 steel.   10

6. Design the stem of a reinforced concrete cantilever type retaining wall having a 4·5 m stem. The wall retains soil level with its top. The soil weighs 17 kN/m³ and has an angle of repose of 20°. The safe bearing capacity of the soil is 140 kN/m². Use M20 concrete and Fe 415 steel. 10

7. The roof of a hall is 45 m long and 15 m wide between centres of columns and consists of continuous reinforced concrete slab over rectangular portal frames spaced 5m apart. The portals are assumed to be fixed at their bases. Design the beam at mid span of the portal frame showing details of reinforcement. The ceiling height is 3·5 m above the base. Use M20 and Fe 415 steel.   10

8. Design the short walls of an underground water tank 6 m × 12 m × 4m deep. The subsoil consists of sand having angle of repose of 35° and saturated unit weight of $17 \, kN/m^3$. The water table is likely to rise up to ground level. Use M20 concrete and Fe415 steel.   10

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