23423

M.Tech. 2nd Semester Civil Engg. (Specialization in Structural Design) Examination, May–2017

DESIGN OF STRUCTURES–II

Paper–MTSD–203

Time allowed : 3 hours] *[Maximum marks : 100*

Note : *Attempt five questions. Assume any data if missing.*

1. (a) After the analysis of a continuous beam, design moments obtained are as shown

Near Supports = 450 kN-m

Mid Span = 350 kN-m

Obtain design moments at support and mid span after 20 percent redistribution.

(b) Explain why redistribution of moments is not permitted in indeterminate R.C. structures ? 20

2. A simply supported reinforced concrete beam of rectangular section 300 mm × 500 mm overall depth is used over an effective span of 5m. The beam is reinforced with 3 nos. 25mm dia. at an effective depth of 450 mm. Two hanger bar of 10 mm dia are provided. The self weight together with dead load on the beam is 4.5 kN/m and live load is 10 kN/m. Using M 25 grade of concrete and Fe 500 steel compute

(a) Short term deflection.

(b) Long term deflection.

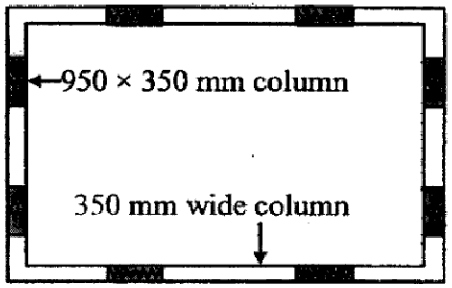
Maximum crack width at tension face directly under bar.

3. A single span deep beam has an overall depth of 4m and an effective length of 6m. The width of the beam is 400 mm. The beam supports a uniformly distributed live load on 300 kN/m, over the entire span. Using M25 grade concrete and Fe-415HYSD bars, design suitable reinforcements for the beam and sketch the details. 20

4. Design an interior panel of a flat slab for a live load of 5000 N/m^2. Drop shall be provided. All panels are 6m × 6. Use M25 concrete and mild steel reinforcement. 20

5. A straight stair in a residential building is supported on wall on one side and stringer beam on the other side. The risers are 150 mm and treads are 250 mm and horizontal span of the stairs may be taken as 1.2 m. Design the steps. Use M20 concrete and Fe steel bars. 20

6. Design a raft foundation supporting the columns of a building as shown in fig. The load on each column is 400 kN, c/c distance between columns are 3m size of raft is 9m × 9m. Use M25 concrete and Fe-415 steel. Safe bearing capacity of the soil is 120 kN/m^2. 20



7. Design an underground water tank 4m × 8m × 3m deep. The sub soil condition of sand having angle of repose of 30° and saturated unit weight of 19kN/m^3. The water table is like to raise upto ground level. Use M35 grade of concrete and HYSD bars. Take unit weight of water as 9.81 kN/m^3. 20

8. Design an Intz type overhead water tank to store 2 million liters of water. The height of tank above the ground level is 15m. The safe bearing capacity of soil at site is 190 kN/m^2. Number of supporting columns are 12. Adopt M25 grade concrete and Fe-415 HYSD bars. Design the Intz tank and sketch the details. 20