

FACULTY OF ENGINEERING & TECHNOLOGY

B.E.(Civil) Examination - DEC - 2014

Design of Structures -III (Revised)

[Time: Four Hours]

[Max. Marks: 80]

"Please check whether you have got the right question paper."

- N.B** 1) Solve any two questions from section A and B each.
2) Use of Is: 456, Is: 3370, Is: 875 is permitted.
5) Assume suitable data, if necessary & state it clearly.
- SECTION A
- Q.1 Design a combined footing for two columns A and B located 3.8m apart. The sizes of the columns are 375 mm × 375mm and 525mm × 525mm respectively. Loads on them are 1100kN and 1700kN respectively. The projection of the footing parallel to the length of footing beyond axis of column 'A' is restricted to 1m. The SBC of soil is 300 kN/m². Use M₂₅ and Fe₅₀₀ grades. 20
- Q.2 A) Explain the difference in direct design method and equivalent frame method of design of flat slab. 03
B) Design an interior panel 4m × 5m grid of flat slab without drop. Assume live load of 4.1 kN/m² and floor finish of 1kN/m². Assume M₂₀ and Fe₄₁₅ grades. Draw sketch reinforcement detailing. 17
- Q.3 Design heel slab and vertical wall of a counter fort retaining wall 7m high above G.L is to be provided to retain earth with top. Density of earth is 17kN/m³ and its angle of repose is 30°. Hard strata having SBC of soil 260 kN/m² is available at 1m below ground level. The counter forts are provided at 3.3 m c/c. 20
- SECTION B
- Q.4 A) Explain the necessity of high grade concrete and high tensile stress wires in prestressed concrete members. 08
B) Explain the freyssint system of prestressing with the help of neat sketch. 09
C) State the principles of prestressing. 03
- Q.5 A) A circular tank has 12m diameter and 3m water height. Determine i) maximum hoop tension and its location and ii) maximum bending moment. Also design the water tank using M₃₀ grade concrete. 07
B) A rectangular tank 5m × 10m × 4m deep has its walls rigidly jointed at the vertical edges and pin jointed at their horizontal edges. The tank is supported on all sides under the wall. Using IS code tables. Design the tank, use M₂₅ grade 13
- Q.6 Design sheathing, joist, stringer, and shores, slab formwork following given data. 20
Thickness of decking = 20mm
Concrete slab = 150mm
1. live load = 3.5 kN/m² with 25% additional for impact
2. deck bending = 12 N/mm²
3. shear = 0.5 N/mm²
4. E = 10,000 N/mm²
5. Batten as joist of size = 75mm × 100mm
6. Clear span of the slab – 3.5 m
7. Permissible bending stress of timber = 8N/mm²
8. Shear = 0.5 N/mm²
9. E = 10,000/mm²
Use 100mm × 150mm batten as the stringer compressive strength normal to the grain is 2.75N/mm². Compression parallel to the grain is 11N/mm², E = 4,000N/mm² permissible deflection in the sheathing is 1.6mm.