[Oct-17]

[ECE-307]
B.Tech. Degree Examination

Civil Engineering
V SEMESTER

DESIGN OF REINFORCED CONCRETE STRUCTURES
(Effective from the admitted batch 2015–16)

Time: 3 Hours Max.Marks: 60

Instructions: Each Unit carries 12 marks.
Answer all units choosing one question from each unit.
All parts of the unit must be answered in one place only.
Figures in the right hand margin indicate marks allotted.

MODULE-I

1. Design a rectangular reinforced concrete beam of section 230 mm width to carry a factored moment of 200 kNm. Assume $f_{ck}=20 \text{ N/mm}^2$ and $f_y=415 \text{ N/mm}^2$. Use working stress method of design 12

OR

2. a) What are the objectives of structural design? 4
   b) Explain in detail the working stress and limit states design philosophies 8

MODULE-II

3. Determine the ultimate moments of resistance for the beam section.
   Take $b = 230 \text{ mm}$, effective depth $d = 550 \text{ mm}$, $A_{st} = 1963 \text{ mm}^2$, $f_y = 415 \text{ MPa}$, $f_{ck} = 25 \text{ MPa}$ using limit states approach 12

OR

4. An isolated T-beam, having a simple span of 6m and cross sectional dimensions are as follows: Width of flange = 1000 mm; depth of beam = 600 mm; depth of flange = 100 mm, depth of rib = 500 mm; width of rib = 250 mm; effective cover = 80 mm. $A_{st} = 4$ Nos of 20 mm dia, $A_{sc} = 2$ Nos of 16 mm dia. Compute the maximum uniformly distributed load that can be imposed on the beam 12
5. Design the shear reinforcement for the following beam data. Beam span = 6 m; \( b = 250 \text{ mm} \), depth \( D = 400 \text{ mm} \), \( A_{st} = 1963 \text{ mm}^2 \), \( f_y = 415 \text{ MPa} \), \( f_{ck} = 30 \text{ MPa} \). Assume dead load = 7.5 kN/m; Brick work load = 30 kN; live load = 10kN/m. use limit state approach.

OR

6. A rectangular beam 400 mm wide is subjected to the following at a section; (i) B.M of 40 kN-m, (ii) S.F of 50 kN, (iii) torsional moment of 20 kNm. Design the section with Fe 415 steel and M25 concrete

MODULE-IV

7. Design a one-way slab, with a clear span of 3.5 m, simply supported on 230 mm thick masonry walls, subjected to a live load of 4 kN/m\(^2\) and a surface finish of 1 kN/m\(^2\). Assume M20 concrete and Fe 415 steel

OR

8. Design a simply supported slab to cover a room with internal dimensions 4.0 m \( \times \) 5.0 m and 230 mm thick brick wall all around. Assume a live load of 2 kN/m\(^2\) and a finish load of 1 kN/m\(^2\). Use M20 concrete and Fe 415 steel. Assume that the slab corners are free to lift up

MODULE-V

9. Design the reinforcement in a circular column to carry an axial load of 2200 kN under service dead and live loads. The column has an unsupported length of 3 m and is braced against side sway in both directions. Use M20 concrete and Fe 415 steel

OR

10. Design an isolated footing for RC column bearing a vertical load of 1200 kN, and having a base size of 500 \( \times \) 500 mm. the safe bearing capacity of soil may be taken as 120 kN/m\(^2\). Use M20 concrete and Fe 415 steel

[2/V S/117]