7. An R.C.C. Short column of size 400 mm × 500 mm is carrying a factored load of 3000 kN. Design the column assuming e_{min} < 0.05D. Use M25 concrete and Fe415 steel. (15)

Roll No. ..... Total Pages : 4

002601

August/September 2022

B.Tech. (Civil) VI SEMESTER

Design of Reinforced Concrete Structures

(PCC-CE300)

Time : 3 Hours] [Max. Marks : 75

Instructions :

1. *It is compulsory to answer all the questions (1.5 marks each) of Part-A in short.*
2. *Answer any four questions from Part-B in detail.*
3. *Different sub-parts of a question are to be attempted adjacent to each other.*
4. *Use of IS 456 and scientific calculator is permitted.*

PART-A

1. (a) Differentiate between under reinforced and over reinforced sections. (1.5)

   (b) Define anchorage length. (1.5)

   (c) Define serviceability condition. (1.5)

   (d) Elaborate on the various factors affecting bond strength development between steel and concrete. (1.5)

(e) Define characteristic strength. (1.5)

(f) Define clear cover and effective cover. (1.5)

(g) A simply supported beam of size 400 × 600 mm is supported on walls of 300 mm width, the clear span is 4 m. Calculate the effective span of the beam. (1.5)

(h) Differentiate between short and long columns. (1.5)

(i) Define T-Beam and discuss its applications. (1.5)

(j) Define Neutral axis and Limiting depth of neutral axis. (1.5)

PART-B

2. (a) Derive the expression for limiting depth of neutral axis for Fe 250 and Fe 415 and Fe 500 steel. Draw suitable diagrams. (10)

(b) Differentiate between one-way and two-way slabs. (5)

3. (a) Differentiate between working stress and limit state method. (5)

(b) A simply supported R.C.C. Beam 250 mm wide and 450 mm deep (effective) is reinforced with 4-18 mm diameter bars. Design the shear reinforcement if M20 grade of concrete and Fe 415 steel is used and beam is subjected to a shear force of 150 kN at service state. (10)

4. A simply supported slab of a corridor of a hospital building has a clear span 2.5 m and is supported on beams 230 mm width. Design the slab, if the beam is carrying a live load of 5 kN/m^2. Use M20 concrete and Fe415 steel. (15)

5. (a) Determine the depth of neutral axis of a beam 250 mm × 400 mm, reinforced with 3 bars of 20 mm diameter. Also, check for the type of section. Use M20 concrete and Fe415 steel. (5)

(b) An R.C.C. beam 250 mm × 400 mm effective is carrying a uniformly distributed load of 16 kN/m. The beam is reinforced with 4 bars of 22 mm diameter. The clear span of the beam is 4 m. Design the shear reinforcement. Use M20 concrete and plain mild steel bars. (10)

6. (a) An isolated simply supported T-beam has a flange width of 2400 mm and flange thickness of 120 mm. The effective span of the beam is 3.6 m. The effective depth of the beam is 580 mm and its width is 300 mm. It is reinforced with 8-20 mm diameter Fe 415 bars. Determine the moment of resistance of the section. Use M20 concrete. (10)

(b) Determine the ultimate moment of resistance of a 150 mm thick slab reinforced with 10 mm dia bars at 200 mm c/c. The effective cover is 25 mm. Use M20 concrete and Fe415 steel. (5)