



CBCS SCHEME

21CV53

Fifth Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025

Design of RC Structural Elements

Time: 3 hrs.

Max. Marks:100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.

2. Used of US 456 – 200, SP 16 is permitted

3. Missing data, if any, may be suitably assumed.

Module-1

- 1 a. Distinguish between working stresses and limit state methods design. (08 Marks)
- b. Write a brief note on :
- i) Balanced section
 - ii) Under reinforced section
 - iii) Deflection
 - iv) Cracking. (12 Marks)

OR

- 2 a. Define long-term and short-time deflection. What are the factors influencing the long-term and short-term. (08 Marks)
- b. A simply supported beam of rectangular section spans over 8m and has an effective depth of 600 mm. The beam is reinforced with 1% reinforcement on the tension side. Check for the deflection control of the beam by empirical method if :
- i) Fe – 250 grade steel
 - ii) Fe – 415 grade steel
 - iii) Fe – 500 grade steel. (12 Marks)

Module-2

- 3 What are the steps involved in the analysis of design, when the following area given, A_{st} or number of bars with diameter(ϕ) of bars, size of beam, grade of concrete, and steel, if load to be calculated then span is given. (20 Marks)

OR

- 4 a. Find the depth of neutral axis of a singly reinforced RC beam of 250 mm width and 500 mm effective depth. It is reinforced with 4 bars of 20 mm diameter. Use M20 concrete and Fe 415 bars. Also check for type of section. (10 Marks)
- b. A singly reinforced concrete beam 250 mm width is reinforced 4 bars of 25 mm diameter at an effective depth of 400 mm. If M20 grade concrete and Fe 415 bars are used, compute ultimate moment of resistance of the section. (10 Marks)

Module-3

- 5 List and enumerate general specification for flexure design of beams. (20 Marks)

OR

- 6 Design the T-beam as per IS : 456 – 2000. The beam is subjected to an ultimate moment of 400 kN-m. Use M20 concrete and Fe 415 steel. Following are the parameters which are used for design. $b_f = 800$ mm, $b_w = 200$ mm, $D_f = 100$ mm, $d = 400$ mm. (20 Marks)

Module-4

- 7 Design a simply supported slab on masonry walls to the following requirements. Draw plan and section showing reinforcement details.
Clear span = 2.5 m
Live load = 300 N/m²
Use M-20 concrete and Fe-415 steel. (20 Marks)

OR

- 8 Design a dog-legged staircase for a building in which the vertical distance between floors is 3.6m. The stair hall measures 3m × 6m. Take live load on the stairs is 4 kN/m². The flight are supported on 230 mm walls at the ends of outer edges. So, that it spans in the direction of going. Adopt M20 concrete and Fe-415 grade steel. Sketch the reinforcement details. (20 Marks)

Module-5

- 9 a. Distinguish between short column and long column. (10 Marks)
b. What are the assumptions made for the limit state of collapse in compression? (10 Marks)

OR

- 10 Design on RCC short square column to the following particulars.

Axial load = 1200 kN

Grade of concrete = M-20

Length of column = 1.85m

Grade of steel = Fe-415

Sketch the reinforcement details. (20 Marks)

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