

CBCS SCHEME

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17CV/CT51

Fifth Semester B.E. Degree Examination, July/August 2021 Design of RC Structural Elements

Time: 3 hrs.

Max. Marks: 100

- Note:** 1. Answer any FIVE full questions.
2. Use of IS456 – 2000, SP – 16 Permitted.
3. Assume any missing data suitably.

- What is a Stress block? Derive from fundamentals the expression for area of stress block $0.36f_{uc} x_u$ and depth of centre of compressive force from the extreme fibre in compression $0.42x_u$. (10 Marks)
 - Briefly explain the modes of failure of beam sections with sketches. (10 Marks)
- A rectangular simply supported beam of span 5m is 300mm × 650mm in cross section and is reinforced with 3 bars of 20mm on tension side as an effective cover of 50 mm. Determine short term deflections due to an imposed load of 20kN/m. Assume grade of concrete M₂₀ and Fe 415 grade steel. (20 Marks)
- A singly reinforced beam 300mm × 450mm in section is reinforced with 3 – bars of 20mm diameter with an effective cover of 50mm. Effective span of the beam is 6m. Assuming M₂₀ concrete and Fe 415 steel, determine the Central Concentrated load P that can be carried by the beam in addition to its self weight. (20 Marks)
- Calculate the area of reinforcement required for L – beam of flange width 1000mm, flange thickness 120mm, width of rib 250mm, total depth 750mm and effective cover 70mm to resist an ultimate bending moments (a) 400 kN-m (b) 75 kN – m. Assume concrete grade M₂₀ and steel of grade Fe 415. (20 Marks)
- A T – beam slab floor has 125mm thick slab forming part of T – beams which are of 8m clear span. The end bearings are 300mm thick. Spacing of T – beams is 3.5m. The live load on floor is 3kN/m². Design one of the intermediate beams. Using M₂₀ grade concrete and Fe 415 grade steel. Design the beam and sketch the details of reinforcement. (20 Marks)
- Design a rectangular beam of section 230mm × 600mm of effective span 6m. Effective cover should be kept as 50mm imposed load on the beam is 40kN/m. Use M₂₀ concrete and Fe 415 steel. (20 Marks)
- Design a Cantilever slab projecting 1.5m from a beam. Adopt live load of 2.5 kN/m². Use M₂₀ concrete and Fe 415 steel. Design the slab and sketch the details of reinforcement. (20 Marks)
- Design a dog legged stairs for an office building in a room measuring 2.8m × 5.8m clear. Vertical distance between the floor is 3.6m. Width of the flight is to be 1.25m. Allow a live load of 3kN/m². Use M₂₀ concrete and Fe 415 grade steel. Assume the stairs are supports on 230mm walls at the end of outer edges of landing slabs. (20 Marks)
- Design a square footing for a short axially loaded column of size 300mm × 300mm carrying 600kN load. Use M20 concrete and Fe 415 steel. SBC of soil is 180 kN/m². Sketch the details of reinforcement. (20 Marks)
- An R.C. column of unsupported length 2.75m has to be designed for an ultimate axial load 3250 kN. Find cross – sectional dimensions of the column and reinforcement required. Use M₂₀ grade of concrete and Fe 415 steel. Sketch the details of reinforcement. (20 Marks)

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Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg. 42+8 = 50, will be treated as malpractice.



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