CBCS SCHEME

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15CV/CT51

Fifth Semester B.E. Degree Examination, Aug./Sept.2020
Design of RC Structural Elements

Time: 3 hrs. Max. Marks: 80

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Use of IS456-2000 and SP16 is permitted.

Module-1

1 a. Explain balanced section, under reinforced section, and over reinforced section. **(04 Marks)**

b. Obtain an expression for stress block parameter compressive force Cu and its position $\bar{y} = 0.42\ x_u$ from top. **(08 Marks)**

c. Obtain an expression for limiting percentage of steel and find limiting steel for M20 concrete and Fe415 steel. **(04 Marks)**

OR

2 a. Explain limit state of deflection and limit state of cracking. **(04 Marks)**

b. What are the factors and which influence deflection? **(04 Marks)**

c. Check the deflection requirement for the T beam continuous over 10m span having flange width 1200 mm web width 250mm and effective depth 400mm. Area of tension reinforcement 1500mm^2 area of compression reinforcement 960 mm^2. Adopt Fe415 steel. **(08 Marks)**

Module-2

3 a. A singly reinforced concrete beam 250 mm and 450mm deep up to centre of reinforcement is reinforced with 3-16mm dia effective cover 50mm, Effective span 6m. Determine central point load that can be applied in addition to self weight. Adopt M20 concrete and Fe500 steel. **(08 Marks)**

b. Find the steel for a rectangular beam 300×700mm E.span 6m supporting a load of 80 kN/m. Adopt M20 concrete and Fe415 steel. **(08 Marks)**

OR

4 a. A doubly reinforced concrete beam having rectangular section 250mm × 500mm is reinforced with 2-12 mm dia in compression 4-20 mm dia in tension. Effective cover 40 mm, Effective span 5 m. Find M_u. Adopt M20 concrete and Fe415 steel. **(08 Marks)**

b. A T beam having flange 1200 mm × 100mm web width 300 mm E.depth 550 mm, Area of tension steel 2280 mm^2. Find M_u . Adopt M20 concrete and Fe 500 steel. **(08 Marks)**

Module-3

5 Design a singly reinforced beam having effective span 7m to carry a live load of 20 kN/m for flexure and shear. Adopt M20 concrete and Fe415 steel. Also check the design for deflection and bond. **(16 Marks)**

OR

6 A hall 6m × 16m supported by beam spaced 4m c/c slab thickness 120mm. Supporting a live load 4 kN/m^2 and finishing 1 kN/m^2. Design interior T beam. Adopt M20 concrete and Fe415 steel. Assume bearing 500 mm. Overall depth limited to 450 mm. Take Effective cover 40mm. **(16 Marks)**

Module-4

7 Design a slab over a room 5.5m × 4m. Supporting a live load 4 kN/m^2. Floor finishing 1.0 kN/m^2. Design the slab if edges are restrained. Adopted M15 concrete and Fe415 steel. **(16 Marks)**

OR

8 The main stair of an office building has to be located in a stair case measuring 3.5m × 5.5m. Distance between the floor 3.75m. Design the stair. Live load 3 kN/m^2. Adopt M20 concrete and Fe415 steel. **(16 Marks)**

Module-5

9 a. Design a column to support an ultimate load 1800 kN. Effective length of column 1.85m adopt M20 concrete Fe415 steel. **(08 Marks)**

b. A column 300 × 500 mm supporting an ultimate load 1000 kN. M_u = 25 kNm. Find steel Adopt M20 concrete, Fe415 steel. Take cover 50mm. **(08 Marks)**

OR

10 Design a flat square footing to carry a column load 1000 kN column size 400 × 400mm SBC of soil 100 kN/m^2. Adopt M20 concrete, Fe415 steel. Show by calculation one way shear check, two way shear bond check and transfer of load at column base. **(16 Marks)**

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