CBCS SCHEME

USN | | | | | | | | | | 18CV53

Fifth Semester B.E. Degree Examination, Jan./Feb. 2023
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. Use of IS 456-2000 and SP16 is permitted.

Module-1

1 a. Explain characteristic values and design values for strength and load. **(05 Marks)**

b. Differences between working stress method and limit state method. **(05 Marks)**

c. Explain in detail with sketches of balanced section, under reinforced section, under reinforced section and over reinforced section. **(10 Marks)**

OR

2 a. A rectangular simply supported beam of span 5 m is 300mm × 650mm in C/S and is reinforced with 3 bars of 20 mm on tension side at an effective cover of 50 mm. Determine the short term deflection due to an imposed working load of 20 kN/m. Assume grade of concrete M20 and grade of steel Fe415. **(10 Marks)**

b. A reinforced concrete beam of size 250mm × 500mm is provided with 4 bars of 20 mm with an effective cover of 40 mm as shown in Fig. Q2 (b). The section has to resist a bending moment of 60 kNm. Determine the crack width at Point A which is the midpoint of tension edge and at point B, which is on tension edge just below bar M20 and Fe415 steel used.

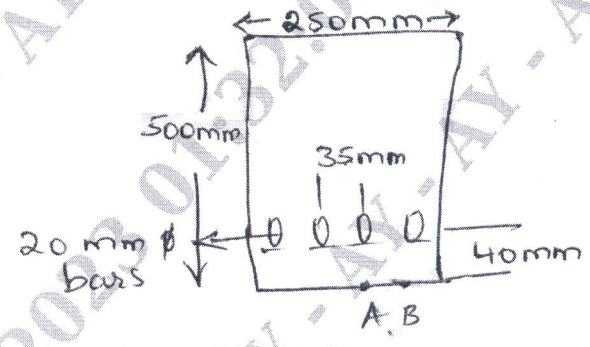

Fig. Q2 (b) **(10 Marks)**

Module-2

3 Determine the moment of resistance of T section having the following section properties. Width of flange = 2500 mm, Depth of flange = 150 mm, Width of rib = 300 mm, effective depth = 800 mm, Area of steel = 8 bars of 25 mm diameter. Use M20 and Fe415 HYSD bar. **(20 Marks)**

OR

4 A doubly reinforced concrete beam having a rectangular section 250 mm wide and 540 mm overall depth is reinforced with 2 bars of 12 mm diameter in the compression side and 4 bars of 20 mm diameter in the tension side. The effective cover to bars is 40 mm. Using M20 grade concrete and Fe415 HYSD bars, estimate the flexural strength of the section using IS456-2000 code recommendations. **(20 Marks)**

Module-3

5 Design a rectangular beam of section $230\text{mm} \times 600\text{mm}$ of effective span 6 m effective cover for reinforcement should be kept as 50 mm. Imposed load on the beam is 40 kN/m. Use M20 concrete and Fe415 steel. **(20 Marks)**

OR

6 Design a simply supported beam of span 5 m carries a live load of 12 kN/m. Use M20 grade of concrete and Fe415 steel. **(20 Marks)**

Module-4

7 A hall has clear dimension $3\text{m} \times 9\text{m}$ with wall thickness 230 mm. The live load on the slab is 3 kN/m^2 and a finishing load of 1 kN/m^2 may be assumed. Use M20 grade concrete and Fe415 grade steel. Design the slab. **(20 Marks)**

OR

8 Design a cantilever Balcony slab projecting 1.2 m from a beam. Adopt a live load of 2.5 kN/m^2. Use M20 and Fe415 steel. **(20 Marks)**

Module-5

9 Design a square footing for a short axially loaded column of size $300\text{mm} \times 300\text{mm}$ carrying 600 kN load. Use M20 concrete and Fe415 steel. SBC of soil is 180 kN/m^2. Sketch the details of reinforcement. **(20 Marks)**

OR

10 a. Design a RC column 400 mm square to carry a ultimate load of 1000 kN at an eccentricity of 160 mm. Use M20 and Fe415 materials. **(10 Marks)**

b. Design the reinforcements in a circular column of diameter 400 mm to support a factored load of 800 kN together with a factored moment of 80 kNm. Use M20 grade and Fe415 HYSD bars. **(10 Marks)**

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