Code No: R1932011 **R19** **SET - 1**

III B. Tech II Semester Regular Examinations, June-2022

DESIGN AND DRAWING OF REINFORCED CONCRETE STRUCTURES

(Civil Engineering)

Time: 3 hours Max. Marks: 75

Answer any **ONE** Question from **Part–A**, and any **THREE** Questions from **Part–B**
Please specify the IS codes to be allowed to the student in the Examination hall.

*****

PART–A (30 Marks)

1. Design a continuous R.C. slab for a hall 6.5 m wide and 13.5 m long. The slab is supported on R.C.C. beams, each 240 mm wide which are monolithic. The ends of the slab are supported on walls, 300 mm wide. Design the slab for a live load of 2 kN/m^2. Assume the weight of roof finishing equal to 1.5 kN/m^3. Use M20 concrete and Fe 415 steel. Draw a neat sketch of reinforcement details. [30M]

(OR)

2. Design suitable reinforcements for a column of section 300 mm by 500 mm supporting an axial service load of 1000 kN. Design a suitable footing for the column. Assume safe bearing capacity (SBC) of soil as 200 kN/m^2. Materials used are M20 grade concrete and Fe 415 HYSD bars. Draw the cross-section of the column and footing showing reinforcement details. [30M]

PART–B (45 Marks)

3. A reinforced concrete beam 200 mm × 400 mm effective depth is used over an effective span of 5 m. It is subjected to a uniformly distributed load of 7 kN/m inclusive of its own weight. Find the necessary steel reinforcement at the centre of the span. Take allowable stresses in steel and concrete as 130 N/mm^2 and 4 N/mm^2 respectively and m = 16. [15M]

4. A T-beam has the following data: [15M]
Width of the flange = 750 mm; Breadth of beam = 250 mm;
Effective depth = 500 mm; Thickness of flange = 90 mm; Applied moment = 130 kN-m.
Design the beam. Use M20 grade concrete and Fe 415 steel.

5. A straight stair in a residential building is supported on wall on one side and stringer beam on the other side. The risers are 150 mm and treads are 250 mm and the horizontal span of the stairs may be taken as 1.2 m. Design the steps. Use M20 concrete and Fe 415 steel bars. [15M]

6. a) Design a short circular column of 500 mm diameter with the following data: Factored load = 800 kN. Factored moment = 162.5 kN-m. Provide hoop reinforcement. Take M20 concrete mix and use Fe 415 steel. [10M]

   b) Explain in detail about the basic assumptions and modes of failures for combined axial load and uniaxial bending columns. [5M]

7. Explain in detail about the following: [15M]
   (i) Nominal shear stress
   (ii) Design shear strength of concrete
   (iii) Minimum shear reinforcement
   (iv) Design of shear reinforcement

*****

Code No: R1932011 **R19** **SET - 2**

III B. Tech II Semester Regular Examinations, June-2022

DESIGN AND DRAWING OF REINFORCED CONCRETE STRUCTURES

(Civil Engineering)

Time: 3 hours Max. Marks: 75

Answer any **ONE** Question from **Part–A**, and any **THREE** Questions from **Part–B**

Please specify the IS codes to be allowed to the student in the Examination hall.

*****

PART–A (30 Marks)

1. Design a R.C. slab for a room having inside dimensions 3 m × 7 m. The thickness of supporting wall is 300 mm. The slab carries 75 mm thick lime concrete at its top, the unit weight of which may be taken as 20 kN/m^3. The live load on the slab may be taken as 2 kN/m^3. Assume the slab to be simply supported at the ends. Use M20 concrete and Fe 415 steel. Draw a neat sketch of reinforcement details. [30M]

(OR)

2. Design suitable reinforcements in a column using the following data: [30M]
Cross-section of column = 500 mm × 500 mm.
Axial load = 2500 kN
Safe bearing capacity (SBC) = 150 kN/m^2
Materials used: M20 grade concrete and Fe 415 grade HYSD bars.
Design a suitable footing for the column and sketch the reinforcement details in the column section and footing.

PART–B (45 Marks)

3. Design a reinforced concrete beam to carry a load of 6 kN/m inclusive of its own weight on an effective span of 6 m. Keep the breadth to be 2/3rd of effective depth. The permissible stresses in concrete and steel are not to exceed 5 N/mm^2 and 140 N/mm^2 respectively. Take m = 18. [15M]

4. Design the reinforcement for a reinforced concrete beam as doubly reinforced section having 300 mm wide and 400 mm deep of grade M20, to resist an ultimate moment of 150 kN-m, using mild steel bars of grade Fe 250. [15M]

5. Design a dog-legged stair for a building in which the horizontal distance between floors is 3.6 m. The stair hall measures 2.5 m × 5 m. The live load may be taken as 2500 N/m^2. Use M20 concrete and Fe 415 steel bars. [15M]

6. Design a rectangular column of 4.5 m unsupported length, restrained in position and direction at both the ends, to carry an axial load of 1200 kN. Use M20 concrete and Fe 415 steel. [15M]

7. Explain in detail about the following: [15M]
   (i) Stress-Strain relationship for steel.
   (ii) Assumptions: Stress block parameters
   (iii) Columns with uniaxial and biaxial bending.

*****

Code No: R1932011 **R19** **SET - 3**

III B. Tech II Semester Regular Examinations, June-2022

DESIGN AND DRAWING OF REINFORCED CONCRETE STRUCTURES

(Civil Engineering)

Time: 3 hours Max. Marks: 75

Answer any **ONE** Question from **Part–A**, and any **THREE** Questions from **Part–B**
Please specify the IS codes to be allowed to the student in the Examination hall.

*****

PART–A (30 Marks)

1. Design a R.C.C. floor slab for a room having inside dimensions 4 m × 10 m and supported on all sides by a 40 cm thick brick wall. The super-imposed load may be taken as 3 kN/m^3. Use M20 concrete and Fe 415 reinforcement. Draw a neat sketch of reinforcement details. [30M]

(OR)

2. Design suitable reinforcements for an axially loaded column supporting a load of 500 kN using the following data:
Cross-section of column = 200 mm × 400 mm.
Soil bearing capacity = 150 kN/m^2
Materials used: M20 grade concrete and Fe 415 grade HYSD bars.
Design a suitable footing for the column and sketch the reinforcement details in the column and footing. [30M]

PART–B (45 Marks)

3. A reinforcement concrete beam 200 mm × 400 mm effective depth is used over an effective span of 5 m. It is subjected to a uniformly distributed load of 5 kN/m inclusive of its own weight. Find the necessary steel reinforcement at the centre of the span. Take allowable stresses in steel and concrete as 130 N/mm^2 respectively and m = 16. [15M]

4. A concrete beam has 300 mm breadth and 500 mm effective depth. Design the beam as doubly reinforced beam, if it is subjected to a super-imposed bending moment of 200 kN-m. Use M20 grade concrete and Fe 415 steel. [15M]

5. Design the stairs for a public building supported on wall on one side and stringer beam on the other side. The horizontal span of stairs is 1.4 m. The risers are 120 mm and tread are 300 mm. Use M20 grade concrete and Fe 414 steel. [15M]

6. Design a short column subjected to biaxial bending using the following data: [15M]
Column size = 400 mm × 600 mm. Pu = 2000 kN.
M_{ux} = 160 kN. M_{uy} = 120 kN.
Use M20 grade concrete and Fe 415 steel.

7. Explain in detail about: [15M]
   (i) Limit state of collapse (safety requirements)
   (ii) Limit state of serviceability
   (iii) Imposed loads

*****

Code No: R1932011 **R19** **SET - 4**

III B. Tech II Semester Regular Examinations, June-2022

DESIGN AND DRAWING OF REINFORCED CONCRETE STRUCTURES

(Civil Engineering)

Time: 3 hours Max. Marks: 75

Answer any **ONE** Question from **Part–A**, and any **THREE** Questions from **Part–B**
Please specify the IS codes to be allowed to the student in the Examination hall.

*****

PART–A **(30 Marks)**

1. Design the floor slab for a room 3 m × 10 m of a building if the live load is 5000 N/m^2. Use M20 grade concrete. The slab can be considered as simply supported on supports of width 250 mm. Draw a neat sketch of reinforcement details. [30M]

(OR)

2. Design suitable reinforcements for a rectangular reinforced concrete column using the following data: [30M]
   Cross-section of column = 400 mm × 600 mm
   Axial load = 800 kN
   Soil bearing capacity of soil = 160 kN/m^2
   Materials used: M20 grade concrete and Fe 415 grade HYSD bars.

PART–B **(45 Marks)**

3. Design a reinforced concrete beam subjected to a bending moment of 20 kN-m. Use M20 grade concrete and Fe 415 reinforcement. Keep the width of the beam equal to half the effective depth. [15M]

4. A reinforced concrete beam 250 mm wide and 400 mm effective depth is subjected to ultimate design shear force of 150 kN at the critical section near supports. The tensile reinforcement at the section near supports is 0.5 percent. Design the shear stirrups near the supports. Also design the minimum shear reinforcement at the mid span. Assume concrete of grade M20 and mild steel bars of Fe 250 grade. [15M]

5. Design a suitable dog-legged stair in a public building to be located in a staircase 6 m long, 3.2 m wide and 3.7 m high, with a door of 1.1 m wide in each of the longitudinal walls. The doors face each other and are located with their centres at a distance of 0.9 m from the respective corners of the staircase. Use M20 grade concrete and Fe 415 steel. [15M]

6. Design a short column to carry a working load of 1000 kN and an uniaxial moment of 250 kN. Use M20 concrete and Fe 415 steel. [15M]

7. Explain in detail about the following: [15M]
   (i) Characteristic strength of materials
   (ii) Design Values
   (iii) Partial safety factor
   (iv) Imposed loads.

*****