Code No: **R31011** **R10** **Set No. 1**

III B.Tech I Semester Supplementary Examinations, June - 2015
DESIGN & DRAWING OF CONCRETE STRUCTURES-I
(Civil Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any ONE Question from Part – A
and any THREE Questions from Part – B
Use of IS: 456-2000 and design charts from SP-16 is allowed.

*****

PART-A

1 Design a short column for the following data: [30]
Column size : 350 mm × 450 mm
Factored load Pu : 1250kN
Factored moment acting parallel to the larger dimension, M_{ux} : 110kN
Factored moment acting parallel to the shorter dimension, M_{uy} : 90 kN
Sketch the reinforcement details.

2 Design a R.C. slab for a room 4 m × 4 m measuring from inside. The thickness of wall is 400 mm. The superimposed load, exclusive of the self weight of the slab, is 2.5kN /m^2. The slab may be assumed to be simply supported at all the four edges. With corners free to lift. Use M 20 mix. and Fe 415 steel. Sketch the reinforcement details. [30]

PART-B

3 Design a continuous R.C. slab for a hall 6.0 m wide and 13.0 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 wall, 300 mm wide. Design the slab for a live load of 2.5kN/m^2. Assume the weight of roof finishing equal to 2kN /m^2 Use M20 concrete and Fe 415 steel. [15]

4 Find the moment of resistance of a T-beam section having b_w =300 mm, b_f = 1650 mm, D_f =120 mm and d =510 mm. The reinforcement consists of 4 bars of 25 mm dia. Use M 20 concrete and Fe 415 Steel. [15]

5 A reinforced concrete beam 250 mm wide and 400 mm effective depth is subjected to ultimate design shear force of 180kN 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 Fe 415 grade Steel. [15]

6 Design a rectangular isolated footing of uniform thickness for R.C. column bearing a vertical load of 650kN, and having a base size of 400 × 600 mm. The safe bearing capacity of the soil may be taken as 125kN /m^2. Use M 20 concrete and Fe 415 steel. [15]

7 a) Why is it necessary to limit deflections in reinforced concrete flexural members? [7]

b) How does shrinkage of concrete lead to deflections in reinforced concrete flexural members? [8]

-000-

Code No: **R31011** **R10** **Set No. 2**

III B.Tech I Semester Supplementary Examinations, June - 2015
DESIGN & DRAWING OF CONCRETE STRUCTURES-I
(Civil Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any ONE Question from Part – A
and any THREE Questions from Part – B
Use of IS: 456-2000 and design charts from SP-16 is allowed.
*****

PART-A

1 Design of short column subjected to biaxial bending [30]
Determine the reinforcement for a short column for the following data :
Column size: 400 × 600 mm: P_u : 1800kN
M_{ux} : 180kN: M_{uy}: 125k
Use M20 concrete mix and Fe 415 steel. Draw the reinforcement details.

2 Design a simply supported R.C. slab over a room 4.5 m × 6 m from inside, assuming that the corners are not free to lift. The thickness of all the four walls is 230 mm. The live load on the floor is 2.5kN/m^2. The floor carries a floor finish which weights 8.5kN /m^2. Use M20 mix and Fe 415 steel. Draw the reinforcement details. [30]

PART-B

3 Design a R.C. cantilever beam projecting out 3 m beyond the fixed end and carrying a super-imposed load of 15 kN. The cantilever also carries a concentrated load of 6kN at the free end. Use M 20 mix and Fe 415 steel. [15]

4 Find the moment of resistance of a T-beam having the following data [15]
Width of flange : 800 mm; Thickness of slab: 120 mm
Width of rib : 200 mm; Effective depth : 400 mm
Tensile steel area: 3500 mm^2, Use M 20 concrete and Fe 415 steel.

5 A simply supported beam, 300 mm wide and 600 mm effective depth carries a uniformly distributed load of 80 kN/m including its own weight over an effective span of 6 m. The reinforcement consists of 6 bars of 25 mm diameter. Out of these, two bars can be safely bent up at 1 m distance from the support. Design the shear reinforcement for the beam. [15]
Given: Grade of concrete : M 20; Grade of steel : Fe415
Assume width of supports = 300 mm.

6 Design an isolated square sloped footing for a column 500 mm × 500 mm, transmitting an axial load of 1250kN. The column is reinforced with 8 bars of 20 mm diameter. The safe bearing capacity of soil is 120 kN/m^2. Use M 20 concrete and Fe 415 steel. [15]

7 a) Why is it difficult to make an accurate prediction of total deflection in a reinforced concrete flexural member? [7]
b) How is the short-term deflection due to live loads alone estimated? What is its relevance? [8]

-000-

Code No: **R31011** **R10** **Set No. 3**

III B.Tech I Semester Supplementary Examinations, June - 2015
DESIGN & DRAWING OF CONCRETE STRUCTURES-I
(Civil Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any ONE Question from Part – A
and any THREE Questions from Part – B
Use of IS: 456-2000 and design charts from SP-16 is allowed.
*****

PART-A

1 A Steel stanchion carries 400 mm × 200 mm heavy beam section and carries a load of 1100kN. Design a R.C.C. base for column. The safe bearing capacity of the soil may be taken as 120kN/m^2 at a depth of 1 m below ground surface. Use M 20 concrete and Fe415 steel. Sketch the details. [30]

2 A.R.C. floor is supported on R.C. columns 250 mm square at the corners of a rectangle 6 m × 8 m with R.C. beams connecting the columns along the perimeter of the rectangle. Design the floor as a two-way reinforced slab. Also design one of the 6 m span beams as an L-beam. Live load on floor = 8kN/m^2. Use M 20 mix. and Fe 415 steel. Sketch the details. [30]

PART-B

3 Design a R.C.C. floor slab for a having inside dimensions 4 m × 10 m and supported on all sides by a 30 cm thick brick wall. The super-imposed load may be taken as 3kN/m^2. Use M 20 concrete and Fe 415 steel. [15]

4 A T-beam has the following data: width of flange =750 mm; Breadth of beam = 250 mm Effective depth = 500 mm; Thickness of flange = 90 mm; Applied moment = 150kN-m Design the beam. Use M20 concrete and Fe 415 steel. [15]

5 Determine the reinforcement required for a rectangular beam section with the following data: [15]
Width of section : 300 mm; Depth of section : 500 mm
Factored B.M : 80kN-m; Factored torsional moment: 50kN-m
Factored shear force: 80 kN. Use M 20 grade concrete and Fe 415 grade steel.

6 A circular column, 5.0 m high is effectively held in position at both the ends and restrained against rotation at one end. Design the column to carry an axial load of 1250 kN, if its diameter is restricted to 450 mm. Use M20 mix and Fe 415 steel. [15]

7 a) Explain the importance of serviceability limit states in the structural design of reinforced concrete flexural members. [7]
b) What is meant by the tension stiffening effect in reinforced concrete members subject to flexure? Explain with suitable sketches. [8]

-000-

Code No: **R31011** **R10** **Set No. 4**

III B.Tech I Semester Supplementary Examinations, June - 2015
DESIGN & DRAWING OF CONCRETE STRUCTURES-I
(Civil Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any ONE Question from Part – A
and any THREE Questions from Part – B
Use of IS: 456-2000 and design charts from SP-16 is allowed.
*****

PART-A

1 A rectangular R.C. column, 240 mm × 300 mm carries an axial load of 450 kN. Design a rectangular footing of uniform thickness, if the safe bearing capacity of the soil is 80kN/m^2. Use M 20 concrete and Fe415 steel. Sketch the details. [30]

2 Design a R.C. slab for a room measuring 4 m × 6 m size. The slab is simply supported on all the four edges, with corners held down and carries a superimposed load of 3100N/m^2, inclusive of floor finishes etc. Use M20 mix, Fe 415 steel. Sketch the details. [30]

PART-B

3 Design a reinforced concrete lintel over the openings of two windows, each 2 m wide, separated by a wall of 50 cm. The height of wall over the lintel is 3 m and the thickness of wall is 30 cm. The lintel is to be provided with a sunshade projecting out by 80 cm and cast monolithically with the lintel. Use M20 mix and Fe415 steel. The live load on sunshade may be taken as 1.5kN/m^2. [15]

4 Find the moment of resistance of a T-beam section having b_w =300 mm, b_f = 1650 mm, D_f =150 mm and d =550 mm. The reinforcement consists of 6 bars of 20 mm dia. Use M 20 concrete and Fe 415 Steel. [15]

5 A rectangular beam, 240 mm wide and 450 mm effective depth is reinforced with 3 bars of 20 mm dia. at supports. Design the shear reinforcement if it carries a shear of 80kN at service state. Use M20 concrete and Fe 415 steel. Also, determine the nominal shear stirrups at mid-span. [15]

6 Design a rectangular column of 4.0 m unsupported length, restrained in position and direction at both the ends, to carry an axial load of 1250kN. Use M20 concrete and Fe 415 steel. [15]

7 a) Distinguish between short-term deflection and long–term deflection. [7]

b) What are the different options available to a designer with regard to control of cracking in flexural members? [8]

-000-