Code No: RT31013 **R13** SET - 1

III B. Tech I Semester Regular Examinations, November - 2015
DESIGN AND DRAWING OF REINFORCED CONCRETE STRUCTURES
(Civil Engineering)

Time: 3 hours Max. Marks: 70

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.
For all designs adopt Limit State Method

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PART –A

1 A rectangular reinforced concrete beam is simply supported on two masonry walls 230 mm thick and 6 m apart (centre to centre). The beam is carrying an imposed load of 15 kN/m. Design the beam with all necessary checks. Use M25 concrete and Fe 415 steel. Sketch the details of reinforcement. [28M]

(OR)

2 Design a reinforced concrete slab for a room of clear dimensions 4 m x 5 m. The slab is supported on walls of width 300 mm. The slab is carrying a live load of 4 kN/m^2 and floor finish 1 kN/m^2. Use M20 concrete and Fe 415 steel. The corners of slab are held down. Sketch the layout of the reinforcement. [28M]

PART -B

3 a) What are different methods of design in R.C.C? [7M]
b) Draw stress-strain relationship for concrete and explain it briefly. [7M]

4 A simply supported R.C.C. beam 250 mm wide and 450 mm deep (effective) is reinforced with 4 numbers of 18 mm diameter bars. Design the shear reinforcement if M20 grade of concrete and Fe 415 steel is used and beam is subjected to a shear force of 150 kN at service state. [14M]

5 Design a short R.C.C. column to carry an axial load of 1600 kN. It is 4 m long, effectively held in position and restrained against rotation at both ends. Use M20 concrete and Fe 415 steel. [14M]

6 Design a square footing of uniform thickness for an axially loaded column of 450 mm x 450 mm size. The safe bearing capacity of soil is 190 kN/m^2. Load on column is 850 kN. Use M20 concrete and Fe 415 steel. [14M]

7 Design a flight (waist slab) between landing to landing of a tread-riser type of staircase, with 10 risers, each 150 mm, and with tread of 270 mm. The upper and lower landings are 1200 mm wide each supported on 230 mm thick masonry walls at the edges, parallel to the risers. The risers are liable to be overcrowding. The materials to be used for construction are M20 grade concrete and HYSD bars of grade Fe 415. [14M]

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Code No: RT31013 **R13** SET - 2

III B. Tech I Semester Regular Examinations, November - 2015
DESIGN AND DRAWING OF REINFORCED CONCRETE STRUCTURES
(Civil Engineering)

Time: 3 hours Max. Marks: 70

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.
For all designs adopt Limit State Method

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PART –A

1 Design a reinforced concrete beam of span 7 m carrying a load of 20 kN/m throughout its length. The beam is simply supported on brick masonry walls with 230 mm width. Use M30 grade concrete and Fe500 steel bars. Keep the depth as 1.5 times the width. Sketch the details of reinforcement. [28M]

(OR)

2 A reinforced concrete slab of size 6m x 4m whose adjacent short edges are discontinuous and monolithic construction with the supports. The slab has to carry a live load of 5 kN/m^2 and a floor finish of 1.5 kN/m^2 and the floor partition is 1 kN/m^2. Use M20 concrete and Fe415 steel. Sketch the details of reinforcement also. [28M]

PART -B

3 Draw stress block diagram and evaluate the following expressions for limit state design:

a) Neutral Axis depth [5M]
b) Lever arm [4M]
c) Moment of resistance. [5M]

4 A simply supported R.C.C. beam 230 mm wide and 450 mm over all depth is reinforced with 4 numbers of 16 mm diameter bars. Design the shear reinforcement if the shear force at service state is 180 kN. Use M20 grade of concrete and Fe 415 grade steel. [14M]

5 Design a circular column of 4 m height is effectively held in position at one end and pinned at other end. The diameter of the column is 400 mm. Calculate the reinforcement if it is required to carry a factored axial load of 1600 kN. Use M30 mix and Fe 500 grade steel. [14M]

6 Design an isolated rectangular footing for an axial load of 1500 kN transmitted by the column. The cross section of the column is 230 mm x 450 mm. The SBC of soil is 180 kN/m^2. Adopt M20 grade concrete and Fe 415 grade steel. [14M]

7 Design a stair case slab for a three storied residential building. The dimensions of stair case room are 3.6 m x 4.5 m. The height of each storey is 3.6 m. Adopt M 20 grade concrete and Fe 415 grade steel. [14M]

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Code No: RT31013 **R13** SET - 3

III B. Tech I Semester Regular Examinations, November - 2015
DESIGN AND DRAWING OF REINFORCED CONCRETE STRUCTURES
(Civil Engineering)

Time: 3 hours Max. Marks: 70

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.
For all designs adopt Limit State Method

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PART –A

1 A reinforced concrete beam is simply supported over a clear span of span 6 m. The beam carries a superimposed load of 10 kN/m. Design the beam if the width of the beam is 300 mm. Use M20 grade concrete and Fe 415 steel. The beam is resting on 400 mm thick walls. Sketch the details of reinforcement. [28M]

(OR)

2 Design an R.C.C. slab of size 5 m x 6 m, simply supported on all four edges with corners held down. The slab is carrying a load of 4 kN/m^2 including floor finish etc. Use M 20 concrete and Fe 415 steel. Sketch the details of reinforcement also. [28M]

PART -B

3 a) Write short notes on balanced, under reinforced and over reinforced sections with sketches (working stress method). [7M]

b) A doubly reinforced beam 300 mm x 680 mm effective is reinforced on tension and compression side with 4 numbers of 25 mm diameter bars. Compression steel is placed 40 mm from top of the beam. If the beam carries a bending moment of 215 x 10^6N-mm, find the stresses induced in steel and concrete. Take m = 13.33 [7M]

4 A simply supported R.C.C. beam 200 mm x 400 mm (effective) is reinforced with 4 bars of 22 mm diameter on tension side. The beam is carrying a load of 10 kN/m over a clear span of 8 m. Design the shear reinforcement. Use M 20 concrete and Fe 415 steel bars. [14M]

5 An R.C.C. short column of size 400 mm x 500 mm is carrying a factored load of 3000 kN. Design the column assuming e_{min} < 0.05 D. Use M25 concrete and Fe 415 steel. [14M]

6 Design a rectangular footing of uniform thickness for an axially loaded column of size 300 mm x 600 mm. Load on the column is 1150 kN. Safe bearing capacity of the soil is 200 kN/m^2. Use M20 concrete and Fe 415 steel. [14M]

7 Design the waist slab type stair case consisting of a straight flight of stairs resting on two stringer beams along the two sides. Assume the span of the slab as 2 m with risers of 160 mm and treads of 270 mm. Live load= 3 kN/m^2. Adopt M20 grade concrete and Fe 415 grade steel. [14M]

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Code No: RT31013 **R13** SET - 4

III B. Tech I Semester Regular Examinations, November - 2015
DESIGN AND DRAWING OF REINFORCED CONCRETE STRUCTURES
(Civil Engineering)

Time: 3 hours Max. Marks: 70

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.
For all designs adopt Limit State Method

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PART –A

1 A simply supported R.C.C. beam over an effective span of 8 m carrying an imposed load of 30 kN/m. Design the beam using M20 grade concrete and Fe 415 steel. Sketch the details of reinforcement. [28M]

(OR)

2 The panel of slab is 4.5 m x 5 m. One short edge and one long edge of the slab is discontinuous and other short edge and long edges are continuous. The slab is restrained with edge beam. Super imposed load is 3.5 kN/m^2 and floor finishes being 1.0 kN/m^2. Design the slab. Use M20 grade concrete and Fe 415 steel. Sketch the details of reinforcement also. [28M]

PART -B

3 a) Find the moment of resistance of a beam section 250 mm x 500 mm deep is reinforced with 2- 16 mm bars in tension at an effective cover of 40 mm. Use M20 concrete and Fe 500 grade of steel. [7M]

b) What would be the increase in the moment of resistance if it is reinforced with 2-16 mm bars of Fe 500 grade in compression at an effective cover of 40 mm. Whether the neutral axis would shift upwards or downwards, and by what amount? [7M]

4 A simply supported beam with clear span 6 m, width 400 mm and effective depth 560 mm carries a limit state load of 175 kN/m inclusive of self weight, dead load and live load. It is reinforced with 4 bars of 28 mm diameter tension steel which continue right into the support. Take f_{ck} = 20 N/mm^2, f_y= 250 N/mm^2, Design shear reinforcement. [14M]

5 Design a R.C.C. column to carry an axial load of 2000N. The size of the column is restricted to 600 mm square. The effective height of column is 9 m. Use M20 concrete and σ_{sc} = 190 N/mm^2. [14M]

6 Design the footing for a reinforced concrete column 225 x 450 mm carrying an axial load of 1075 kN. The bearing capacity of the soil is 100 kN/m^2. Use M20 concrete and Fe500 grade steel as reinforcement. [14M]

7 Design a single flight stair case slab to cover a horizontal span of 4.5 m if the total vertical rise is 3.6 m. There are total 18 steps to rise. The tread is 250 mm. Take live load as 3000 N/m^2. Use M25 concrete and Fe 415 steel. [14M]

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