Code No: R1631014 **R16** SET - 1

III B. Tech I Semester Regular/Supplementary Examinations, March - 2021

DESIGN AND DRAWING OF REINFORCED CONCRETE STRUCTURES

(Civil Engineering)

Time: 3 hours Max. Marks: 70

Note: i) Answer any ONE Question from Part – A and any THREE Questions from Part – B
ii) Use IS 800-2007 & SP16 code to be allowed to the student in the Examination hall.
iii) Assume any missing data.

*****

PART –A (28 Marks)

1 Design a Reinforced concrete T-beam section that supports the continuous RC slab at 3.0 m center to centre. Assume clear span dimensions of RC slab 21x6m and effective length of T beam is 6 m which is simply supported on its end. The thickness of RC slab is 125 mm and cross section of supporting beam 300 x 400mm (depth). The slab carrying imposed load of 5 kN/m^2. Use concrete grade M25 and HYSD steel reinforcement grade Fe415. (use limit state method) [28M]
Draw a neat sketch and detailing aspects of reinforcement of T beam section and showing its location in plan with clear dimensions. Apply relevant design checks for strength and serviceability conditions.

(OR)

2 Design a rectangular column for effective height 4 m. The column is subjected to axial load 2000 kN at 50 mm eccentricity in the direction of long axis. Use M20 grade concrete, Fe415 steel. Apply necessary design checks. [28M]
Draw a neat sketch of suitable scale shows plan, section, elevation, detailing aspects of steel. Also show the connection system of between column and beam (use limit state method).

PART –B (42 Marks)

3 a) Design a Circular Footing of R.C column 450 mm diameter, carrying axial loads 140 kN and uni-axial moment 6 kN-m. Assume the allowable bearing pressure of soil 150 kN/m^2. Use concrete grade M25 and steel reinforcement Fe500 HYSD. Assume any necessary design data if required. (use Limit state design). [7M]

b) Write about the concept of Limit state collapse and Limit state serviceability in the design of RC members. [7M]

4 Find the cross sectional area of concrete and steel of singly reinforced R.C rectangular beam that simply supported over an effective span of 6 m. The beam carrying dead load 2 kN/m and live load 4 kN/m. Use concrete grade M30 and HYSD steel Fe415. Assume the following data: Steel young's modulus Es=2.1x10^5 MPa, modular ratio m=18, clear cover=40 mm. Neatly sketch the detailing aspects of steel (Use working stress method). [14M]

5 Design a Reinforced concrete L-beam section supporting the ends of R.C slab (3x3m) at all sides four. The effective thickness of slab 80 mm with load intensity 3 kN/m^2. Use concrete grade M25 and HYSD steel reinforcement Fe415. Apply necessary design checks for shear and bond in L beam section. Also neatly sketch the detailing of steel reinforcement in L beam. (use limit state method). [14M]

6 A simply supported roof slab for room of 3x5m clear dimension is resting on RC beam 250 mm of width. Design the slab if it carries live load of 4 kN/m^2. Use M25 grade concrete and Fe415 grade steel. Apply necessary design checks and neatly sketch the detailing of slab reinforcement. (use limit state method). [14M]

7 a) Calculate the Long Term deflection of beam size 250x400 mm effective depth, reinforced with 16 mm diameter bars 3nos in tension face and 12 mm bars 2nos in compression face. Assume the effective span of beam 4 m. The beam supports service load 8 kN/m. Use concrete grade M20 and Fe415, HYSD steel. [7M]

b) Design the Torsion reinforcement of L-beam section 250x400 mm depth that support RC slab of 100 mm thick. Assume clear span of beam 5 m, live load on slab 3 kN/m^2 and factored Torsion moment 30 kN-m, factored shear 60 kN and factored moment 120 kN-m. Use concrete grade M25 and steel grade Fe500, HYSD. [7M]

*****

Code No: R1631014 **R16** SET - 2

III B. Tech I Semester Regular/Supplementary Examinations, March - 2021

DESIGN AND DRAWING OF REINFORCED CONCRETE STRUCTURES

(Civil Engineering)

Time: 3 hours Max. Marks: 70

Note: i) Answer any ONE Question from Part – A and any THREE Questions from Part – B
ii) Use IS 800-2007 & SP16 code to be allowed to the student in the Examination hall.
iii) Assume any missing data.

*****

PART –A (28 Marks)

1 Design a RC circular footing (pedestal type) supporting a circular column 450 mm diameter for axial load of 1000 kN acts at an eccentricity of 50 mm. The column reinforcement provided by 6nos of 16 mm diameter main bars and 8 mm diameter helical ties. Assume safe bearing capacity of soil 150 kN/m^2 located at 1.80 m below the ground level. Use concrete M30 and steel Fe415 HYSD. [28M]
Apply necessary design checks against punching shear, flexure and anchorage column bars in footing. (use limit state method)Also draw a neat sketch with suitable scale of showing plan, section, elevation and detailing aspects of column footing and reinforcement connection system between the members.

(OR)

2 Design a continuous RC slab for an office building measuring 4mx12m clear dimension. Assume the slab is supported by beam located at 3 m center to center in the long direction. The live load on slab 3 kN/m^2. Use M20 grade concrete and Fe415 steel. (Use limit state method). Draw a neat sketch with suitable scale showing plan, section, and elevation and detailing aspects of slab. Also its connection system with internal beams. [28M]

PART –B (42 Marks)

3 A doubly reinforce beam of 250x400 mm, simply supported is reinforced with 4nos, 22 mm diameter bars on tension side and equal amount of steel in compression side. Assume clear cover on all sides 50 mm. Calculate the moment of resistance and UDL on the beam. Use M20 concrete Fe415 HYSD steel (Es=2x10^{5}MPa). Neatly sketch the detailing aspects. (Use working stress method). [14M]

4 Design a Reinforced concrete T-beam section supporting a continuous R.C slab at 3 m center to centre. The effective length of simply supported T beam (300x300 mm) is 4 m, and thickness of slab 100 mm. The slab is carrying imposed load of 3 kN/m^2. Use concrete grade M25 and HYSD steel reinforcement Fe415. (limit state method). [14M]

5 Estimate the maximum possible crack width of doubly reinforced beam against serviceability. The beam is provided with 400 mm overall depth, 3bars of 25 mm diameter in tension side at effective depth 340 mm and 3bars of 20 mm diameter in compression face and effective cover on all faces is 50 mm. The beam is designed to support total service load moment 120 kN-m. Assume spacing of tension bars 75 mm. Use concrete grade M25 and HYSD steel grade Fe500. [14M]

6 Design a square column of effective height 4 m that received an axial load 700 kN with 60 mm eccentricity in both directions. Use concrete grade M20 and steel grade Fe500 HYSD. Apply necessary design checks and detail the column reinforcement. (limit state method). [14M]

7 a) Write short notes on parameters that influence short term deflection and long term deflection of RC beams. [7M]

b) Write short notes on factors that influence bond strength of reinforcement bars in RC beam column joint. [7M]

*****

Code No: R1631014 **R16** SET - 3

III B. Tech I Semester Regular/Supplementary Examinations, March - 2021

DESIGN AND DRAWING OF REINFORCED CONCRETE STRUCTURES

(Civil Engineering)

Time: 3 hours Max. Marks: 70

Note: i) Answer any ONE Question from Part – A and any THREE Questions from Part – B
ii) Use IS 800-2007 & SP16 code to be allowed to the student in the Examination hall.
iii) Assume any missing data.

*****

PART –A (28 Marks)

1 Design a RC rectangular footing of uniform thickness supporting an axial load of 1200 kN from the column. Assume the column is braced against side sway. The column is provided by 8 nos of 12 mm diameter main bars and 6 mm diameter transverse ties as helical reinforcement. Assume safe bearing capacity of soil 200 kN/m^2 located at 1.50 m below the ground level. Use concrete grade M25 and steel Fe415 HYSD. Apply necessary design checks against punching shear, flexure and development length. (use limit state method). Draw a neat sketch with suitable scale showing plan, section, and elevation and detailing aspects of column footing and reinforcement connection system between the members. [28M]

(OR)

2 Design a RC roof slab for a room measuring 3x5 m clear dimension which was resting on RC beam of 300x450 mm at all four sides. Assume live load on slab 3 kN/m^2 and floor finish 1 kN/m^2 .Use concrete grade M25 and steel Fe415. Assume the corners are held down. Apply necessary design checks for shear, deflection and anchorage of reinforcement. (use limit state method). Draw a neat sketch of suitable scale showing plan, section, and elevation and detailing aspects of slab and reinforcement connection system between beam and slab. [28M]

PART –B (42 Marks)

3 Find the sectional area of concrete and steel of R.C simply supported rectangular beam and effective span 3 m, carrying dead load 4 kN/m and live load 6 kN/m. Use concrete grade M20 and HYSD steel Fe415.(Use working stress method). Assume the following data: Young's modulus of steel Es=2.x10^5 MPa and clear cover of to reinforcement 40 mm. (use working stress method). [14M]

4 A rectangular R.C beam of size 250x400 mm reinforced with 4nos 12mm tensile steel and simply supported over an effective span of 6 m. The beam is subjected to uniform live load 3 kN/m and point load 8 kN at mid span. UseM20 concrete, steel Fe415. Design the beam shear in combination of vertical stirrups and bent up bars. Use concrete grade M30, HYSD steel reinforcement Fe415. (Limit state method). [14M]

5 a) Explain the design concept of long column subjected to uni-axial bending. Write the IS code provisions. [7M]

b) Explain the concept of stress block parameter and its significance in the design of T-beams (limit state method). [7M]

6 Determine the moment of resistance of T-beam section simply supported over a span of 4m. Use the following data: Width of flange 2300 mm , depth of flange 125 mm, width of rib 300 mm, effective depth 450 mm , area of tension reinforcement 8 bars 16 mm diameter. Use concrete grade M20 and steel Fe500 HYSD (use limit state method). [14M]

7 Design the Torsion reinforcement of L-beam section 250x300 mm effective depth that support RC slab of 150 mm thick. Assume clear span of beam 6 m, live load on slab 4 kN/m^2 and factored Torsion moment 50 kN-m, factored shear 40 kN and factored moment 80 kN-m . Use concrete grade M20 and steel grade Fe500, HYSD. [14M]

*****

Code No: R1631014 **R16** SET - 4

III B. Tech I Semester Regular/Supplementary Examinations, March - 2021

DESIGN AND DRAWING OF REINFORCED CONCRETE STRUCTURES

(Civil Engineering)

Time: 3 hours Max. Marks: 70

Note: i) Answer any ONE Question from Part – A and any THREE Questions from Part – B
ii) Use IS 800-2007 & SP16 code to be allowed to the student in the Examination hall.
iii) Assume any missing data.

*****

PART –A (28 Marks)

1 Design a continuous slab for a residential building of 12x3 m clear dimension. Assume the slab is resting on beam 300x450 mm depth. The live load on slab is 3 kN/m^2. The beams are arranged at 3m center to center over the length of slab. Assume the corners of slab are held down. Use M25 grade concrete and Fe415 steel. Apply necessary design checks. (use limit state design). [28M]
Draw a neat sketch with suitable scale showing plan, section, and elevation and detailing aspects of steel.

(OR)

2 Design a RC Column 450x600 mm depth with unsupported length of 6 m. The column is subjected to axial load 1500 kN and 75 mm eccentricity in both the directions. The column is effectively held in position but not restrained against rotation. Use M25 concrete and Fe415 HYSD steel. Apply necessary design checks. (Use limit state design). [28M]
Draw a neat sketch with suitable scale showing plan, section, and elevation and detailing aspects of column and connection system of column with footing.

PART –B (42 Marks)

3 a) Explain the design concepts of under reinforced, balanced and over reinforced sections with neat sketch. Write the influence of these RC sections. [7M]
b) Explain the design concepts of limit state and work stress methods. [7M]

4 A simply supported beam of 300x400 mm depth, consist 4 no.s 16 mm diameter tension reinforcement and 2 nos of 16 mm diameter compression reinforcement with 50 mm clear cover in all sides. Find out the moment capacity of the beam. Use the concrete grade M20 and HYSD steel Fe415. (use limit state design) [14M]

5 a) Explain the concept of IS code provisions in the design of one way slab. [7M]
b) Explain the design concepts of braced and un-braced columns. Mention the design provisions as per IS code. [7M]

6 a) A simply supported beam of 7 m effective span is reinforced with 6 bars of 25 mm diameter at center of span and 50% of reinforcement bars are continued into supports. Check the bearing length and development length at the supports. Use concrete grade M25 and HYSD steel Fe500. (Limit state design). [7M]
b) Write short notes on different types of splicing system used for tension reinforcement of beams. [7M]

7 Design a Circular Footing which supports circular column 400 mm diameter. Assume axial load on column 25 kN and uni-axial moment 6 kN-m. The safe bearing capacity of soil 15kN/m^2. Use concrete grade M25 and HYSD steel Fe500. (limit state design) [14M]

*****

||''|''||''||''''''|