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

III B. Tech I Semester Supplementary Examinations, May - 2017
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 column 400 mm by 400 mm supports an axial service load of 1200 kN. The safe bearing capacity of the soil at site is 200 kN/m^2. Adopting M25 grade concrete and Fe415 HYSD bars design a suitable footing for the column and sketch the details of reinforcement. [28M]

2 Design a continuous R.C. slab for a class room 8m wide and 16 m long. The roof is to be supported on R.C.C. beams spaced at 4m intervals. The width of beam should be kept 230 mm. The superimposed load is 3kN/m^2 and finishing load expected is 1.5kN/m^2.Use M20 concrete and Fe415 steel. [28M]

PART -B

3 a) What is meant by characteristic strength of a material as used in IS 456 -2000? [6M]
b) Explain the term M_u (lim) and give the expression for this value for Fe 415 steel. [8M]

4 A reinforced concrete beam is to be designed over an effective span of 5.5 m to support a design service live load of 6kN/m. Adopt M20 grade concrete and Fe415 HYSD bars and design the beam to satisfy the limit states of collapse of serviceability. [14M]

5 Design a short circular column of diameter 350 mm to support a factored axial load of 1200kN, together with a factored moment of 100kNm. Adopt M20 grade concrete and Fe415 HYSD bars. [14M]

6 A R.C.C beam 230mm wide and 450mm deep is reinforced with 4 NO.s of 16 mm diameter bars of grade Fe415, on the tension side with an effective cover of 50mm. If the shear reinforcement of 2 legged 8 mm stirrups at a spacing of 150 mm c/c is provided at a section, determine the design (ultimate) strength of the section. Assume M20 concrete has been used. [14M]

7 a) What are the types of reinforcements used to resist shear? Explain the action of different types of shear steel in resisting shear. [7M]
b) What is meant by full development length? What is its approximate value for tension and compression in terms of the diameter of the bar? [7M]

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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.

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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]

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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.

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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]

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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.

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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]

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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.

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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]

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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]

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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]

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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]

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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]

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Code No: **R32015** **R10** **Set No. 1**

III B.Tech II Semester Regular Examinations, May/June - 2015
DESIGN & DRAWING OF CONCRETE STRUCTURES-II
(Civil Engineering)

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

Answer any ONE question from PART-A
and THREE questions from PART-B
Use of IS: 456-2000 and design charts from SP-16 is allowed.

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PART-A

1 Design the typical interior panel of a flat slab floor of size 5.5m x 5.5m with suitable drop to support a live load of 5kN/m^2.The floor is supported by columns of size 550mm x 550mm.Use M20 grade and Fe 415 steel .Sketch the reinforcement details by showing cross sections. 30

2 Design a combined rectangular footing to support two columns of size 450 x 450 mm spaced 4.5 m apart carrying axial loads of 850kN and 950kN respectively. The SBC of soil is 200 kN/m^2. Adopt M20 concrete and Fe 415 steel. Sketch the reinforcement details. 30

PART-B

3 a) Write the characteristics of high tensile steel and high strength concrete. 10
b) Write about the historic development of pre stressed concrete. 5

4 a) List the various types of tensioning devices used in pre stressed concrete. 6
b) Distinguish between pre tensioning and post tensioning. 9

5 a) Mention the various losses of pre stress 3
b) A pre tensioned beam 550 mm wide and 900 mm deep is pre stressed by 16 wires each of 12mm diameter initially stressed to 1400 N/mm^2 with their centroids located 150 mm from the soffit. Estimate the final percentage loss of stress due to elastic deformation, creep, shrinkage and relaxation using the following data: 12
Relaxation of steel stress = 90 N/mm^2
Es =210 kN/mm^2, E_C = 35 kN/mm^2
Creep coefficient = 1.6
Residual shrinkage strain = 3 x 10^{-4}.

6 A concrete beam of symmetrical I section spanning 9m has flange width and thickness 220mm and 70mm,respectively.The overall depth of the beam is 450mm.The thickness of the web is 80mm.The beam is pre stressed by a parabolic cable with an eccentricity of 25mm at the centre and zero at the supports with an effective force of 200kN.The live load on the beam is 3kN/m. Draw the distribution diagram at the central section for 15
(i) pre stress + self weight
(ii) pre stress +self weight +live load. Take density of concrete as 24 kN/m^3.

7 a) What are the various methods generally used for the investigation of anchorage zone stresses? 6

b) The horizontal pressure at the centroid of a concrete beam of rectangular cross section 220mm x 460mm is 10N/mm^2 and the maximum shearing force on the beam is 100kN. Calculate the maximum principle tensile stress. What is the minimum vertical prestress required to eliminate the principal tensile stress? 9

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Code No: **R32015** **R10** **Set No. 2**

III B.Tech II Semester Regular Examinations, May/June - 2015
DESIGN & DRAWING OF CONCRETE STRUCTURES-II
(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) Design the typical interior panel of a flat slab floor of size 6.5m x 6.5m with suitable drop to support a live load of 6kN/m^2.The floor is supported by columns of size 500mm x 500mm.Use M20 grade and Fe 415 steel .Sketch the reinforcement details by showing cross sections. 30

2 a) Design a combined rectangular footing to support two columns of size 550 x 550 mm spaced 5.5 m apart carrying axial loads of 950kN and 1050kN respectively. The SBC of soil is 200 kN/m^2. Adopt M20 concrete and Fe 415 steel. Sketch the reinforcement details. 30

PART-B

3 a) Write the advantages and limitations of pre stressed concrete. 7

b) Differentiate pre stressed beam with reinforced concrete beam. 8

4 Explain with sketches Hoyer's long line system of pretensioning. 15

5 a) Mention the various losses of prestress. 3

b) A pre tensioned beam 600 mm wide and 900 mm deep is pre stressed by 12wires each of 12mm diameter initially stressed to 1200 N/mm^2 with their centroids located 100 mm from the soffit. Estimate the final percentage loss of stress due to elastic deformation, creep, shrinkage and relaxation using the following data: 12
Relaxation of steel stress = 90 N/mm^2
Es =210 kN/mm^2, E_C = 35 kN/mm^2
Creep coefficient = 1.6
Residual shrinkage strain = 3 x 10^{-4}

6 a) A concrete beam of symmetrical I section spanning 9m has flange width and thickness 200mm and 50mm,respectively.The overall depth of the beam is 420mm.The thickness of the web is 60mm.The beam is pre stressed by a parabolic cable with an eccentricity of 15mm at the centre and zero at the supports with an effective force of 100kN.The live load on the beam is 2kN/m. Draw the distribution diagram at the central section for 15
(i)pre stress + self weight
(ii)pre stress +self weight +live load
Take density of concrete as 24kN/m^3

7 a) What is Pressure Thrust line? Explain its significance with sketches.

b) A pre stressed concrete beam 300mm x 600mm in section has a span of 7m and is subjected to uniformly distributed load of 20kN/m including the self weight of the beam. The pre stressing tendons which are located along the longitudinal centroidal axis provide an effective pre stressing force of 900kN. Determine the extreme fibre stresses in concrete at the mid span section.

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Code No: **R32015** **R10** **Set No. 3**

III B.Tech II Semester Regular Examinations, May/June - 2015
DESIGN & DRAWING OF CONCRETE STRUCTURES-II
(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 the interior panel of a flat slab 5.6m x 5.6m in size for a super imposed load of 7.9kN/m^2. Provide two way reinforcement. Use M20 concrete and Fe 415 steel. 30

2 Two reinforced concrete columns 400m x 400mm in section carry a point load of 900kN each, inclusive of self weight .Design a combined footing having a central beam joining the columns. The centre to centre spacing of the columns is 4metres.The safe bearing capacity of the soil is 150kN/m^2.Use M20 and Fe 415 steel. Sketch the details. 30

PART-B

3 a) Write about pre tensioning and post tensioning 6

b) Write the characteristics of high tensile steel and high strength concrete. 9

4 Explain with sketches Magnell's system of posttensioning. 15

5 a) Mention the various losses of pre stress 3

b) A pre tensioned beam 500 mm wide and 800 mm deep is pre stressed by 10wires each of 10mm diameter initially stressed to 1000 N/mm^2 with their centroids located 100 mm from the soffit. Estimate the final percentage loss of stress due to elastic deformation, creep, shrinkage and relaxation using the following data: 12

Relaxation of steel stress = 90 N/mm^2
Es =210 kN/mm^2, E_C = 35 kN/mm^2
Creep coefficient = 1.6
Residual shrinkage strain = 3 x 10^{-4}

6 A concrete beam of symmetrical I section spanning 8m has flange width and thickness 220mm and 60mm,respectively.The overall depth of the beam is 400mm.The thickness of the web is 40mm.The beam is pre stressed by a parabolic cable with an eccentricity of 15mm at the centre and zero at the supports with an effective force of 120kN.The live load on the beam is 2kN/m. Draw the distribution diagram at the central section for 15
(i)pre stress + self weight
(ii)pre stress +self weight +live load
Take density of concrete as 24kN/m^3

7 a) What is Pressure Thrust line? Explain its significance with sketches.

b) What are the different types of flexural modes observed in pre stressed concrete beams? Explain with sketches.

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Code No: **R32015** **R10** **Set No. 4**

III B.Tech II Semester Regular Examinations, May/June - 2015
DESIGN & DRAWING OF CONCRETE STRUCTURES-II
(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 the interior panel of a flat slab 6m x 6m in size for a super imposed load of 9kN/m^2. Provide two way reinforcement. Use M20 concrete and Fe 415 steel. 30

2 Two reinforced concrete columns 450m x 450mm in section carry a point load of 1000kN each, inclusive of self weight. Design a combined footing having a central beam joining the columns. The centre to centre spacing of the columns is 5metres.The safe bearing capacity of the soil is 200kN/m^2.Use M20 and Fe 415 steel. Sketch the details. 30

PART-B

3 a) Write about pre tensioning and post tensioning. 6
b) What are the characteristics of high tensile steel and high strength concrete? 9

4 Explain with sketches Freyssinet's system of post tensioning 15

5 a) Mention the various losses of pre stress 3
b) A pre tensioned beam 550 mm wide and 900 mm deep is pre stressed by 12wires each of 12mm diameter initially stressed to 1200 N/mm^2 with their centroids located 120 mm from the soffit. Estimate the final percentage loss of stress due to elastic deformation, creep, shrinkage and relaxation using the following data: 12
Relaxation of steel stress = 90 N/mm^2
Es =210 kN/mm^2, E_C = 35 kN/mm^2
Creep coefficient = 1.6
Residual shrinkage strain = 3 x 10^{-4}

6 A concrete beam of symmetrical I section spanning 10m has flange width and thickness 300mm and 60mm,respectively.The overall depth of the beam is 450mm.The thickness of the web is 45mm.The beam is pre stressed by a parabolic cable with an eccentricity of 15mm at the centre and zero at the supports with an effective force of 150kN.The live load on the beam is 3kN/m. Draw the distribution diagram at the central section for 15
(i) pre stress + self weight
(ii) pre stress +self weight +live load. Take density of concrete as 24kN/m^3.

7 a) How do you estimate the ultimate shear strength of pre stressed concrete section with web shear cracks? 6
b) Explain the concept of load balancing in pre stressed concrete members. 9

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Code No: **R32015** **R10** **Set No. 1**

III B.Tech II Semester Supplementary Examinations, Dec - 2015

DESIGN AND DRAWING OF CONCRETE STRUCTURES-II

(Civil Engineering)

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

Answer any ONE question from PART-A
and THREE questions from PART-B
Use of IS: 456-2000 and design charts from SP-16 is allowed.

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PART-A

1 A flat slab system consists of 4 m × 6 m panels and is without drop and column head. It has to carry a live load of 4 kN/m^2 and a finishing load of 1 kN/m^2. It is to be designed using M20 grade concrete and Fe 415 steel. The size of the columns supporting the system is 500× 500 mm and floor to floor height is 405 m. Calculate design moments in interior and exterior panels at column and middle strips in both directions. [30]

2 Combined footing is to be provided for columns of sizes 400 × 400 mm and 600× 600 mm carrying loads of 600 KN and 1200 kN. The centre to centre distance of the columns is 4 m. The property line is at a distance 0.3 m from the column carrying 600 kN. Length of footing is to be restricted to 5 m. Prepare the layout plan of the footing and show the loading on longitudinal section. Given SBC of soil = 150 kN/m^2. [30]

PART-B

3 a) What is the basic principle of prestressed concrete? [7]

b) Distinguish between creep and shrinkage of concrete. [8]

4 a) What are loop anchorages? Explain with sketches Baur-Leonhardt system of post-tensioning. [7]

b) Explain the concept of internal resisting couple in a prestressed concrete beam supporting dead and live loads. [8]

5 a) ''The Indian Standard Code IS: 1343 specifies different strains for pretensioned and post-tensioned members". Explain with reasons. [5]

b) A concrete beam, 120 mm wide and 300 mm deep, is prestressed by a straight cable carrying an effective force of 200 kN at an eccentricity of 50 mm. The beam spanning over 6 m supports a total uniformly distributed load of 3 kN/m, which includes the self-weight of the beam. The initial stress in the tendons is 1000 N/mm^2. Determine the percentage increase of stress in the tendons due to the loading on the beam. [10]
E_S = 210 kN/mm^2, E_c = 35 kN /mm^2

6 A pretensioned concrete sleeper 300 mm wide by 250 mm deep is prestressed using nine wires of 7 mm diameter. Four wires are located at top and five wires near the soffit. The effective cover being 40 mm. The initial stress in the wires is 1200 N/mm^2. Assuming the modular ratio as 6, estimate the percentage loss of stress in the top and bottom wires due to elastic deformation of concrete. [15]

7 a) What is the difference in the types of stress blocks adopted in Indian code specifications regarding flexural strength computations? [5]

b) A concrete beam of rectangular section 250 mm wide and 650 mm overall depth, is subjected to a torque of 25 kN m and a uniform prestressing force of 150 kN. Calculate the maximum principal tensile stress. Assuming 15 percent loss of prestress, calculate the prestressing force necessary to limit the principal tensile stress to 0.4 N/mm^2. [10]

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Code No: **R32015** **R10** **Set No. 1**

III B.Tech II Semester Regular Examinations, May/June - 2015
DESIGN & DRAWING OF CONCRETE STRUCTURES-II
(Civil Engineering)

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

Answer any ONE question from PART-A
and THREE questions from PART-B
Use of IS: 456-2000 and design charts from SP-16 is allowed.

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PART-A

1 Design the typical interior panel of a flat slab floor of size 5.5m x 5.5m with suitable drop to support a live load of 5kN/m^2.The floor is supported by columns of size 550mm x 550mm.Use M20 grade and Fe 415 steel .Sketch the reinforcement details by showing cross sections. 30

2 Design a combined rectangular footing to support two columns of size 450 x 450 mm spaced 4.5 m apart carrying axial loads of 850kN and 950kN respectively. The SBC of soil is 200 kN/m^2. Adopt M20 concrete and Fe 415 steel. Sketch the reinforcement details. 30

PART-B

3 a) Write the characteristics of high tensile steel and high strength concrete. 10
b) Write about the historic development of pre stressed concrete. 5

4 a) List the various types of tensioning devices used in pre stressed concrete. 6
b) Distinguish between pre tensioning and post tensioning. 9

5 a) Mention the various losses of pre stress 3
b) A pre tensioned beam 550 mm wide and 900 mm deep is pre stressed by 16 wires each of 12mm diameter initially stressed to 1400 N/mm^2 with their centroids located 150 mm from the soffit. Estimate the final percentage loss of stress due to elastic deformation, creep, shrinkage and relaxation using the following data: 12
Relaxation of steel stress = 90 N/mm^2
Es =210 kN/mm^2, E_C = 35 kN/mm^2
Creep coefficient = 1.6
Residual shrinkage strain = 3 x 10^{-4}.

6 A concrete beam of symmetrical I section spanning 9m has flange width and thickness 220mm and 70mm,respectively.The overall depth of the beam is 450mm.The thickness of the web is 80mm.The beam is pre stressed by a parabolic cable with an eccentricity of 25mm at the centre and zero at the supports with an effective force of 200kN.The live load on the beam is 3kN/m. Draw the distribution diagram at the central section for 15
(i) pre stress + self weight
(ii) pre stress +self weight +live load. Take density of concrete as 24 kN/m^3.

Code No: **R32015** **R10** **Set No. 1**

7 a) What are the various methods generally used for the investigation of anchorage zone stresses? 6

b) The horizontal pressure at the centroid of a concrete beam of rectangular cross section 220mm x 460mm is 10N/mm^2 and the maximum shearing force on the beam is 100kN. Calculate the maximum principle tensile stress. What is the minimum vertical prestress required to eliminate the principal tensile stress? 9

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Code No: **R32015** **R10** **Set No. 2**

III B.Tech II Semester Regular Examinations, May/June - 2015
DESIGN & DRAWING OF CONCRETE STRUCTURES-II
(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) Design the typical interior panel of a flat slab floor of size 6.5m x 6.5m with suitable drop to support a live load of 6kN/m^2.The floor is supported by columns of size 500mm x 500mm.Use M20 grade and Fe 415 steel .Sketch the reinforcement details by showing cross sections. 30

2 a) Design a combined rectangular footing to support two columns of size 550 x 550 mm spaced 5.5 m apart carrying axial loads of 950kN and 1050kN respectively. The SBC of soil is 200 kN/m^2. Adopt M20 concrete and Fe 415 steel. Sketch the reinforcement details. 30

PART-B

3 a) Write the advantages and limitations of pre stressed concrete. 7

b) Differentiate pre stressed beam with reinforced concrete beam. 8

4 Explain with sketches Hoyer's long line system of pretensioning. 15

5 a) Mention the various losses of prestress. 3

b) A pre tensioned beam 600 mm wide and 900 mm deep is pre stressed by 12wires each of 12mm diameter initially stressed to 1200 N/mm^2 with their centroids located 100 mm from the soffit. Estimate the final percentage loss of stress due to elastic deformation, creep, shrinkage and relaxation using the following data: 12
Relaxation of steel stress = 90 N/mm^2
Es =210 kN/mm^2, E_C = 35 kN/mm^2
Creep coefficient = 1.6
Residual shrinkage strain = 3 x 10^{-4}

6 a) A concrete beam of symmetrical I section spanning 9m has flange width and thickness 200mm and 50mm,respectively.The overall depth of the beam is 420mm.The thickness of the web is 60mm.The beam is pre stressed by a parabolic cable with an eccentricity of 15mm at the centre and zero at the supports with an effective force of 100kN.The live load on the beam is 2kN/m. Draw the distribution diagram at the central section for 15
(i)pre stress + self weight
(ii)pre stress +self weight +live load
Take density of concrete as 24kN/m^3

7 a) What is Pressure Thrust line? Explain its significance with sketches.

b) A pre stressed concrete beam 300mm x 600mm in section has a span of 7m and is subjected to uniformly distributed load of 20kN/m including the self weight of the beam. The pre stressing tendons which are located along the longitudinal centroidal axis provide an effective pre stressing force of 900kN. Determine the extreme fibre stresses in concrete at the mid span section.

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Code No: **R32015** **R10** **Set No. 3**

III B.Tech II Semester Regular Examinations, May/June - 2015
DESIGN & DRAWING OF CONCRETE STRUCTURES-II
(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.

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PART-A

1 Design the interior panel of a flat slab 5.6m x 5.6m in size for a super imposed load of 7.9kN/m^2. Provide two way reinforcement. Use M20 concrete and Fe 415 steel. 30

2 Two reinforced concrete columns 400m x 400mm in section carry a point load of 900kN each, inclusive of self weight .Design a combined footing having a central beam joining the columns. The centre to centre spacing of the columns is 4metres.The safe bearing capacity of the soil is 150kN/m^2.Use M20 and Fe 415 steel. Sketch the details. 30

PART-B

3 a) Write about pre tensioning and post tensioning 6

b) Write the characteristics of high tensile steel and high strength concrete. 9

4 Explain with sketches Magnell's system of posttensioning. 15

5 a) Mention the various losses of pre stress 3

b) A pre tensioned beam 500 mm wide and 800 mm deep is pre stressed by 10wires each of 10mm diameter initially stressed to 1000 N/mm^2 with their centroids located 100 mm from the soffit. Estimate the final percentage loss of stress due to elastic deformation, creep, shrinkage and relaxation using the following data: 12

Relaxation of steel stress = 90 N/mm^2
Es =210 kN/mm^2, E_C = 35 kN/mm^2
Creep coefficient = 1.6
Residual shrinkage strain = 3 x 10^{-4}

6 A concrete beam of symmetrical I section spanning 8m has flange width and thickness 220mm and 60mm,respectively.The overall depth of the beam is 400mm.The thickness of the web is 40mm.The beam is pre stressed by a parabolic cable with an eccentricity of 15mm at the centre and zero at the supports with an effective force of 120kN.The live load on the beam is 2kN/m. Draw the distribution diagram at the central section for 15
(i)pre stress + self weight
(ii)pre stress +self weight +live load
Take density of concrete as 24kN/m^3

7 a) What is Pressure Thrust line? Explain its significance with sketches.

b) What are the different types of flexural modes observed in pre stressed concrete beams? Explain with sketches.

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Code No: **R32015** **R10** **Set No. 4**

III B.Tech II Semester Regular Examinations, May/June - 2015
DESIGN & DRAWING OF CONCRETE STRUCTURES-II
(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 the interior panel of a flat slab 6m x 6m in size for a super imposed load of 9kN/m^2. Provide two way reinforcement. Use M20 concrete and Fe 415 steel. 30

2 Two reinforced concrete columns 450m x 450mm in section carry a point load of 1000kN each, inclusive of self weight. Design a combined footing having a central beam joining the columns. The centre to centre spacing of the columns is 5metres.The safe bearing capacity of the soil is 200kN/m^2.Use M20 and Fe 415 steel. Sketch the details. 30

PART-B

3 a) Write about pre tensioning and post tensioning. 6
b) What are the characteristics of high tensile steel and high strength concrete? 9

4 Explain with sketches Freyssinet's system of post tensioning 15

5 a) Mention the various losses of pre stress 3
b) A pre tensioned beam 550 mm wide and 900 mm deep is pre stressed by 12wires each of 12mm diameter initially stressed to 1200 N/mm^2 with their centroids located 120 mm from the soffit. Estimate the final percentage loss of stress due to elastic deformation, creep, shrinkage and relaxation using the following data: 12
Relaxation of steel stress = 90 N/mm^2
Es =210 kN/mm^2, E_C = 35 kN/mm^2
Creep coefficient = 1.6
Residual shrinkage strain = 3 x 10^{-4}

6 A concrete beam of symmetrical I section spanning 10m has flange width and thickness 300mm and 60mm,respectively.The overall depth of the beam is 450mm.The thickness of the web is 45mm.The beam is pre stressed by a parabolic cable with an eccentricity of 15mm at the centre and zero at the supports with an effective force of 150kN.The live load on the beam is 3kN/m. Draw the distribution diagram at the central section for 15
(i) pre stress + self weight
(ii) pre stress +self weight +live load. Take density of concrete as 24kN/m^3.

7 a) How do you estimate the ultimate shear strength of pre stressed concrete section with web shear cracks? 6
b) Explain the concept of load balancing in pre stressed concrete members. 9

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Code No: **R32013** **R10** **Set No. 1**

III B.Tech II Semester Regular/Supplementary Examinations, May/June - 2015
DESIGN & DRAWING OF STEEL STRUCTURES
(Civil Engineering)

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

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

*****

PART-A

1 a) A column is made of one ISHB 300 @ 58.8 kg/m and one plate 400mm ×12mm symmetrically placed on each flange. The column thus measures 324mm × 400mm overall dimensions. The column carries an axial load of 1800kN. The column is to be provided with a gusseted base resting on concrete base. Design the gusseted base giving full details of the connections. Take safe compressive stress on concrete as 30MPa. [15]

b) Draw to Scale the elevation and plan [15]

2 a) Design a gantry girder for an industrial building to carry an electric overhead traveling crane with the following data. Crane capacity is 300 kN. Weight of crane excluding crab is 200 kN. Weight of crab is 5 kN. Span of crane between rails is18 m. Minimum hook approach is1.0 m. Wheel base is 3.0 m. Span of gantry girder is 9 m. Weight of rail section is 30 kg/m. [15]

b) Draw to Scale the longitudinal and cross sections. [15]

PART-B

3 A tension member consisting of two channel sections 200mm × 75mm @22.1 kg/m back to back is to be connected to gusset plate. Design the welded joint for the condition that the section is loaded to its full strength. Take A= 3000 sq.mm. Thickness of the flange is 11.4mm and the thickness of the web is 6.1mm. Take the safe stress in the weld material equal to110 N/mm^2. Take the safe stress in axial tension equal to150 N/mm^2. [15]

4 Explain the difference in performance of laterally unrestrained beams and restrained beams with neat diagrams. Explain design procedure [15]

5 The main tie of a building roof truss has to carry a maximum axial tension of 200kN. Design a suitable section for the member as per IS specifications. Design the section as two angles placed back to back of a gusset plate. [15]

6 Design a suitable section for a column to carry an axial load of 350kN. The column is 4m long and is fixed in position as well as direction at one end and fixed in position at the other end. [15]

7 Angle of slope of a roof truss is 26^0. The average height of roof above ground is 12m and the building is situated in Delhi. Find wind pressures for different permeabilities to be considered for the design of roof truss. Basic wind pressure is 140 kg/m^2. [15]

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Code No: **R32013** **R10** **Set No. 2**

III B.Tech II Semester Regular/Supplementary Examinations, May/June - 2015
DESIGN & DRAWING OF STEEL STRUCTURES
(Civil Engineering)

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

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

PART-A

1 a) Design the web and flanges of a plate girder for an effective span of 18m if the dead and live loads amount to 35 kN and 50kN respectively. Check the suggested section for web stiffness. [15]

b) Draw to Scale the Cross section and Longitudinal section. [15]

2 a) A column in an industrial building has to carry a total load axial load of 1500kN. Its length is 5.25m.and is effectively restrained in position as well as direction at both the ends. Design a double I section for the column. Design a single lacing system for the column. [15]

b) Draw to Scale the plan and elevation. [15]

PART-B

3 A beam of clear span 15meters has a bearing of 300mm at each end. It has to carry a superimposed load of 100kN/m Design the section as a plated beam assuming that only 12mm mild steel plates are available. The top flange of the plated beam may be assumed to be laterally restrained at 3m c/c. also calculate the theoretical and actual points of cut off for the plates used. [15]

4 Design a tension member using two angle sections to carry 180kN when both angles are connected (i) on both sides of the gusset plate and [8]
(ii) on the same side of the gusset plate. [7]

5 What is a slab base? Explain various features of a column base with neat sketches. Describe procedure for designing a slab base [15]

6 Explain with neat sketches the functioning of a crane girder and the effect of the movement on the gantry girder. What are impact forces and how they are included in the design? [15]

7 Angle of slope of a roof truss is 28^0. The average height of roof above ground is 10m and the building is situated in Delhi. Find wind pressures for different permeabilities to be considered for the design of roof truss. Basic wind pressure is 150 kg/m^2. [15]

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Code No: **R32013** **R10** **Set No. 3**

III B.Tech II Semester Regular/Supplementary Examinations, May/June - 2015
DESIGN & DRAWING OF STEEL STRUCTURES
(Civil Engineering)

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

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

PART-A

1 a) A column is made of one ISHB 300 @ 58.8 kg/m one plate 400mm × 12mm symmetrically placed on each flange. The column thus measures 324mm × 400mm overall dimensions. The column carries an axial load of 2000kN. The column is to be provided with a base plate resting on concrete base. Design the base plate giving full details of the connections. Take safe compressive stress on concrete as 30MPa. [15]

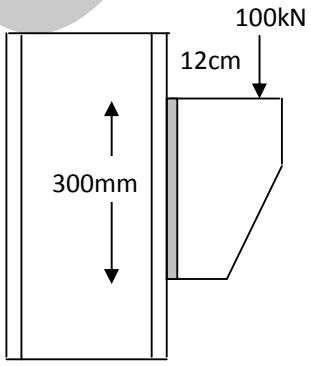
b) Draw to Scale the plan and elevation. [15]

2 a) Design the central section of a plate girder for an effective span of 15m if the dead and live loads amount to 25 kN and 50kN respectively. [15]

b) Draw to Scale the Cross section and Longitudinal section. [15]

PART-B

3 A plate bracket carrying a load of 100 kN at an eccentricity of 120mm is connected to the face of the steel stanchion by fillet welds on both sides of the plate, as shown in figure. Determine the size of the fillet weld 'a' if 8mm fillet weld is used to determine the depth of the bracket 'b'. If 8mm fillet weld is used with a bracket of 250mm depth, calculate the resulting stress in the weld. [15]



4 Design a beam of effective span 5m and carrying a uniformly distributed load of 25 kN / m for the whole length. Compression flange of the beam is laterally restrained against buckling throughout the length. [15]

Code No: **R32013** **R10** **Set No. 3**

5 a) What is tension member? Explain various modes of failure of a tension member. [5]

b) Design a C section to act as a tension member carrying an axial tension of 220 kN. Check the suggested section for slenderness ratio. [10]

6 Explain with neat sketches the development of longitudinal and lateral forces on the gantry girder section while the crab is moving on the crane girder. How these forces are taken care of in case of both electrical overhead crane and manually operated cranes. [15]

7 Explain **i)** Low permeability [5]

ii) Medium permeability [5]

iii) High permeability incorporated in calculation of wind pressure on trusses. [5]

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Code No: **R32013** **R10** **Set No. 4**

III B.Tech II Semester Regular/Supplementary Examinations, May/June - 2015
DESIGN & DRAWING OF STEEL STRUCTURES
(Civil Engineering)

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

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

PART-A

1 a) Design a gantry girder for an industrial building to carry an hand operated overhead traveling crane with the following data. Crane capacity is 250 kN. Weight of crane excluding crab is 200 kN. Weight of crab is 5 kN. Span of crane between rails is18 m. Minimum hook approach is1.0 m. Wheel base is 3.0 m. Span of gantry girder is 9 m. Weight of rail section is 30 kg/m. Check the suggested section for bending stresses. [15]

b) Draw to Scale the Cross section and Longitudinal section [15]

2 a) A column in an industrial building has to carry a total load axial load of 1200kN. Its length is 4.5m.and is effectively restrained in position as well as direction at base and fixed in position and free in direction at top. Design a double I section for the column. Design battens system for the section. [15]

b) Draw to Scale the plan and elevation. [15]

PART-B

3 a) Design a suitable section for a beam of effective span 6m and carrying a superimposed load of 30 kN/m including its self weight. Assume that the compression flange is fully restrained against lateral buckling. Apply necessary checks. [15]

4 a) Draw various probable cross sections of a typical tension member. Discuss relative merits. What are various conditions where a structure is subjected to tensile loads? [7]

b) Explain the difference in performance of laterally unrestrained beams and restrained beams with neat diagrams. Explain design procedure. [8]

5 What is a slab base? Explain various features of a column base with neat sketches. Describe procedure for designing a slab base. [15]

6 Define a welded connection. What are the different types of welded connections and how are they classified? Draw neat sketches. [15]

Code No: **R32013** **R10** **Set No. 4**

7 A pitched roof is to be provided for a workshop of effective span of 12m. The trusses are spaced at 4 center to center and purlins at 2m center to center. The pitch of the roof is 26 degrees. The weight of roofing materials is 16.2 kg/m^2 and normal wind pressure is 140 kg/m^2. Design I section purlin for the roof considering permissible bending stress as 1650 kg/cm^2. [15]

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Code No:**R32011** **R10** **Set No. 1**

III B.Tech II Semester Regular/Supplementary Examinations, May/June - 2015
GEOTECHNICAL ENGINEERING –I
(Civil Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks
Ordinary and Semi-log Graph Papers are to be supplied in the Examination Hall
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1 a) Write short note on formation of soils 7

b) A sample of sand above the water table was found to have a natural moisture content of15% and a unit weight of 18.84 kN/m^3. Laboratory tests on a dried sample indicatedvalues of e_{min} = 0.50 and e_{max} =0.85 for the densest and loosest states respectively.Compute the degree of saturation and the relative density. Assume G_s = 2.65. 8

2 a) Write briefly about the Liquid limit test conducted in the laboratory. 7

b) During the determination of the shrinkage limit of a sandy clay, the following laboratorydata was obtained:

Wet weight of soil + dish = 87.85 g
Dry weight of soil + dish = 76.91 g
Weight of dish = 52.70 g
The volumetric determination of the soil pat:
Weight of dish + mercury = 430.8 g
Weight of dish = *244.62 g* 8

Calculate the shrinkage limit, assuming G_s = 2.65

3 a) In a falling head permeability test, if the time intervals for the head to fall from h_1 to h_2 and h_2 to h_3 are same. Show that the h_2 is the geometrical mean of h_1 and h_3. ($h_2 = \sqrt{h_1 * h_3}$) 7

b) A soil strata consists of 3 layers of thickness 1 m , 1,5 m and 1.9m having the coefficients of permeability of 2.3 X 10^{-3} cm/s, 1.85 X 10^{-3} and 3.5 X 10^{-4} cm/s respectively. Estimate the average coefficient of permeability in the direction. (i) parallel and (ii) normal to the flow. 8

4 a) What are the specifications of soil used as filters? Why these specifications are required. 7

b) A stratum of sand 2.5 m thick overlies a stratum of saturated clay 3 m thick. The water table is 1 m below the surface. For the sand, G_s = 2.65, e = 0.50 and for the clay G_s = 2.72, e = 1.1. Calculate the total and effective vertical stresses at depths of 1 m, 2.5 m and 5.5 m below the surface assuming that the sand above the water table is completely dry. 8

Code No: **R32011** **R10** **Set No. 1**

5 a) Derive the governing differential equation for a stress at any point below the ground with line load by considering stress at any pint with a point load. 8

b) A rigid footing of 3 m diameter carries a column load of 1500 kN at foundation level. Compute the increase in stress due to the column load at a radial distance of 5 m and vertical downward from foundation level of 2m. 7

6 a) Briefly discuss about the effect of Compaction of Engineering Properties 6

b) The following results were obtained from a standard compaction test on a soil

Mass (g)	2010	2092	2114	2100	2055
Water Content (%)	12.8	14.5	15.6	16.8	19.2

The value of G_s is 2.67. Plot the dry density – water content curve and give the optimum water content and maximum dry density? Plot also the curves of 0%, 5% and 10 % air content and give the value of air content at maximum dry density. The volume of the mould is 1000 cm^3 9

7 a) Briefly explain any one method to compute the coefficient of consolidation. 7

b) In an oedometer (consolidation) test a specimen of saturated clay 20 mm thick reaches 50% consolidation in 30 min. How long it will take a layer of this clay 5 m thick to reach 90 % of the consolidation under the same stress and drainage conditions? How long would it take the layer to reach 50 % consolidation? 8

8 a) What are the different types tri-axial compression tests are available based on drainage conditions. Explain them in brief. 7

b) Pore pressure measurements were made during undrained tri-axial tests on samples of compacted fill material from an earth dam after saturating them in the laboratory. The results were as follows.

Property Measured (kN/m^3)	I Test	II Test
Lateral Earth Pressure	150	550
Total Vertical Pressure	450	1250
Pore Water Pressure	35	112

Determine the apparent cohesion and the angle of shearing resistance as referred to (i) Total Stress and (ii) Effective stress. 8

*****

Code No: **R32011** **R10** **Set No. 2**

III B.Tech II Semester Regular/Supplementary Examinations, May/June - 2015
GEOTECHNICAL ENGINEERING –I
(Civil Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks
Ordinary and Semi-log Graph Papers are to be supplied in the Examination Hall
*****

1 a) What are the different structures of clay minerals are available? Discuss them. 7

b) An undisturbed sample of soil has a volume of 29 cm^3 and weighs 48 g. The dry weight ofthe sample is 32 g. The value of G_s = 2.66. Determine the (i) natural water content, (ii) insitu void ratio, (iii) degree of saturation, and (iv) saturated unit weight of the soil. 8

2 a) Define Consistency Limits? Why they are required to find in geotechnical Engineering? What are they? 7

b) Liquid limit test on a given sample gave the following values

Water Content (%)	47.5	49.5	51.9	53.9
Number of Blows	38	27	20	43

Plot the values on semi log-sheet and determine the liquid limit and flow index. 8

3 a) What are the limitations of Darcy's Law? Explain the concept of flow of water through soil. 7

b) In a falling head permeameter, the sample used is 20 cm long having a cross-sectional areaof 24 cm^2. Calculate the time required for a drop of head from 25 to 12 cm if the cross-sectionalarea of the stand pipe is 2 cm^2. The sample of soil is made of three layers. Thethickness of the first layer from the top is 8 cm and has a value of $k_1 = 2 \times 10^{-4}$ cm/sec, thesecond layer of thickness 8 cm has $k_2 = 5 \times 10^{-4}$ cm/sec and the bottom layer of thickness4 cm has $k_3 = 7 \times 10^{-4}$ cm/sec. Assume that the flow is taking place perpendicular to thelayers (Fig. 1). 8

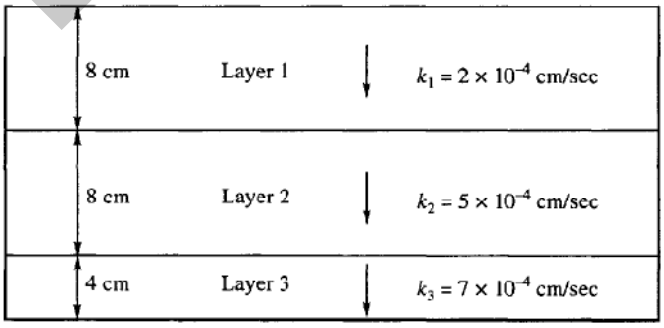

Fig. 1

Code No: **R32011** **R10** **Set No. 2**

4 a) What is flow net? What are its characteristics? Discuss its uses? 7

b) From the flow net diagram drawn for seepage flow through an earth dam the flowing data is obtained. Compute the seepage through the body of the dam per unit length. Number of flow lines = N_f = 2.1, Number of equi-potential drops = 10. coefficient of permeability = 1.35 X 10^{-5} cm/sec. head causing seepage flow, h = 13.5 m. 8

5 a) Derive the governing differential equation for a stress at any point below the ground with circular load by considering stress at any pint with a point load. 8

b) A monument 1500 kN is erected on the ground surface. Considering the load as concentrated, determine the vertical pressure directly under the monument at a depth of 6 m below the ground surface. Also calculate the vertical pressure at a point, which is at a depth of 10 m and a horizontal distance of 3 m from the axis of the load. 7

6 a) Discuss about the compaction control in the field. 7

b) In a compaction test the optimum moisture content (OMC) = 11.0%, and the maximum dry density = 1.98 t/m^3. At the OMC the degree of saturation = 91%. Determine the greatest dry density that it is possible for this soil to have when the moisture content is 11%. 8

7 a) Explain the Consolidation process with Spring Analogy Mechanism. 6

b) The fallowing results were obtained from an oedometer test on a specimen of saturated clay:

Pressure (kN/m^2)	27	54	107	214	429	214	107	54
Void ratio	1.243	1.217	1.144	1.068	0.994	1.001	1.012	1.024

A layer of this clay 8 m thick lies below a 4 m depth of sand, the water table being at the surface. The saturated unit weight for both soils is 19 kN/m^3. A 4 m depth of fill of unit weight 21 kN/m^3 is placed on the sand over an extensive area. Determine the final settlement due to consolidation of the clay. If the fill were to be removed some time after the completion of consolidation, what would eventually take place due to swelling of the clay? 9

8 a) Draw stress strain relations of dense and loose sand from shear strength tests and explain. 5

b) Define critical void ratio. What is its importance? 5

c) Explain the Different types of failure of Soil specimen during the triaxial test and explain. 5

*****

Code No:**R32011** **R10** **Set No. 3**

III B.Tech II Semester Regular/Supplementary Examinations, May/June - 2015
GEOTECHNICAL ENGINEERING –I
(Civil Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks
Ordinary and Semi-log Graph Papers are to be supplied in the Examination Hall
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1 a) Write detailed note on minerals available in soil. 7

b) A clay sample is found to have a mass of 423.53 g in its natural state. It is then dried in anoven at 105 °C. The dried mass is found to be 337.65 g. The specific gravity of the solids is2.70 and the density of the soil mass in its natural state is 1700 kg/m^3. Determine the watercontent, degree of saturation and the dry density of the mass in its natural state. 8

2 a) Discuss briefly about HRB classification of soils. 7

b) A dried soil of 128.4 gm were subjected to a mechanical analysis and hydrometer analysis together with the following result: Sieve analysis gave the following quantities 8

Retained Sieve	2.00 mm	0.60 mm	0.150 mm	0.075 mm	0.03 mm	0.003 mm
Retained Soil	0	42.1	24.2	16.6	28.3	17.2

Draw the grading curve and classify the material according IS Classification.

3 a) Derive the relation between the superficial velocity of flow to the seepage velocity of the flow. 7

b) The data given below relate to two falling head permeameter tests performed on two different soilsamples:
stand pipe area = 4 cm^2; sample area = 28 cm^2; sample height = 5 cm; initial head in the stand pipe =100 cm and final head = 20 cm; time required for the fall ofwater level in test 1, t = 500 sec and time required for the fall ofwater level in test 2, t = 15 sec.
(i) Determine the values of k for each of the samples. If these two types of soils form adjacentlayers in a natural state with flow (ii) in the horizontal direction, and (iii) flow in the verticaldirection, determine the equivalent permeability for both the cases by assuming that the thickness of each layer is equal to 150 cm. 8

4 a) Write short note on Quick sand condition. Derive the governing differential equation for critical hydraulic gradient. 8

b) What are the different corrections to be made to the phreatic line? And how the same is carriedout. 7

5 a) Derive the governing differential equation for a stress at any point along the center line below the ground with strip load by considering stress at any pint with a point load. 7

Code No: **R32011** **R10** **Set No. 3**

b) Three parallel strip footings (Fig. 1) 3 m wide each and 5 m apart center to center transmit contact pressures of 200, 150 and 100 kN/m^2 respectively. Calculate the vertical stress due to the combined loads beneath the centers of each footing at a depth of 3 m below the base. Assume the footings are placed at a depth of 2 m below the ground surface. Use Boussinesq's method for line loads. 8

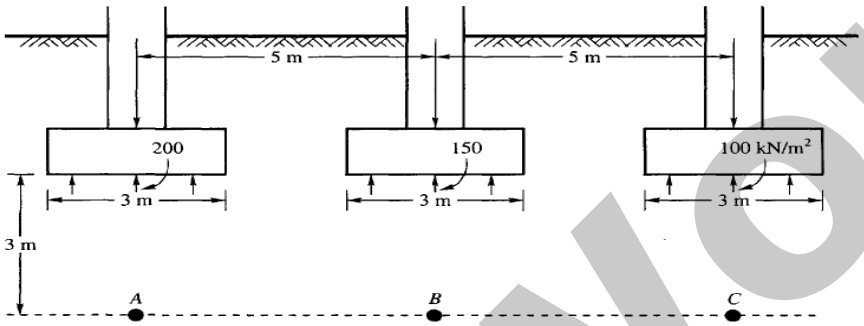

Fig. 1

6 a) What are the factors affecting compaction? Discuss. 6

b) The following results were obtained from a standard compaction test on a soil

Mass (g)	1850	1910	1950	1940	1910
Water Content (%)	14	16	18	20	22

9

The value of G_s is 2.67. Plot the dry density – water content curve and give the optimum water content and maximum dry density? Plot also the curves of 0%, 5% and 10 % air content and give the value of air content at maximum dry density. The volume of the mould is 1000 cm^3

7 a) Define the stress history? What is its importance? Discuss the procedure of estimating the presonsildation pressure given by Casagrande. 8

b) A Normally consolidated clay layer of 10 m thickness has a unit weight of 20 kN/m^3 and specific gravity 2.70. The liquid limit of the clay is 65%. A structure constructed on the clay increase the overburden pressure by 10%. Estimate the ultimate consolidation settlement 7

Code No: **R32011** **R10** **Set No. 3**

8 a) What are the different strength tests available in the laboratory based on drainage conditions. Explain them in detail when do you prefer the corresponding tests by simulating the field conditions? 7

b) The results below were obtained at failure in a series of consolidated undrainedtriaxial tests, with pore water pressure measurement, on specimens of fully saturated clay. Determine the values of the shear strength parameters C^1 and φ^1. If a specimen of the same soil were consolidated under an all round pressure of 250 kN/m^2 and the principal stress difference applied with the all round pressure changed to 350 kN/m^2, what would be the expected value of principal stress difference at failure? 8

Cell Pressure, σ_3 (kN/m^2)	150	300	450
Deviator stress ($\sigma_1 - \sigma_3$) (kN/m^2)	103	202	305
Pore water pressure, u (kN/m^2)	82	169	252

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Code No: **R32011** **R10** **Set No. 4**

III B.Tech II Semester Regular/Supplementary Examinations, May/June - 2015
GEOTECHNICAL ENGINEERING –I
(Civil Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks
Ordinary and Semi-log Graph Papers are to be supplied in the Examination Hall
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	a)	Write short note on Adsorbed water in soil	7
	b)	A partially saturated soil sample has a natural water content of 15% and a bulk unit weight of 20 kN/m^3. Compute the degree of saturation, void ratio and porosity if the specific gravity of solids is 2.7. If subsequently the soil gets submerged compute its unit weight.	8
2	a)	Discuss about the hydrometer analysis test. What are the corrections to be applied to the hydrometer readings? Why?	7
	b)	A 500 g sample of dry soil was used for a combined sieve and hydrometer analysis (152 H typeHydrometer, L =16.3-0.16417R). The soil mass passing through the 75 *fi* sieve = 120 g. Hydrometer analysis wascarried out on a mass of 40 g that passed through the 75 μsieve. The average temperature recordedduring the test was 30°C. Given: G_s = 2.55, C_m(meniscus) = 0.50, C_o = +2.5, η = 8.15 x 10~3 poises. The actual hydrometer reading R = 15.00 after a lapse of 120 min after the start of the test.Determine the particle size D and percent finer P%.	8
3	a)	What is capillary Rise? Derive the equation for the same.	8
	b)	In a falling head permeability test, the time taken for the head to fall from h_1 to h_2 is t. If thetest is repeated with the same initial head h_1, what would be the final head in a time interval of t/2?	7
4	a)	What are Total, neutral and effective stresses? Explain them with an example.	7
	b)	A soil profile consists of a surface layer of sand 6 m thick (γ = 15.8 kN/m^3), an intermediate clay layer 2 m thick (γ_{sat} = 19.75 kN/m^3), and a bottom layer of gravel 4 m thick (γ_{sat} = 21.8 kN/m^3). The water table is at the top of the clay layer. Determine the effective stress at various layers when a surcharge of 100 kN/m^2 is placed at the ground surface	8
5	a)	Discuss about the construction of New marks Influence Chart. What are the uses of New mark's Influence chart?	7
	b)	A long masonry wall footing carries a uniformly distributed load of 200 kN/m 2. If the width of the footing is 4 m, determine the vertical pressures at a depth of 3 m below the (i) center, and (ii) edge of the footing.	8

Code No: **R32011** **R10** **Set No. 4**

6 a) Explain the mechanism of compaction. 6

b) The following results were obtained from a standard compaction test on a soil 9

Mass (g)	1850	1940	1980	1960	1930
Water Content (%)	24	27	29	32	34

The value of G_s is 2.67. Plot the dry density – water content curve and give the optimum water content and maximum dry density? Plot also the curves of 0%, 5% and 10 % air content and give the value of air content at maximum dry density. The volume of the mould is 1000 cm^3

7 a) List the basic assumptions on which Terzaghi's theory of consolidation is based. 6

b) Data obtained from a laboratory consolidation test are tabulated as follows: 9

Test pints	1	2	3	4	5	6
σ' (kPa)	20	50	100	200	400	800
Total ΔH (mm)	0.23	0.87	1.90	3.62	5.55	7.25

G_s = 2.70, H_0 (initial thickness at zero pressure) = 22.5 mm, w = (moisture content at the beginning of the test) = 0.78. Plot the e – logσ' curve and calculate C_c.

8 a) Define Mohr's rupture envelope. Explain the theory of failure on which this line is based. 7

b) Discuss the procedure of conducting direct shear test? What are the results we can estimate from this test? What are its limitations? 8

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Code No: **R32016** **R10** **Set No. 1**

III B.Tech II Semester Regular/Supplementary Examinations, May/June - 2015

Transportation Engineering-II

(Civil Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks
Assume any missing data suitably

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1	a)	What are the ideal requirements of Rail fastenings?	[8]
	b)	What are the locations at which the joints in rails are avoided?	[7]
2	a)	If a sag curve is introduced between down grade of 0.8 % followed by an up gradient of 0.6%, find out the length of parabolic vertical curve, the offsets at every 25m and R.L.s corresponding to various points on the curve. When given the R.L of the ground at sag point is 100m and allowable change of gradient is 0.25.	[10]
	b)	What are the various causes for the derailment of trains?	[5]
3	a)	What are the various parts of turnout?	[8]
	b)	Explain the requirements of a crossing.	[7]
4	a)	Define Interlocking and explain the principle involved in interlocking.	[8]
	b)	Explain Track circuiting.	[7]
5	a)	What is crosswind component? How do you fix the runway orientation if wind direction and wind coverage duration.	[8]
	b)	What are the factors to be considered for the design of taxiway?	[7]
6	a)	Explain briefly about the failures in airfield flexible pavements.	[8]
	b)	What are the special characteristics of an airfield drainage system?	[7]
7	a)	Explain the classification of harbours based on location	[8]
	b)	What are the uses of dry and wet docks? What is the role of ware houses?	[7]
8	a)	What are the differences between wharves and Jetties?	[6]
	b)	What are the different types of buoys used as navigational aids	[4]
	c)	What is Bucket ladder dredger? Explain briefly	[5]

*****

Code No: **R32016** **R10** **Set No. 2**

III B.Tech II Semester Regular/Supplementary Examinations, May/June - 2015

Transportation Engineering-II

(Civil Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks
Assume any missing data suitably

*****

1	a)	What are the functions of Rails? Explain the sleeper density.	[8]
	b)	Explain the concept of creep using percussion theory and explain the method of identifying creep.	[7]
2	a)	What is the use of preliminary survey in railway alignment?	[8]
	b)	Explain the necessity of design of railway track.	[7]
3	a)	What is the role of switches in turnouts? Explain briefly about various types of switches.	[7]
	b)	If an 8^0 curve track diverges from main curve 6^0 in an opposite direction of B.G yard. Calculate speed and super elevation of branch line if the maximum speed permitted on main line is 45kmph.	[8]
4	a)	Bring out the differences between detector locking and Tappet locking.	[8]
	b)	Explain the function and location of Outer signal and Home signal.	[7]
5	a)	What are the different aids available for a pilot during flight journey?	[8]
	b)	What are assumptions made for finding the basic runway length?	[7]
6	a)	What are the special characteristics of an airfield drainage system?	[8]
	b)	Discuss about Rapid runway repair and advanced runway repair systems.	[7]
7	a)	Explain classification of harbors based on utility.	[8]
	b)	What do you understand about the dry and wet docks and write their applications?	[7]
8	a)	Distinguish between lowest and highest astronomical tides.	[8]
	b)	Explain the importance and different types of navigational aids.	[7]

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Code No: **R32016** **R10** **Set No. 3**

III B.Tech II Semester Regular/Supplementary Examinations, May/June - 2015

Transportation Engineering-II

(Civil Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks
Assume any missing data suitably

*****

1	a)	What are the requirements of an ideal joint?	[8]
	b)	What are the advantages and disadvantages of wooden sleepers?	[7]
2	a)	What are the factors to be considered for the selection of good railway alignment?	[8]
	b)	Distinguish between Pusher gradient and Momentum gradients.	[7]
3	a)	What are the different types of switches based on assembling? Explain with the help of neat sketches.	[8]
	b)	Draw a sketch showing various components of a left hand turnout.	[7]
4	a)	What is the necessity and functions of interlocking?	[8]
	b)	Explain automatic Block system.	[7]
5	a)	Find out the corrected basic runway length from the following data. Run way length = 3200m, Altitude above MSL =450m, Airport reference temperature = 42^0C, Effective Gradient = 1.5%.	[8]
	b)	What are the different aids available for a pilot during flight journey?	[7]
6	a)	Explain Burmister method of designing airfield flexible pavement.	[8]
	b)	Discuss about Rapid runway repair and advanced runway repair systems.	[7]
7	a)	Explain the classification of harbours based on location	[8]
	b)	What are the uses of dry and wet docks? What is the role of ware houses?	[7]
8	a)	Distinguish between various tidal terms with the help of a graph.	[8]
	b)	Describe with sketches a composite breakwater.	[7]

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Code No: **R32016** **R10** **Set No. 4**

III B.Tech II Semester Regular/Supplementary Examinations, May/June – 2015

Transportation Engineering-II

(Civil Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks
Assume any missing data suitably

*****

1	a)	What are the different components of permanent way? Explain briefly about the function of each component.	[8]
	b)	Discuss about causes of kinks in rails and their ill effects.	[7]
2	a)	Explain briefly about the use of various types of gradients in railways	[8]
	b)	If an 8^0 curve track diverges from main curve 5^0 in an opposite direction of B.G yard. Calculate speed and super elevation of branch line if the max. Speed permitted on main line is 45kmph.	[7]
3	a)	Explain Facing direction, trailing direction, face point and trail points of turnouts.	[8]
	b)	Explain different types of crossings based on shape.	[7]
4	a)	What are the objectives of signaling in railways?	[5]
	b)	Explain slotting of signals.	[10]
5	a)	Find out the corrected basic runway length from the following data: Run way length = 3000m, Altitude above MSL =400m, Airport reference temperature = 42^0C, Effective Gradient = 1.25%.	[8]
	b)	Explain how an engine failure case affects the basic runway length.	[7]
6	a)	Explain briefly about the factors to be considered in the design of airfield pavements.	[8]
	b)	Explain briefly about the failures in airfield flexible pavements.	[7]
7	a)	Explain the classification of harbours based on location.	[8]
	b)	What are the uses of dry and wet docks? What is the role of ware houses?	[7]
8	a)	Distinguish between lowest and highest astronomical tides.	[8]
	b)	Describe with sketches a composite breakwater.	[7]

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Code No: **R32012** **R10** **Set No. 1**

III B.Tech II Semester Regular/Supplementary Examinations, May/June - 2015
WATER AND WASTE WATER ENGINEERING
(Civil Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks
*****

1 a) What do you understand by the term 'per capita demand'? How total quantity of water required by a town is estimated. 7

b) Population of a town as obtained from the census reports is as follows : 8

Year	1950	1960	1970	1980	1990	2000	2010
Population	24831	25293	25423	27263	38284	49909	67105

Estimate the population expected by 2020 by Incremental Increase method

2 a) Explain merits and demerits of surface sources of water supply. 7

b) What is a River Intake? What are the factors which govern the location of a intake structure on a river. 8

3 a) Prove that theoretically the surface loading Q/A and not the depth is a measure of effective removal of particles in a sedimentation tank. 8

b) What are the objectives of adding alum? 3

c) Calculate kilograms of alum needed per day if alum dosage is 30 mg/l and the flow is 20×10^6 l/d. 4

4 a) Explain theory of Filtration as used in the purification of water. Sketch and describe an outlet for a slow sand filter. 8

b) What do you understand by the term disinfection of water? Why it is necessary to disinfect the water for public water supply schemes? What should be the requirements of a good disinfectant? 7

5 a) State the merits and demerits of (i) separate system of sewage and (ii) combined system of sewage. 7

b) What are the characteristics of sewage? How various constituents of sewage influence these characteristics? 8

6 a) Draw a neat sketch of a drop manhole and indicate where it is used. 7

b) Enumerate the two general methods adopted for sewage disposal and discuss their merits and demerits explaining the conditions favorable for their adoption. 8

7 a) With a neat sketch explain the function Detritus tank. 7

b) Write explanatory note on "High Rate Trickling Filter". 8

8 a) Explain Aerobic Sludge digestion and mention factors controlling digestion. 8

b) With a neat sketch explain the function of soak pit. 7

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Code No: **R32012** **R10** **Set No. 2**

III B.Tech II Semester Regular/Supplementary Examinations, May/June - 2015
WATER AND WASTE WATER ENGINEERING
(Civil Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks
*****

1 a) What are the various factors which directly affect the per capita demand of a town? What do you understand by the term fluctuations in water demand? 7

b) The population statistics pertaining to a town were given below. Estimate the population expected in 2020 by Arithmetical Increase method. 8

Year	1970	1980	1990	2000	2010
Population	70,000	1,00,000	1,50,000	2,00,000	2,40,000

2 a) What factors should be considered while selecting site of an Impounding reservoir. 8

b) What are Intake towers? Differentiate between Dry Intake and Wet Intake. 7

3 a) Explain the process of Sedimentation in the treatment of water. Discuss the difference between Plain sedimentation and Coagulation. 8

b) Write a short note on (i) Alum as coagulant and (ii) Clariflocculator 7

4 a) Draw a neat sketch of a Rapid Gravity Filter and describe how it works? 8

b) What are the various methods of disinfecting water? State the theory of disinfection of water by chlorine. 7

5 a) Describe the conservancy and water carriage system of sanitation. In new developing town which method you will prefer and why? 7

b) If 2.5 ml of raw sewage have been diluted to 250 ml and the D.O concentration of the diluted sample at the beginning was 8.0 mg/l and 50 mg/l after 5 days incubating at $20^{o}C$, find the BOD of raw sewage. 8

6 a) Draw a neat sketch of a Manhole and indicate where it is used. 7

b) What are the factors affecting Self purification of polluted streams. 8

7 a) What are design considerations for a Grit Chamber? 7

b) With the help of a neat sketch explain Activated Sludge Process. 8

8 a) Explain with a neat sketch, the details of Oxidation pond. 8

b) Explain with a neat sketch, the details of Two stage Rate Digester. 7

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Code No: **R32012** **R10** **Set No. 3**

III B.Tech II Semester Regular/Supplementary Examinations, May/June - 2015
WATER AND WASTE WATER ENGINEERING
(Civil Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks
*****

1 a) Write a short note on provision for fire demand in water supply 7

b) Estimate the future population of a town in 2021, given 8

Year	1961	1971	1981	1991	2001	2011
Population	3,50,000	4,66,000	9,95,000	15,60,000	16,30,000	18,40,000

Justify the method you have adopted.

2 a) Discuss the merits and demerits of rive water sources and ground water sources for the water supply scheme of a town. 8

b) With a neat sketch explain functioning of Canal Intake. 7

3 a) Explain the functioning of a Plain Sedimentation tank in water treatment plant. 8

b) What is the necessity of using Coagulants in Sedimentation? What are the various chemical coagulants which are commonly used in Coagulation process? How they remove suspended impurities? 7

4 a) Describe with a neat sketch the working of a Pressure filter. What are the relative merits and demerits of Pressure filters over Gravity filters? 7

b) Write a note on (i) free available chlorine and (ii) Break point chlorination. 8

5 a) Discuss the comparative merits and demerits of the separate system and combined system of sewage. 7

b) Calculate 1-day 37^{o}C BOD of sewage sample whose 5-day 20^{o}C BOD is 100 mg/l. 8

6 a) Draw a neat sketch of Inverted syphon and indicate where it is used. 7

b) What do you understand by Self purification of a stream? Explain the factors affecting this property. 8

7 a) Write a note on Skimming Tanks and indicate where it is used. 7

b) Explain different aeration practices in Activated Sludge Process viz (i) Tapered Aeration (ii) Step aeration and (iii) Extended aeration. 8

8 a) What is sludge digestion? What are the two basic types of sludge digestion units? 8

b) Explain the functioning of Imhoff tank. 7

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Code No: **R32012** **R10** **Set No. 4**

III B.Tech II Semester Regular/Supplementary Examinations, May/June - 2015
WATER AND WASTE WATER ENGINEERING
(Civil Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks
*****

1 a) Explain the different methods of forecasting future population of a city for which a water supply scheme is to be planned. 7

b) The population statistics pertaining to a town are given below. Estimate the population expected by 2020 by Geometrical Increase method 8

Year	1970	1980	1990	2000	2010
Population	90,000	1,20,000	1,75,000	2,10,000	2,65,000

2 a) Compare and contrast Surface and Subsurface sources of water supply. 7

b) With a neat sketch explain functioning of Infiltration Gallery. 8

3 a) Explain the Sedimentation process used in a water treatment plant. 7

b) Determine the quantity of alum required in order to treat 13 million litres of water per day at a treatment plant, where 12 ppm of alum dose is required. 8

4 a) Explain clearly how does a rapid gravity filter differ in its action from a slow sand filter. What are the merits and demerits for the rapid sand filters as compared with slow sand filters? 8

b) What do you understand by Super chlorination? What are the various methods of chlorination? 7

5 a) What is partially combined system of sewage? Why it is considered most suitable for Indian conditions/ 7

b) A 2% solution of a sewage sample is incubated for 5 days at 20^{o}C. The depletion of oxygen was found to be 4 ppm. Determine the BOD of the sewage. 8

6 a) Write a note on Automatic flush tank. 7

b) Explain the importance of study of re-oxygenation and de-oxygenation in problems of stream sanitation. 8

7 a) Write a note on Grit Chambers and indicate where it is used. 7

b) With the help of a neat sketch explain functioning of Trickling filter in waste water treatment. 8

8 a) Explain with a neat sketch working of High Rate Digester. Compare and contrast Standard rate digester and High rate digester. 8

b) Write a note on Sludge drying beds. 7

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Code No: **R32014** **R10** **Set No. 1**

III B.Tech II Semester Regular/Supplementary Examinations, May/June - 2015

WATER RESOURCES ENGINEERING-II

(Civil Engineering)

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

Answer any FIVE Questions

All Questions carry equal marks

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1	a)	Explain briefly about silt extractor and silt ejector?	7
	b)	Describe in brief various types of weirs. Distinguish clearly between a weir and a barrage.	8
2	a)	Explain various types of reservoirs. What do you understand by multipurpose reservoir?	8
	b)	What do you understand by mass inflow curve and how is it prepared?	7
3	a)	Write a note on foundation problems for dams and their remedies.	7
	b)	Explain the method of stability analysis of u/s slope during sudden drawdown.	8
4	a)	What do you understand by galleries and what are the functions of galleries?	7
	b)	What are the remedial measures would you undertake to control the seepage through the dam foundation?	8
5	a)	What is a spillway? What are its functions? Enumerate various types of spillways.	7
	b)	What do you understand by a fall in a canal? Why it is necessary? How do you select its location?	8
6	a)	Explain why trapezoidal notches are preferred to rectangular notches in the design of canal drops.	7
	b)	Compute the discharge over an ogee spillway with a coefficient of discharge C=2.5 at a head of 4m.The effective length of the spillway is 100m.Neglect the velocity of approach.	8
7	a)	What is meant by "canal regulation" and what are the functions of a 'Distributary head regulator' and a 'Cross regulator' in a canal project?	8
	b)	Define sensitivity of an outlet. Find the relation between sensitivity and flexibility of an outlet.	7
8	a)	Write short notes on: (i) Syphon (ii) Super passage (iii) Syphon aqueduct.	8
	b)	What do you understand by level crossing? State briefly the conditions under which it is used.	7

Code No: **R32014** **R10** **Set No. 2**

III B.Tech II Semester Regular/Supplementary Examinations, May/June - 2015

WATER RESOURCES ENGINEERING-II

(Civil Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks

*****

1	a)	Explain the procedure for the design of a vertical drop weir.	7
	b)	Explain Khosla's method of independent variables. How do you apply corrections for (i) thickness of floor (ii) interference of piles?	8
2	a)	Explain how you would determine safe yield from a reservoir of a given capacity.	8
	b)	Discuss various methods of reservoir sediment control.	7
3	a)	Distinguish between a low gravity dam and high gravity dam. Derive the expression used for such a distinction.	8
	b)	What do you understand by the elementary profile of a gravity dam? Derive expressions for determining base width of such a dam based on (i) stress criterion and (ii) sliding criterion.	7
4	a)	Define and explain the term phreatic line in earthen dams. Explain the importance of seepage through earthen dams.	8
	b)	What are the remedial measures would you undertake to control the seepage through earthen dam body?	7
5	a)	Explain the design procedure for the standard stilling basin type I.	7
	b)	Write a note on Notch type fall.	8
6	a)	Enumerate the various types of spillways and describe in details the most widely used.	7
	b)	Discuss the comparative merits and demerits of Notch falls and Sarda type falls.	8
7	a)	What do you understand by a head regulator? State functions of a distributary head regulator and a cross regulator.	8
	b)	Write a note on selection of suitable type of cross-drainage works.	7
8	a)	What do you understand by flexibility of an outlet? Derive an expression for the same.	7
	b)	Differentiate between (i) syphon aqueduct and canal syphon, (ii) aqueduct and super passage.	8

Code No: **R32014** **R10** **Set No. 3**

III B.Tech II Semester Regular/Supplementary Examinations, May/June - 2015

WATER RESOURCES ENGINEERING-II

(Civil Engineering)

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

Answer any FIVE Questions

All Questions carry equal marks

*****

1 a) Write short notes on the following: (i) fish ladder (ii) divide wall (iii) under sluices. 7

b) Design a vertical drop weir, using Bligh's theory for the following data: 8

(i) Maximum flood discharge = 1200 cumecs
(ii) HFL before construction of weir = 172.5 m
(iii) River bed level = 168 m
(iv) FSL of canal = 171.5 m
(v) Allowable afflux = 1 m
(vi) Coefficient of creep = 11

Assume any other data not given. The weir wall need not be designed and its dimensions may be taken as follows: (i) top width = 3m (ii) bottom width = 6 m.

2 a) Explain in brief various investigations required for reservoir planning. 8

b) What do you understand by demand curve? Explain the method of calculating reservoir capacity for a specific yield, from the mass inflow curve. 7

3 a) What do you understand by gravity dam? Explain various forces that act on a gravity dam. 7

b) Discuss in brief the USBR recommendations for determining uplift pressure under the base of a dam, provided with a drainage gallery. 8

4 a) What are the criteria for safe design of earth dam? 7

b) Explain the method of stability analysis of d/s slope during steady seepage. 8

5 a) What are canal falls and why are they constructed? 7

b) How would you compute the discharge passing over an ogee spillway? Discuss the various factors affecting the coefficient of discharge in the discharge equation. 8

6 a) Discuss briefly the various types of energy dissipaters that are used for energy dissipation below overflow spillways, under different relative positions of T.W.C. and J.H.C. 8

b) Explain the procedure of designing straight glacis fall. 7

7 a) Distinguish clearly between non-modular and semi-modular outlets. Give examples. 8

b) Explain the procedure for designing the head regulator of a distributary. 7

8 a) Write short notes on: (i)Aqueduct (ii)Canal Syphon (iii)Level Crossing 7

b) Discuss with neat sketches, the three different types of aqueducts which can possibly be constructed depending upon the size of the drainage to be passed below the canal. Also discuss the factors governing the choice of any of these three types of aqueducts. 8

Code No: **R32014** **R10** **Set No. 4**

III B.Tech II Semester Regular/Supplementary Examinations, May/June - 2015

WATER RESOURCES ENGINEERING-II

(Civil Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks

*****

1	a)	Discuss in brief various causes of failure of weirs and their remedies.	7
	b)	What is meant by scour? What precautions do you take against it in weir design?	8
2	a)	Define the following: (i) surcharge storage (ii) valley storage (iii) safe yield and (iv) secondary yield.	8
	b)	Explain in brief various investigations required for reservoir planning.	7
3	a)	Explain how you account for earthquake effects in the design of a gravity dam.	7
	b)	Explain the method of determining the principal and shear stresses in a gravity dam.	8
4	a)	Discuss in brief the causes of failure of earth dams.	8
	b)	Explain with the help of a sketch, the components of a zoned embankment dam, with their functions	7
5	a)	What is a 'spillway gate' and what are the merits and demerits of installing such gates?	7
	b)	What are spillways and where are they provided? Write short notes on Ogee-shaped spillway.	8
6	a)	Discuss briefly the components of various types of falls with neat sketches. Also discuss the stability of each type.	8
	b)	Explain the procedure of designing Sarda type fall.	7
7	a)	Describe the necessity and functioning of a 'Distributary head regulator' and a 'Cross regulator' in a canal project.	8
	b)	What is meant by the terms 'flexibility',' proportionality', 'setting' and 'sensitivity' as applied to modules.	7
8	a)	Classify aqueducts and explain under what circumstances each one is used.	8
	b)	Describe with the help of sketches various types of cross-drainage works.	7

Code No: **R32015** **R10** **Set No. 1**

III B.Tech II Semester Regular Examinations, May/June - 2015
DESIGN & DRAWING OF CONCRETE STRUCTURES-II
(Civil Engineering)

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

Answer any ONE question from PART-A
and THREE questions from PART-B
Use of IS: 456-2000 and design charts from SP-16 is allowed.

*****

PART-A

1 Design the typical interior panel of a flat slab floor of size 5.5m x 5.5m with suitable drop to support a live load of 5kN/m^2.The floor is supported by columns of size 550mm x 550mm.Use M20 grade and Fe 415 steel .Sketch the reinforcement details by showing cross sections. 30

2 Design a combined rectangular footing to support two columns of size 450 x 450 mm spaced 4.5 m apart carrying axial loads of 850kN and 950kN respectively. The SBC of soil is 200 kN/m^2. Adopt M20 concrete and Fe 415 steel. Sketch the reinforcement details. 30

PART-B

3 a) Write the characteristics of high tensile steel and high strength concrete. 10
b) Write about the historic development of pre stressed concrete. 5

4 a) List the various types of tensioning devices used in pre stressed concrete. 6
b) Distinguish between pre tensioning and post tensioning. 9

5 a) Mention the various losses of pre stress 3
b) A pre tensioned beam 550 mm wide and 900 mm deep is pre stressed by 16 wires each of 12mm diameter initially stressed to 1400 N/mm^2 with their centroids located 150 mm from the soffit. Estimate the final percentage loss of stress due to elastic deformation, creep, shrinkage and relaxation using the following data: 12
Relaxation of steel stress = 90 N/mm^2
Es =210 kN/mm^2, E_C = 35 kN/mm^2
Creep coefficient = 1.6
Residual shrinkage strain = 3 x 10^{-4}.

6 A concrete beam of symmetrical I section spanning 9m has flange width and thickness 220mm and 70mm,respectively.The overall depth of the beam is 450mm.The thickness of the web is 80mm.The beam is pre stressed by a parabolic cable with an eccentricity of 25mm at the centre and zero at the supports with an effective force of 200kN.The live load on the beam is 3kN/m. Draw the distribution diagram at the central section for 15
(i) pre stress + self weight
(ii) pre stress +self weight +live load. Take density of concrete as 24 kN/m^3.

Code No: **R32015** **R10** **Set No. 1**

7 a) What are the various methods generally used for the investigation of anchorage zone stresses? 6

b) The horizontal pressure at the centroid of a concrete beam of rectangular cross section 220mm x 460mm is 10N/mm^2 and the maximum shearing force on the beam is 100kN. Calculate the maximum principle tensile stress. What is the minimum vertical prestress required to eliminate the principal tensile stress? 9

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Code No: **R32015** **R10** **Set No. 2**

III B.Tech II Semester Regular Examinations, May/June - 2015
DESIGN & DRAWING OF CONCRETE STRUCTURES-II
(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) Design the typical interior panel of a flat slab floor of size 6.5m x 6.5m with suitable drop to support a live load of 6kN/m^2.The floor is supported by columns of size 500mm x 500mm.Use M20 grade and Fe 415 steel .Sketch the reinforcement details by showing cross sections. 30

2 a) Design a combined rectangular footing to support two columns of size 550 x 550 mm spaced 5.5 m apart carrying axial loads of 950kN and 1050kN respectively. The SBC of soil is 200 kN/m^2. Adopt M20 concrete and Fe 415 steel. Sketch the reinforcement details. 30

PART-B

3 a) Write the advantages and limitations of pre stressed concrete. 7

b) Differentiate pre stressed beam with reinforced concrete beam. 8

4 Explain with sketches Hoyer's long line system of pretensioning. 15

5 a) Mention the various losses of prestress. 3

b) A pre tensioned beam 600 mm wide and 900 mm deep is pre stressed by 12wires each of 12mm diameter initially stressed to 1200 N/mm^2 with their centroids located 100 mm from the soffit. Estimate the final percentage loss of stress due to elastic deformation, creep, shrinkage and relaxation using the following data: 12
Relaxation of steel stress = 90 N/mm^2
Es =210 kN/mm^2, E_C = 35 kN/mm^2
Creep coefficient = 1.6
Residual shrinkage strain = 3 x 10^{-4}

6 a) A concrete beam of symmetrical I section spanning 9m has flange width and thickness 200mm and 50mm,respectively.The overall depth of the beam is 420mm.The thickness of the web is 60mm.The beam is pre stressed by a parabolic cable with an eccentricity of 15mm at the centre and zero at the supports with an effective force of 100kN.The live load on the beam is 2kN/m. Draw the distribution diagram at the central section for 15
(i)pre stress + self weight
(ii)pre stress +self weight +live load
Take density of concrete as 24kN/m^3

7 a) What is Pressure Thrust line? Explain its significance with sketches.

b) A pre stressed concrete beam 300mm x 600mm in section has a span of 7m and is subjected to uniformly distributed load of 20kN/m including the self weight of the beam. The pre stressing tendons which are located along the longitudinal centroidal axis provide an effective pre stressing force of 900kN. Determine the extreme fibre stresses in concrete at the mid span section.

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Code No: **R32015** **R10** **Set No. 3**

III B.Tech II Semester Regular Examinations, May/June - 2015
DESIGN & DRAWING OF CONCRETE STRUCTURES-II
(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 the interior panel of a flat slab 5.6m x 5.6m in size for a super imposed load of 7.9kN/m^2. Provide two way reinforcement. Use M20 concrete and Fe 415 steel. 30

2 Two reinforced concrete columns 400m x 400mm in section carry a point load of 900kN each, inclusive of self weight .Design a combined footing having a central beam joining the columns. The centre to centre spacing of the columns is 4metres.The safe bearing capacity of the soil is 150kN/m^2.Use M20 and Fe 415 steel. Sketch the details. 30

PART-B

3 a) Write about pre tensioning and post tensioning 6

b) Write the characteristics of high tensile steel and high strength concrete. 9

4 Explain with sketches Magnell's system of posttensioning. 15

5 a) Mention the various losses of pre stress 3

b) A pre tensioned beam 500 mm wide and 800 mm deep is pre stressed by 10wires each of 10mm diameter initially stressed to 1000 N/mm^2 with their centroids located 100 mm from the soffit. Estimate the final percentage loss of stress due to elastic deformation, creep, shrinkage and relaxation using the following data: 12

Relaxation of steel stress = 90 N/mm^2
Es =210 kN/mm^2, E_C = 35 kN/mm^2
Creep coefficient = 1.6
Residual shrinkage strain = 3 x 10^{-4}

6 A concrete beam of symmetrical I section spanning 8m has flange width and thickness 220mm and 60mm,respectively.The overall depth of the beam is 400mm.The thickness of the web is 40mm.The beam is pre stressed by a parabolic cable with an eccentricity of 15mm at the centre and zero at the supports with an effective force of 120kN.The live load on the beam is 2kN/m. Draw the distribution diagram at the central section for 15
(i)pre stress + self weight
(ii)pre stress +self weight +live load
Take density of concrete as 24kN/m^3

7 a) What is Pressure Thrust line? Explain its significance with sketches.

b) What are the different types of flexural modes observed in pre stressed concrete beams? Explain with sketches.

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Code No: **R32015** **R10** **Set No. 4**

III B.Tech II Semester Regular Examinations, May/June - 2015
DESIGN & DRAWING OF CONCRETE STRUCTURES-II
(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 the interior panel of a flat slab 6m x 6m in size for a super imposed load of 9kN/m^2. Provide two way reinforcement. Use M20 concrete and Fe 415 steel. 30

2 Two reinforced concrete columns 450m x 450mm in section carry a point load of 1000kN each, inclusive of self weight. Design a combined footing having a central beam joining the columns. The centre to centre spacing of the columns is 5metres.The safe bearing capacity of the soil is 200kN/m^2.Use M20 and Fe 415 steel. Sketch the details. 30

PART-B

3 a) Write about pre tensioning and post tensioning. 6
b) What are the characteristics of high tensile steel and high strength concrete? 9

4 Explain with sketches Freyssinet's system of post tensioning 15

5 a) Mention the various losses of pre stress 3
b) A pre tensioned beam 550 mm wide and 900 mm deep is pre stressed by 12wires each of 12mm diameter initially stressed to 1200 N/mm^2 with their centroids located 120 mm from the soffit. Estimate the final percentage loss of stress due to elastic deformation, creep, shrinkage and relaxation using the following data: 12
Relaxation of steel stress = 90 N/mm^2
Es =210 kN/mm^2, E_C = 35 kN/mm^2
Creep coefficient = 1.6
Residual shrinkage strain = 3 x 10^{-4}

6 A concrete beam of symmetrical I section spanning 10m has flange width and thickness 300mm and 60mm,respectively.The overall depth of the beam is 450mm.The thickness of the web is 45mm.The beam is pre stressed by a parabolic cable with an eccentricity of 15mm at the centre and zero at the supports with an effective force of 150kN.The live load on the beam is 3kN/m. Draw the distribution diagram at the central section for 15
(i) pre stress + self weight
(ii) pre stress +self weight +live load. Take density of concrete as 24kN/m^3.

7 a) How do you estimate the ultimate shear strength of pre stressed concrete section with web shear cracks? 6
b) Explain the concept of load balancing in pre stressed concrete members. 9

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Code No: **R32013** **R10** **Set No. 1**

III B.Tech II Semester Regular/Supplementary Examinations, May/June - 2015
DESIGN & DRAWING OF STEEL STRUCTURES
(Civil Engineering)

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

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

*****

PART-A

1 a) A column is made of one ISHB 300 @ 58.8 kg/m and one plate 400mm ×12mm symmetrically placed on each flange. The column thus measures 324mm × 400mm overall dimensions. The column carries an axial load of 1800kN. The column is to be provided with a gusseted base resting on concrete base. Design the gusseted base giving full details of the connections. Take safe compressive stress on concrete as 30MPa. [15]

b) Draw to Scale the elevation and plan [15]

2 a) Design a gantry girder for an industrial building to carry an electric overhead traveling crane with the following data. Crane capacity is 300 kN. Weight of crane excluding crab is 200 kN. Weight of crab is 5 kN. Span of crane between rails is18 m. Minimum hook approach is1.0 m. Wheel base is 3.0 m. Span of gantry girder is 9 m. Weight of rail section is 30 kg/m. [15]

b) Draw to Scale the longitudinal and cross sections. [15]

PART-B

3 A tension member consisting of two channel sections 200mm × 75mm @22.1 kg/m back to back is to be connected to gusset plate. Design the welded joint for the condition that the section is loaded to its full strength. Take A= 3000 sq.mm. Thickness of the flange is 11.4mm and the thickness of the web is 6.1mm. Take the safe stress in the weld material equal to110 N/mm^2. Take the safe stress in axial tension equal to150 N/mm^2. [15]

4 Explain the difference in performance of laterally unrestrained beams and restrained beams with neat diagrams. Explain design procedure [15]

5 The main tie of a building roof truss has to carry a maximum axial tension of 200kN. Design a suitable section for the member as per IS specifications. Design the section as two angles placed back to back of a gusset plate. [15]

6 Design a suitable section for a column to carry an axial load of 350kN. The column is 4m long and is fixed in position as well as direction at one end and fixed in position at the other end. [15]

7 Angle of slope of a roof truss is 26^0. The average height of roof above ground is 12m and the building is situated in Delhi. Find wind pressures for different permeabilities to be considered for the design of roof truss. Basic wind pressure is 140 kg/m^2. [15]

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Code No: **R32013** **R10** **Set No. 2**

III B.Tech II Semester Regular/Supplementary Examinations, May/June - 2015
DESIGN & DRAWING OF STEEL STRUCTURES
(Civil Engineering)

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

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

PART-A

1 a) Design the web and flanges of a plate girder for an effective span of 18m if the dead and live loads amount to 35 kN and 50kN respectively. Check the suggested section for web stiffness. [15]

b) Draw to Scale the Cross section and Longitudinal section. [15]

2 a) A column in an industrial building has to carry a total load axial load of 1500kN. Its length is 5.25m.and is effectively restrained in position as well as direction at both the ends. Design a double I section for the column. Design a single lacing system for the column. [15]

b) Draw to Scale the plan and elevation. [15]

PART-B

3 A beam of clear span 15meters has a bearing of 300mm at each end. It has to carry a superimposed load of 100kN/m Design the section as a plated beam assuming that only 12mm mild steel plates are available. The top flange of the plated beam may be assumed to be laterally restrained at 3m c/c. also calculate the theoretical and actual points of cut off for the plates used. [15]

4 Design a tension member using two angle sections to carry 180kN when both angles are connected (i) on both sides of the gusset plate and [8]
(ii) on the same side of the gusset plate. [7]

5 What is a slab base? Explain various features of a column base with neat sketches. Describe procedure for designing a slab base [15]

6 Explain with neat sketches the functioning of a crane girder and the effect of the movement on the gantry girder. What are impact forces and how they are included in the design? [15]

7 Angle of slope of a roof truss is 28^0. The average height of roof above ground is 10m and the building is situated in Delhi. Find wind pressures for different permeabilities to be considered for the design of roof truss. Basic wind pressure is 150 kg/m^2. [15]

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Code No: **R32013** **R10** **Set No. 3**

III B.Tech II Semester Regular/Supplementary Examinations, May/June - 2015
DESIGN & DRAWING OF STEEL STRUCTURES
(Civil Engineering)

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

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

PART-A

1 a) A column is made of one ISHB 300 @ 58.8 kg/m one plate 400mm × 12mm symmetrically placed on each flange. The column thus measures 324mm × 400mm overall dimensions. The column carries an axial load of 2000kN. The column is to be provided with a base plate resting on concrete base. Design the base plate giving full details of the connections. Take safe compressive stress on concrete as 30MPa. [15]

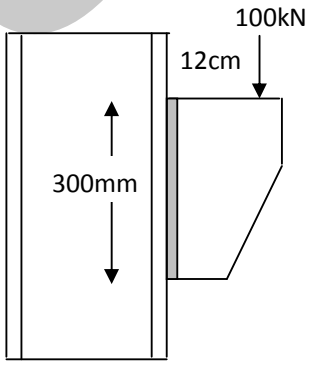
b) Draw to Scale the plan and elevation. [15]

2 a) Design the central section of a plate girder for an effective span of 15m if the dead and live loads amount to 25 kN and 50kN respectively. [15]

b) Draw to Scale the Cross section and Longitudinal section. [15]

PART-B

3 A plate bracket carrying a load of 100 kN at an eccentricity of 120mm is connected to the face of the steel stanchion by fillet welds on both sides of the plate, as shown in figure. Determine the size of the fillet weld 'a' if 8mm fillet weld is used to determine the depth of the bracket 'b'. If 8mm fillet weld is used with a bracket of 250mm depth, calculate the resulting stress in the weld. [15]



4 Design a beam of effective span 5m and carrying a uniformly distributed load of 25 kN / m for the whole length. Compression flange of the beam is laterally restrained against buckling throughout the length. [15]

Code No: **R32013** **R10** **Set No. 3**

5 a) What is tension member? Explain various modes of failure of a tension member. [5]

b) Design a C section to act as a tension member carrying an axial tension of 220 kN. Check the suggested section for slenderness ratio. [10]

6 Explain with neat sketches the development of longitudinal and lateral forces on the gantry girder section while the crab is moving on the crane girder. How these forces are taken care of in case of both electrical overhead crane and manually operated cranes. [15]

7 Explain **i)** Low permeability [5]

ii) Medium permeability [5]

iii) High permeability incorporated in calculation of wind pressure on trusses. [5]

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Code No: **R32013** **R10** **Set No. 4**

III B.Tech II Semester Regular/Supplementary Examinations, May/June - 2015
DESIGN & DRAWING OF STEEL STRUCTURES
(Civil Engineering)

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

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

PART-A

1 a) Design a gantry girder for an industrial building to carry an hand operated overhead traveling crane with the following data. Crane capacity is 250 kN. Weight of crane excluding crab is 200 kN. Weight of crab is 5 kN. Span of crane between rails is18 m. Minimum hook approach is1.0 m. Wheel base is 3.0 m. Span of gantry girder is 9 m. Weight of rail section is 30 kg/m. Check the suggested section for bending stresses. [15]

b) Draw to Scale the Cross section and Longitudinal section [15]

2 a) A column in an industrial building has to carry a total load axial load of 1200kN. Its length is 4.5m.and is effectively restrained in position as well as direction at base and fixed in position and free in direction at top. Design a double I section for the column. Design battens system for the section. [15]

b) Draw to Scale the plan and elevation. [15]

PART-B

3 a) Design a suitable section for a beam of effective span 6m and carrying a superimposed load of 30 kN/m including its self weight. Assume that the compression flange is fully restrained against lateral buckling. Apply necessary checks. [15]

4 a) Draw various probable cross sections of a typical tension member. Discuss relative merits. What are various conditions where a structure is subjected to tensile loads? [7]

b) Explain the difference in performance of laterally unrestrained beams and restrained beams with neat diagrams. Explain design procedure. [8]

5 What is a slab base? Explain various features of a column base with neat sketches. Describe procedure for designing a slab base. [15]

6 Define a welded connection. What are the different types of welded connections and how are they classified? Draw neat sketches. [15]

Code No: **R32013** **R10** **Set No. 4**

7 A pitched roof is to be provided for a workshop of effective span of 12m. The trusses are spaced at 4 center to center and purlins at 2m center to center. The pitch of the roof is 26 degrees. The weight of roofing materials is 16.2 kg/m^2 and normal wind pressure is 140 kg/m^2. Design I section purlin for the roof considering permissible bending stress as 1650 kg/cm^2. [15]

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Code No:**R32011** **R10** **Set No. 1**

III B.Tech II Semester Regular/Supplementary Examinations, May/June - 2015
GEOTECHNICAL ENGINEERING –I
(Civil Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks
Ordinary and Semi-log Graph Papers are to be supplied in the Examination Hall
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1 a) Write short note on formation of soils 7

b) A sample of sand above the water table was found to have a natural moisture content of15% and a unit weight of 18.84 kN/m^3. Laboratory tests on a dried sample indicatedvalues of e_{min} = 0.50 and e_{max} =0.85 for the densest and loosest states respectively.Compute the degree of saturation and the relative density. Assume G_s = 2.65. 8

2 a) Write briefly about the Liquid limit test conducted in the laboratory. 7

b) During the determination of the shrinkage limit of a sandy clay, the following laboratorydata was obtained:

Wet weight of soil + dish = 87.85 g
Dry weight of soil + dish = 76.91 g
Weight of dish = 52.70 g
The volumetric determination of the soil pat:
Weight of dish + mercury = 430.8 g
Weight of dish = *244.62 g* 8

Calculate the shrinkage limit, assuming G_s = 2.65

3 a) In a falling head permeability test, if the time intervals for the head to fall from h_1 to h_2 and h_2 to h_3 are same. Show that the h_2 is the geometrical mean of h_1 and h_3. ($h_2 = \sqrt{h_1 * h_3}$) 7

b) A soil strata consists of 3 layers of thickness 1 m , 1,5 m and 1.9m having the coefficients of permeability of 2.3 X 10^{-3} cm/s, 1.85 X 10^{-3} and 3.5 X 10^{-4} cm/s respectively. Estimate the average coefficient of permeability in the direction. (i) parallel and (ii) normal to the flow. 8

4 a) What are the specifications of soil used as filters? Why these specifications are required. 7

b) A stratum of sand 2.5 m thick overlies a stratum of saturated clay 3 m thick. The water table is 1 m below the surface. For the sand, G_s = 2.65, e = 0.50 and for the clay G_s = 2.72, e = 1.1. Calculate the total and effective vertical stresses at depths of 1 m, 2.5 m and 5.5 m below the surface assuming that the sand above the water table is completely dry. 8

Code No: **R32011** **R10** **Set No. 1**

5 a) Derive the governing differential equation for a stress at any point below the ground with line load by considering stress at any pint with a point load. 8

b) A rigid footing of 3 m diameter carries a column load of 1500 kN at foundation level. Compute the increase in stress due to the column load at a radial distance of 5 m and vertical downward from foundation level of 2m. 7

6 a) Briefly discuss about the effect of Compaction of Engineering Properties 6

b) The following results were obtained from a standard compaction test on a soil

Mass (g)	2010	2092	2114	2100	2055
Water Content (%)	12.8	14.5	15.6	16.8	19.2

The value of G_s is 2.67. Plot the dry density – water content curve and give the optimum water content and maximum dry density? Plot also the curves of 0%, 5% and 10 % air content and give the value of air content at maximum dry density. The volume of the mould is 1000 cm^3 9

7 a) Briefly explain any one method to compute the coefficient of consolidation. 7

b) In an oedometer (consolidation) test a specimen of saturated clay 20 mm thick reaches 50% consolidation in 30 min. How long it will take a layer of this clay 5 m thick to reach 90 % of the consolidation under the same stress and drainage conditions? How long would it take the layer to reach 50 % consolidation? 8

8 a) What are the different types tri-axial compression tests are available based on drainage conditions. Explain them in brief. 7

b) Pore pressure measurements were made during undrained tri-axial tests on samples of compacted fill material from an earth dam after saturating them in the laboratory. The results were as follows.

Property Measured (kN/m^3)	I Test	II Test
Lateral Earth Pressure	150	550
Total Vertical Pressure	450	1250
Pore Water Pressure	35	112

Determine the apparent cohesion and the angle of shearing resistance as referred to (i) Total Stress and (ii) Effective stress. 8

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Code No: **R32011** **R10** **Set No. 2**

III B.Tech II Semester Regular/Supplementary Examinations, May/June - 2015
GEOTECHNICAL ENGINEERING –I
(Civil Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks
Ordinary and Semi-log Graph Papers are to be supplied in the Examination Hall
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1 a) What are the different structures of clay minerals are available? Discuss them. 7

b) An undisturbed sample of soil has a volume of 29 cm^3 and weighs 48 g. The dry weight ofthe sample is 32 g. The value of G_s = 2.66. Determine the (i) natural water content, (ii) insitu void ratio, (iii) degree of saturation, and (iv) saturated unit weight of the soil. 8

2 a) Define Consistency Limits? Why they are required to find in geotechnical Engineering? What are they? 7

b) Liquid limit test on a given sample gave the following values

Water Content (%)	47.5	49.5	51.9	53.9
Number of Blows	38	27	20	43

Plot the values on semi log-sheet and determine the liquid limit and flow index. 8

3 a) What are the limitations of Darcy's Law? Explain the concept of flow of water through soil. 7

b) In a falling head permeameter, the sample used is 20 cm long having a cross-sectional areaof 24 cm^2. Calculate the time required for a drop of head from 25 to 12 cm if the cross-sectionalarea of the stand pipe is 2 cm^2. The sample of soil is made of three layers. Thethickness of the first layer from the top is 8 cm and has a value of $k_1 = 2 \times 10^{-4}$ cm/sec, thesecond layer of thickness 8 cm has $k_2 = 5 \times 10^{-4}$ cm/sec and the bottom layer of thickness4 cm has $k_3 = 7 \times 10^{-4}$ cm/sec. Assume that the flow is taking place perpendicular to thelayers (Fig. 1). 8

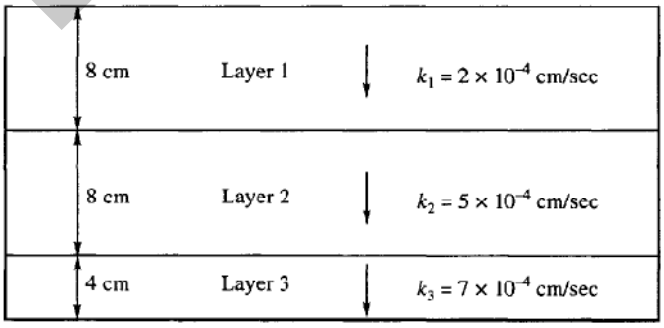

Fig. 1

Code No: **R32011** **R10** **Set No. 2**

4 a) What is flow net? What are its characteristics? Discuss its uses? 7

b) From the flow net diagram drawn for seepage flow through an earth dam the flowing data is obtained. Compute the seepage through the body of the dam per unit length. Number of flow lines = N_f = 2.1, Number of equi-potential drops = 10. coefficient of permeability = 1.35 X 10^{-5} cm/sec. head causing seepage flow, h = 13.5 m. 8

5 a) Derive the governing differential equation for a stress at any point below the ground with circular load by considering stress at any pint with a point load. 8

b) A monument 1500 kN is erected on the ground surface. Considering the load as concentrated, determine the vertical pressure directly under the monument at a depth of 6 m below the ground surface. Also calculate the vertical pressure at a point, which is at a depth of 10 m and a horizontal distance of 3 m from the axis of the load. 7

6 a) Discuss about the compaction control in the field. 7

b) In a compaction test the optimum moisture content (OMC) = 11.0%, and the maximum dry density = 1.98 t/m^3. At the OMC the degree of saturation = 91%. Determine the greatest dry density that it is possible for this soil to have when the moisture content is 11%. 8

7 a) Explain the Consolidation process with Spring Analogy Mechanism. 6

b) The fallowing results were obtained from an oedometer test on a specimen of saturated clay:

Pressure (kN/m^2)	27	54	107	214	429	214	107	54
Void ratio	1.243	1.217	1.144	1.068	0.994	1.001	1.012	1.024

A layer of this clay 8 m thick lies below a 4 m depth of sand, the water table being at the surface. The saturated unit weight for both soils is 19 kN/m^3. A 4 m depth of fill of unit weight 21 kN/m^3 is placed on the sand over an extensive area. Determine the final settlement due to consolidation of the clay. If the fill were to be removed some time after the completion of consolidation, what would eventually take place due to swelling of the clay? 9

8 a) Draw stress strain relations of dense and loose sand from shear strength tests and explain. 5

b) Define critical void ratio. What is its importance? 5

c) Explain the Different types of failure of Soil specimen during the triaxial test and explain. 5

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Code No:**R32011** **R10** **Set No. 3**

III B.Tech II Semester Regular/Supplementary Examinations, May/June - 2015
GEOTECHNICAL ENGINEERING –I
(Civil Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks
Ordinary and Semi-log Graph Papers are to be supplied in the Examination Hall
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1 a) Write detailed note on minerals available in soil. 7

b) A clay sample is found to have a mass of 423.53 g in its natural state. It is then dried in anoven at 105 °C. The dried mass is found to be 337.65 g. The specific gravity of the solids is2.70 and the density of the soil mass in its natural state is 1700 kg/m^3. Determine the watercontent, degree of saturation and the dry density of the mass in its natural state. 8

2 a) Discuss briefly about HRB classification of soils. 7

b) A dried soil of 128.4 gm were subjected to a mechanical analysis and hydrometer analysis together with the following result: Sieve analysis gave the following quantities 8

Retained Sieve	2.00 mm	0.60 mm	0.150 mm	0.075 mm	0.03 mm	0.003 mm
Retained Soil	0	42.1	24.2	16.6	28.3	17.2

Draw the grading curve and classify the material according IS Classification.

3 a) Derive the relation between the superficial velocity of flow to the seepage velocity of the flow. 7

b) The data given below relate to two falling head permeameter tests performed on two different soilsamples:
stand pipe area = 4 cm^2; sample area = 28 cm^2; sample height = 5 cm; initial head in the stand pipe =100 cm and final head = 20 cm; time required for the fall ofwater level in test 1, t = 500 sec and time required for the fall ofwater level in test 2, t = 15 sec.
(i) Determine the values of k for each of the samples. If these two types of soils form adjacentlayers in a natural state with flow (ii) in the horizontal direction, and (iii) flow in the verticaldirection, determine the equivalent permeability for both the cases by assuming that the thickness of each layer is equal to 150 cm. 8

4 a) Write short note on Quick sand condition. Derive the governing differential equation for critical hydraulic gradient. 8

b) What are the different corrections to be made to the phreatic line? And how the same is carriedout. 7

5 a) Derive the governing differential equation for a stress at any point along the center line below the ground with strip load by considering stress at any pint with a point load. 7

Code No: **R32011** **R10** **Set No. 3**

b) Three parallel strip footings (Fig. 1) 3 m wide each and 5 m apart center to center transmit contact pressures of 200, 150 and 100 kN/m^2 respectively. Calculate the vertical stress due to the combined loads beneath the centers of each footing at a depth of 3 m below the base. Assume the footings are placed at a depth of 2 m below the ground surface. Use Boussinesq's method for line loads. 8

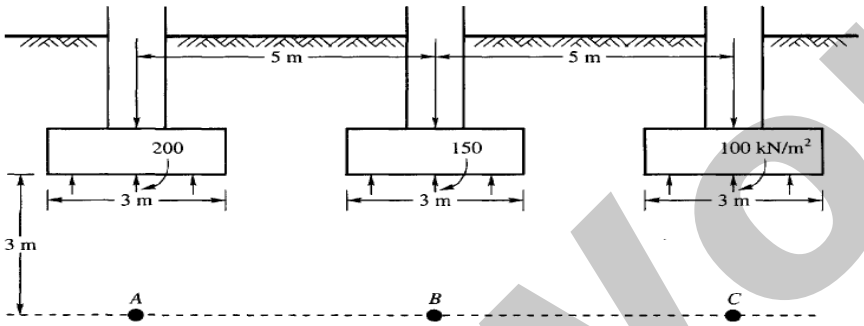

Fig. 1

6 a) What are the factors affecting compaction? Discuss. 6

b) The following results were obtained from a standard compaction test on a soil

Mass (g)	1850	1910	1950	1940	1910
Water Content (%)	14	16	18	20	22

9

The value of G_s is 2.67. Plot the dry density – water content curve and give the optimum water content and maximum dry density? Plot also the curves of 0%, 5% and 10 % air content and give the value of air content at maximum dry density. The volume of the mould is 1000 cm^3

7 a) Define the stress history? What is its importance? Discuss the procedure of estimating the presonsildation pressure given by Casagrande. 8

b) A Normally consolidated clay layer of 10 m thickness has a unit weight of 20 kN/m^3 and specific gravity 2.70. The liquid limit of the clay is 65%. A structure constructed on the clay increase the overburden pressure by 10%. Estimate the ultimate consolidation settlement 7

Code No: **R32011** **R10** **Set No. 3**

8 a) What are the different strength tests available in the laboratory based on drainage conditions. Explain them in detail when do you prefer the corresponding tests by simulating the field conditions? 7

b) The results below were obtained at failure in a series of consolidated undrainedtriaxial tests, with pore water pressure measurement, on specimens of fully saturated clay. Determine the values of the shear strength parameters C^1 and φ^1. If a specimen of the same soil were consolidated under an all round pressure of 250 kN/m^2 and the principal stress difference applied with the all round pressure changed to 350 kN/m^2, what would be the expected value of principal stress difference at failure? 8

Cell Pressure, σ_3 (kN/m^2)	150	300	450
Deviator stress ($\sigma_1 - \sigma_3$) (kN/m^2)	103	202	305
Pore water pressure, u (kN/m^2)	82	169	252

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Code No: **R32011** **R10** **Set No. 4**

III B.Tech II Semester Regular/Supplementary Examinations, May/June - 2015
GEOTECHNICAL ENGINEERING –I
(Civil Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks
Ordinary and Semi-log Graph Papers are to be supplied in the Examination Hall
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	a)	Write short note on Adsorbed water in soil	7
	b)	A partially saturated soil sample has a natural water content of 15% and a bulk unit weight of 20 kN/m^3. Compute the degree of saturation, void ratio and porosity if the specific gravity of solids is 2.7. If subsequently the soil gets submerged compute its unit weight.	8
2	a)	Discuss about the hydrometer analysis test. What are the corrections to be applied to the hydrometer readings? Why?	7
	b)	A 500 g sample of dry soil was used for a combined sieve and hydrometer analysis (152 H typeHydrometer, L =16.3-0.16417R). The soil mass passing through the 75 *fi* sieve = 120 g. Hydrometer analysis wascarried out on a mass of 40 g that passed through the 75 μsieve. The average temperature recordedduring the test was 30°C. Given: G_s = 2.55, C_m(meniscus) = 0.50, C_o = +2.5, η = 8.15 x 10~3 poises. The actual hydrometer reading R = 15.00 after a lapse of 120 min after the start of the test.Determine the particle size D and percent finer P%.	8
3	a)	What is capillary Rise? Derive the equation for the same.	8
	b)	In a falling head permeability test, the time taken for the head to fall from h_1 to h_2 is t. If thetest is repeated with the same initial head h_1, what would be the final head in a time interval of t/2?	7
4	a)	What are Total, neutral and effective stresses? Explain them with an example.	7
	b)	A soil profile consists of a surface layer of sand 6 m thick (γ = 15.8 kN/m^3), an intermediate clay layer 2 m thick (γ_{sat} = 19.75 kN/m^3), and a bottom layer of gravel 4 m thick (γ_{sat} = 21.8 kN/m^3). The water table is at the top of the clay layer. Determine the effective stress at various layers when a surcharge of 100 kN/m^2 is placed at the ground surface	8
5	a)	Discuss about the construction of New marks Influence Chart. What are the uses of New mark's Influence chart?	7
	b)	A long masonry wall footing carries a uniformly distributed load of 200 kN/m 2. If the width of the footing is 4 m, determine the vertical pressures at a depth of 3 m below the (i) center, and (ii) edge of the footing.	8

Code No: **R32011** **R10** **Set No. 4**

6 a) Explain the mechanism of compaction. 6

b) The following results were obtained from a standard compaction test on a soil 9

Mass (g)	1850	1940	1980	1960	1930
Water Content (%)	24	27	29	32	34

The value of G_s is 2.67. Plot the dry density – water content curve and give the optimum water content and maximum dry density? Plot also the curves of 0%, 5% and 10 % air content and give the value of air content at maximum dry density. The volume of the mould is 1000 cm^3

7 a) List the basic assumptions on which Terzaghi's theory of consolidation is based. 6

b) Data obtained from a laboratory consolidation test are tabulated as follows: 9

Test pints	1	2	3	4	5	6
σ' (kPa)	20	50	100	200	400	800
Total ΔH (mm)	0.23	0.87	1.90	3.62	5.55	7.25

G_s = 2.70, H_0 (initial thickness at zero pressure) = 22.5 mm, w = (moisture content at the beginning of the test) = 0.78. Plot the e – logσ' curve and calculate C_c.

8 a) Define Mohr's rupture envelope. Explain the theory of failure on which this line is based. 7

b) Discuss the procedure of conducting direct shear test? What are the results we can estimate from this test? What are its limitations? 8

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Code No: **R32016** **R10** **Set No. 1**

III B.Tech II Semester Regular/Supplementary Examinations, May/June - 2015

Transportation Engineering-II

(Civil Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks
Assume any missing data suitably

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1	a)	What are the ideal requirements of Rail fastenings?	[8]
	b)	What are the locations at which the joints in rails are avoided?	[7]
2	a)	If a sag curve is introduced between down grade of 0.8 % followed by an up gradient of 0.6%, find out the length of parabolic vertical curve, the offsets at every 25m and R.L.s corresponding to various points on the curve. When given the R.L of the ground at sag point is 100m and allowable change of gradient is 0.25.	[10]
	b)	What are the various causes for the derailment of trains?	[5]
3	a)	What are the various parts of turnout?	[8]
	b)	Explain the requirements of a crossing.	[7]
4	a)	Define Interlocking and explain the principle involved in interlocking.	[8]
	b)	Explain Track circuiting.	[7]
5	a)	What is crosswind component? How do you fix the runway orientation if wind direction and wind coverage duration.	[8]
	b)	What are the factors to be considered for the design of taxiway?	[7]
6	a)	Explain briefly about the failures in airfield flexible pavements.	[8]
	b)	What are the special characteristics of an airfield drainage system?	[7]
7	a)	Explain the classification of harbours based on location	[8]
	b)	What are the uses of dry and wet docks? What is the role of ware houses?	[7]
8	a)	What are the differences between wharves and Jetties?	[6]
	b)	What are the different types of buoys used as navigational aids	[4]
	c)	What is Bucket ladder dredger? Explain briefly	[5]

*****

Code No: **R32016** **R10** **Set No. 2**

III B.Tech II Semester Regular/Supplementary Examinations, May/June - 2015

Transportation Engineering-II

(Civil Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks
Assume any missing data suitably

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1	a)	What are the functions of Rails? Explain the sleeper density.	[8]
	b)	Explain the concept of creep using percussion theory and explain the method of identifying creep.	[7]
2	a)	What is the use of preliminary survey in railway alignment?	[8]
	b)	Explain the necessity of design of railway track.	[7]
3	a)	What is the role of switches in turnouts? Explain briefly about various types of switches.	[7]
	b)	If an 8^0 curve track diverges from main curve 6^0 in an opposite direction of B.G yard. Calculate speed and super elevation of branch line if the maximum speed permitted on main line is 45kmph.	[8]
4	a)	Bring out the differences between detector locking and Tappet locking.	[8]
	b)	Explain the function and location of Outer signal and Home signal.	[7]
5	a)	What are the different aids available for a pilot during flight journey?	[8]
	b)	What are assumptions made for finding the basic runway length?	[7]
6	a)	What are the special characteristics of an airfield drainage system?	[8]
	b)	Discuss about Rapid runway repair and advanced runway repair systems.	[7]
7	a)	Explain classification of harbors based on utility.	[8]
	b)	What do you understand about the dry and wet docks and write their applications?	[7]
8	a)	Distinguish between lowest and highest astronomical tides.	[8]
	b)	Explain the importance and different types of navigational aids.	[7]

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Code No: **R32016** **R10** **Set No. 3**

III B.Tech II Semester Regular/Supplementary Examinations, May/June - 2015

Transportation Engineering-II

(Civil Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks
Assume any missing data suitably

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1	a)	What are the requirements of an ideal joint?	[8]
	b)	What are the advantages and disadvantages of wooden sleepers?	[7]
2	a)	What are the factors to be considered for the selection of good railway alignment?	[8]
	b)	Distinguish between Pusher gradient and Momentum gradients.	[7]
3	a)	What are the different types of switches based on assembling? Explain with the help of neat sketches.	[8]
	b)	Draw a sketch showing various components of a left hand turnout.	[7]
4	a)	What is the necessity and functions of interlocking?	[8]
	b)	Explain automatic Block system.	[7]
5	a)	Find out the corrected basic runway length from the following data. Run way length = 3200m, Altitude above MSL =450m, Airport reference temperature = 42^0C, Effective Gradient = 1.5%.	[8]
	b)	What are the different aids available for a pilot during flight journey?	[7]
6	a)	Explain Burmister method of designing airfield flexible pavement.	[8]
	b)	Discuss about Rapid runway repair and advanced runway repair systems.	[7]
7	a)	Explain the classification of harbours based on location	[8]
	b)	What are the uses of dry and wet docks? What is the role of ware houses?	[7]
8	a)	Distinguish between various tidal terms with the help of a graph.	[8]
	b)	Describe with sketches a composite breakwater.	[7]

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Code No: **R32016** **R10** **Set No. 4**

III B.Tech II Semester Regular/Supplementary Examinations, May/June – 2015

Transportation Engineering-II

(Civil Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks
Assume any missing data suitably

*****

1	a)	What are the different components of permanent way? Explain briefly about the function of each component.	[8]
	b)	Discuss about causes of kinks in rails and their ill effects.	[7]
2	a)	Explain briefly about the use of various types of gradients in railways	[8]
	b)	If an 8^0 curve track diverges from main curve 5^0 in an opposite direction of B.G yard. Calculate speed and super elevation of branch line if the max. Speed permitted on main line is 45kmph.	[7]
3	a)	Explain Facing direction, trailing direction, face point and trail points of turnouts.	[8]
	b)	Explain different types of crossings based on shape.	[7]
4	a)	What are the objectives of signaling in railways?	[5]
	b)	Explain slotting of signals.	[10]
5	a)	Find out the corrected basic runway length from the following data: Run way length = 3000m, Altitude above MSL =400m, Airport reference temperature = 42^0C, Effective Gradient = 1.25%.	[8]
	b)	Explain how an engine failure case affects the basic runway length.	[7]
6	a)	Explain briefly about the factors to be considered in the design of airfield pavements.	[8]
	b)	Explain briefly about the failures in airfield flexible pavements.	[7]
7	a)	Explain the classification of harbours based on location.	[8]
	b)	What are the uses of dry and wet docks? What is the role of ware houses?	[7]
8	a)	Distinguish between lowest and highest astronomical tides.	[8]
	b)	Describe with sketches a composite breakwater.	[7]

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Code No: **R32012** **R10** **Set No. 1**

III B.Tech II Semester Regular/Supplementary Examinations, May/June - 2015
WATER AND WASTE WATER ENGINEERING
(Civil Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks
*****

1 a) What do you understand by the term 'per capita demand'? How total quantity of water required by a town is estimated. 7

b) Population of a town as obtained from the census reports is as follows : 8

Year	1950	1960	1970	1980	1990	2000	2010
Population	24831	25293	25423	27263	38284	49909	67105

Estimate the population expected by 2020 by Incremental Increase method

2 a) Explain merits and demerits of surface sources of water supply. 7

b) What is a River Intake? What are the factors which govern the location of a intake structure on a river. 8

3 a) Prove that theoretically the surface loading Q/A and not the depth is a measure of effective removal of particles in a sedimentation tank. 8

b) What are the objectives of adding alum? 3

c) Calculate kilograms of alum needed per day if alum dosage is 30 mg/l and the flow is 20×10^6 l/d. 4

4 a) Explain theory of Filtration as used in the purification of water. Sketch and describe an outlet for a slow sand filter. 8

b) What do you understand by the term disinfection of water? Why it is necessary to disinfect the water for public water supply schemes? What should be the requirements of a good disinfectant? 7

5 a) State the merits and demerits of (i) separate system of sewage and (ii) combined system of sewage. 7

b) What are the characteristics of sewage? How various constituents of sewage influence these characteristics? 8

6 a) Draw a neat sketch of a drop manhole and indicate where it is used. 7

b) Enumerate the two general methods adopted for sewage disposal and discuss their merits and demerits explaining the conditions favorable for their adoption. 8

7 a) With a neat sketch explain the function Detritus tank. 7

b) Write explanatory note on "High Rate Trickling Filter". 8

8 a) Explain Aerobic Sludge digestion and mention factors controlling digestion. 8

b) With a neat sketch explain the function of soak pit. 7

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Code No: **R32012** **R10** **Set No. 2**

III B.Tech II Semester Regular/Supplementary Examinations, May/June - 2015
WATER AND WASTE WATER ENGINEERING
(Civil Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks
*****

1 a) What are the various factors which directly affect the per capita demand of a town? What do you understand by the term fluctuations in water demand? 7

b) The population statistics pertaining to a town were given below. Estimate the population expected in 2020 by Arithmetical Increase method. 8

Year	1970	1980	1990	2000	2010
Population	70,000	1,00,000	1,50,000	2,00,000	2,40,000

2 a) What factors should be considered while selecting site of an Impounding reservoir. 8

b) What are Intake towers? Differentiate between Dry Intake and Wet Intake. 7

3 a) Explain the process of Sedimentation in the treatment of water. Discuss the difference between Plain sedimentation and Coagulation. 8

b) Write a short note on (i) Alum as coagulant and (ii) Clariflocculator 7

4 a) Draw a neat sketch of a Rapid Gravity Filter and describe how it works? 8

b) What are the various methods of disinfecting water? State the theory of disinfection of water by chlorine. 7

5 a) Describe the conservancy and water carriage system of sanitation. In new developing town which method you will prefer and why? 7

b) If 2.5 ml of raw sewage have been diluted to 250 ml and the D.O concentration of the diluted sample at the beginning was 8.0 mg/l and 50 mg/l after 5 days incubating at $20^{o}C$, find the BOD of raw sewage. 8

6 a) Draw a neat sketch of a Manhole and indicate where it is used. 7

b) What are the factors affecting Self purification of polluted streams. 8

7 a) What are design considerations for a Grit Chamber? 7

b) With the help of a neat sketch explain Activated Sludge Process. 8

8 a) Explain with a neat sketch, the details of Oxidation pond. 8

b) Explain with a neat sketch, the details of Two stage Rate Digester. 7

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Code No: **R32012** **R10** **Set No. 3**

III B.Tech II Semester Regular/Supplementary Examinations, May/June - 2015
WATER AND WASTE WATER ENGINEERING
(Civil Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks
*****

1 a) Write a short note on provision for fire demand in water supply 7

b) Estimate the future population of a town in 2021, given 8

Year	1961	1971	1981	1991	2001	2011
Population	3,50,000	4,66,000	9,95,000	15,60,000	16,30,000	18,40,000

Justify the method you have adopted.

2 a) Discuss the merits and demerits of rive water sources and ground water sources for the water supply scheme of a town. 8

b) With a neat sketch explain functioning of Canal Intake. 7

3 a) Explain the functioning of a Plain Sedimentation tank in water treatment plant. 8

b) What is the necessity of using Coagulants in Sedimentation? What are the various chemical coagulants which are commonly used in Coagulation process? How they remove suspended impurities? 7

4 a) Describe with a neat sketch the working of a Pressure filter. What are the relative merits and demerits of Pressure filters over Gravity filters? 7

b) Write a note on (i) free available chlorine and (ii) Break point chlorination. 8

5 a) Discuss the comparative merits and demerits of the separate system and combined system of sewage. 7

b) Calculate 1-day 37^{o}C BOD of sewage sample whose 5-day 20^{o}C BOD is 100 mg/l. 8

6 a) Draw a neat sketch of Inverted syphon and indicate where it is used. 7

b) What do you understand by Self purification of a stream? Explain the factors affecting this property. 8

7 a) Write a note on Skimming Tanks and indicate where it is used. 7

b) Explain different aeration practices in Activated Sludge Process viz (i) Tapered Aeration (ii) Step aeration and (iii) Extended aeration. 8

8 a) What is sludge digestion? What are the two basic types of sludge digestion units? 8

b) Explain the functioning of Imhoff tank. 7

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Code No: **R32012** **R10** **Set No. 4**

III B.Tech II Semester Regular/Supplementary Examinations, May/June - 2015
WATER AND WASTE WATER ENGINEERING
(Civil Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks
*****

1 a) Explain the different methods of forecasting future population of a city for which a water supply scheme is to be planned. 7

b) The population statistics pertaining to a town are given below. Estimate the population expected by 2020 by Geometrical Increase method 8

Year	1970	1980	1990	2000	2010
Population	90,000	1,20,000	1,75,000	2,10,000	2,65,000

2 a) Compare and contrast Surface and Subsurface sources of water supply. 7

b) With a neat sketch explain functioning of Infiltration Gallery. 8

3 a) Explain the Sedimentation process used in a water treatment plant. 7

b) Determine the quantity of alum required in order to treat 13 million litres of water per day at a treatment plant, where 12 ppm of alum dose is required. 8

4 a) Explain clearly how does a rapid gravity filter differ in its action from a slow sand filter. What are the merits and demerits for the rapid sand filters as compared with slow sand filters? 8

b) What do you understand by Super chlorination? What are the various methods of chlorination? 7

5 a) What is partially combined system of sewage? Why it is considered most suitable for Indian conditions/ 7

b) A 2% solution of a sewage sample is incubated for 5 days at 20^{o}C. The depletion of oxygen was found to be 4 ppm. Determine the BOD of the sewage. 8

6 a) Write a note on Automatic flush tank. 7

b) Explain the importance of study of re-oxygenation and de-oxygenation in problems of stream sanitation. 8

7 a) Write a note on Grit Chambers and indicate where it is used. 7

b) With the help of a neat sketch explain functioning of Trickling filter in waste water treatment. 8

8 a) Explain with a neat sketch working of High Rate Digester. Compare and contrast Standard rate digester and High rate digester. 8

b) Write a note on Sludge drying beds. 7

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Code No: **R32014** **R10** **Set No. 1**

III B.Tech II Semester Regular/Supplementary Examinations, May/June - 2015

WATER RESOURCES ENGINEERING-II

(Civil Engineering)

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

Answer any FIVE Questions

All Questions carry equal marks

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1	a)	Explain briefly about silt extractor and silt ejector?	7
	b)	Describe in brief various types of weirs. Distinguish clearly between a weir and a barrage.	8
2	a)	Explain various types of reservoirs. What do you understand by multipurpose reservoir?	8
	b)	What do you understand by mass inflow curve and how is it prepared?	7
3	a)	Write a note on foundation problems for dams and their remedies.	7
	b)	Explain the method of stability analysis of u/s slope during sudden drawdown.	8
4	a)	What do you understand by galleries and what are the functions of galleries?	7
	b)	What are the remedial measures would you undertake to control the seepage through the dam foundation?	8
5	a)	What is a spillway? What are its functions? Enumerate various types of spillways.	7
	b)	What do you understand by a fall in a canal? Why it is necessary? How do you select its location?	8
6	a)	Explain why trapezoidal notches are preferred to rectangular notches in the design of canal drops.	7
	b)	Compute the discharge over an ogee spillway with a coefficient of discharge C=2.5 at a head of 4m.The effective length of the spillway is 100m.Neglect the velocity of approach.	8
7	a)	What is meant by "canal regulation" and what are the functions of a 'Distributary head regulator' and a 'Cross regulator' in a canal project?	8
	b)	Define sensitivity of an outlet. Find the relation between sensitivity and flexibility of an outlet.	7
8	a)	Write short notes on: (i) Syphon (ii) Super passage (iii) Syphon aqueduct.	8
	b)	What do you understand by level crossing? State briefly the conditions under which it is used.	7

Code No: **R32014** **R10** **Set No. 2**

III B.Tech II Semester Regular/Supplementary Examinations, May/June - 2015

WATER RESOURCES ENGINEERING-II

(Civil Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks

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1	a)	Explain the procedure for the design of a vertical drop weir.	7
	b)	Explain Khosla's method of independent variables. How do you apply corrections for (i) thickness of floor (ii) interference of piles?	8
2	a)	Explain how you would determine safe yield from a reservoir of a given capacity.	8
	b)	Discuss various methods of reservoir sediment control.	7
3	a)	Distinguish between a low gravity dam and high gravity dam. Derive the expression used for such a distinction.	8
	b)	What do you understand by the elementary profile of a gravity dam? Derive expressions for determining base width of such a dam based on (i) stress criterion and (ii) sliding criterion.	7
4	a)	Define and explain the term phreatic line in earthen dams. Explain the importance of seepage through earthen dams.	8
	b)	What are the remedial measures would you undertake to control the seepage through earthen dam body?	7
5	a)	Explain the design procedure for the standard stilling basin type I.	7
	b)	Write a note on Notch type fall.	8
6	a)	Enumerate the various types of spillways and describe in details the most widely used.	7
	b)	Discuss the comparative merits and demerits of Notch falls and Sarda type falls.	8
7	a)	What do you understand by a head regulator? State functions of a distributary head regulator and a cross regulator.	8
	b)	Write a note on selection of suitable type of cross-drainage works.	7
8	a)	What do you understand by flexibility of an outlet? Derive an expression for the same.	7
	b)	Differentiate between (i) syphon aqueduct and canal syphon, (ii) aqueduct and super passage.	8

Code No: **R32014** **R10** **Set No. 3**

III B.Tech II Semester Regular/Supplementary Examinations, May/June - 2015

WATER RESOURCES ENGINEERING-II

(Civil Engineering)

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

Answer any FIVE Questions

All Questions carry equal marks

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1 a) Write short notes on the following: (i) fish ladder (ii) divide wall (iii) under sluices. 7

b) Design a vertical drop weir, using Bligh's theory for the following data: 8

(i) Maximum flood discharge = 1200 cumecs
(ii) HFL before construction of weir = 172.5 m
(iii) River bed level = 168 m
(iv) FSL of canal = 171.5 m
(v) Allowable afflux = 1 m
(vi) Coefficient of creep = 11

Assume any other data not given. The weir wall need not be designed and its dimensions may be taken as follows: (i) top width = 3m (ii) bottom width = 6 m.

2 a) Explain in brief various investigations required for reservoir planning. 8

b) What do you understand by demand curve? Explain the method of calculating reservoir capacity for a specific yield, from the mass inflow curve. 7

3 a) What do you understand by gravity dam? Explain various forces that act on a gravity dam. 7

b) Discuss in brief the USBR recommendations for determining uplift pressure under the base of a dam, provided with a drainage gallery. 8

4 a) What are the criteria for safe design of earth dam? 7

b) Explain the method of stability analysis of d/s slope during steady seepage. 8

5 a) What are canal falls and why are they constructed? 7

b) How would you compute the discharge passing over an ogee spillway? Discuss the various factors affecting the coefficient of discharge in the discharge equation. 8

6 a) Discuss briefly the various types of energy dissipaters that are used for energy dissipation below overflow spillways, under different relative positions of T.W.C. and J.H.C. 8

b) Explain the procedure of designing straight glacis fall. 7

7 a) Distinguish clearly between non-modular and semi-modular outlets. Give examples. 8

b) Explain the procedure for designing the head regulator of a distributary. 7

8 a) Write short notes on: (i)Aqueduct (ii)Canal Syphon (iii)Level Crossing 7

b) Discuss with neat sketches, the three different types of aqueducts which can possibly be constructed depending upon the size of the drainage to be passed below the canal. Also discuss the factors governing the choice of any of these three types of aqueducts. 8

Code No: **R32014** **R10** **Set No. 4**

III B.Tech II Semester Regular/Supplementary Examinations, May/June - 2015

WATER RESOURCES ENGINEERING-II

(Civil Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks

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1	a)	Discuss in brief various causes of failure of weirs and their remedies.	7
	b)	What is meant by scour? What precautions do you take against it in weir design?	8
2	a)	Define the following: (i) surcharge storage (ii) valley storage (iii) safe yield and (iv) secondary yield.	8
	b)	Explain in brief various investigations required for reservoir planning.	7
3	a)	Explain how you account for earthquake effects in the design of a gravity dam.	7
	b)	Explain the method of determining the principal and shear stresses in a gravity dam.	8
4	a)	Discuss in brief the causes of failure of earth dams.	8
	b)	Explain with the help of a sketch, the components of a zoned embankment dam, with their functions	7
5	a)	What is a 'spillway gate' and what are the merits and demerits of installing such gates?	7
	b)	What are spillways and where are they provided? Write short notes on Ogee-shaped spillway.	8
6	a)	Discuss briefly the components of various types of falls with neat sketches. Also discuss the stability of each type.	8
	b)	Explain the procedure of designing Sarda type fall.	7
7	a)	Describe the necessity and functioning of a 'Distributary head regulator' and a 'Cross regulator' in a canal project.	8
	b)	What is meant by the terms 'flexibility',' proportionality', 'setting' and 'sensitivity' as applied to modules.	7
8	a)	Classify aqueducts and explain under what circumstances each one is used.	8
	b)	Describe with the help of sketches various types of cross-drainage works.	7

Code No: R32015 **R10** **Set No: 1**

III B.Tech. II Semester Supplementary Examinations, January -2014

DESIGN & DRAWING OF CONCRETE STRUCTURES-II

(Civil Engineering)

Time: 3 Hours **Max Marks: 75**

Note: Answer any ONE question from PART-A and THREE question from PART-B

IS Code books are permitted in the examination hall..

PART-A

1. A reinforced concrete grid floor is to be designed to cover a floor area of size 12m by 16m.The spannings of the ribs in mutually perpendicular directions being 2m c/c. Live load =1.5 kN/m^2 .Adopt M-20 grade concrete and tor steel. Analyze the grid floor for moments and shear. Design suitable reinforcements at critical sections.

2. Design a combined footing for two columns C_1 (400mm x 400mm with 4-25 ϕ bars) and C_2 (500mmX500mm with 4-28 ϕ bars) supporting axial loads P_1 =900kN and P_2=1600kN respectively .The column C_1 is an exterior column whose exterior face is flush with the property line. The centre-to- centre distance between C_1 and C_2 is 4.5m.The allowable soil pressure at the base of the footing, 1.5m below ground level, is 240 kN/m^2 .Assume steel of grade Fe415 in columns as well as footing, and concrete of M30 grade in columns and M20 grade in footing.

(Part B)

3. (a) What are the principles of pre stressing in pre tensioning and post tensioning?
   (b) What are the various states of loading stages to be considered in the design of pre stressed concrete structures?

4. (a) Explain with neat sketch Mangle Blanton system of Pre stressing.
   (b) Explain bonded and unbounded tendons
   (c) Creep and shrinkage losses in pre stress

5. A straight post tensioned concrete member is 15 m long with a cross-section of 400mm x 400 mm is pre stressed with 900 mm^2 of steel wires. This steel is made of four tendons with 225 mm^2 per tendon. The tendons are tensioned to a stress of 1050 N/mm^2. Determine the loss of prestress in each tendon due to elastic shortening of concrete. Find also the average percentage loss of prestress. If it is desired that after the last tendon is tightened a stress of 1050 N/mm^2 be maintained in each tendon, compute the actual stresses to which the individual tendons should be tightened. Take modular ratio =6.

6. A pretensioned beam of rectangular section, 80mmwide x 120mm deep is to be designed to support concentrated loads of 4 kN each at one-third span points over an effective span of 3m. The permissible stresses in concrete are limited to zero and 1.4 N/mm^2 in tension at transfer and working load respectively. If 3mm diameter wires initially stressed to 1400N/mm^2 is used. Find the number of wires required and the eccentricity of the prestressing force, assuming 20% loss in prestress. Weight of concrete is 25 kN/m^3.

7. A post tensioned concrete beam of rectangular section 250mm wide and 500mm deep has a span of 12.5m and carries a superimposed load of 5kN/m. The tendon is provided with a parabolic profile with a central dip of =180mm and with no eccentricity at the ends. The effective prestressing force in the tendon is 750kN. Determine:
   (a) The principal stresses at the supports
   (b) The principal stresses at the supports without prestress. Take weight of concrete as $24kN/m^3$.

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Code No: R32015 **R10** **Set No: 2**

III B.Tech. II Semester Supplementary Examinations, January -2014

DESIGN & DRAWING OF CONCRETE STRUCTURES-II

(Civil Engineering)

Time: 3 Hours **Max Marks: 75**

Note: Answer any ONE question from PART-A and THREE question from PART-B

IS Code books are permitted in the examination hall..

PART-A

1. A two way slab 5m by 5m size with ribs at 1m intervals is to be designed to support a live load of 4 kN/m^2. Adopting M-15 grade concrete and Fe-415 grade for steel, design a suitable grid floor and sketch details of reinforcement in ribs.

2. A portico slab of clear projections 3 m and length 5 m is supported by two cantilevered inverted T-beams at 3 m centers with equal overhangs of slab. Thickness of slab is 100 mm. Imposed load on the slab is 4kN/m^2. Breadth of rib of T-beams is 250 mm. Design the support section of the beam for bending using M25 grade concrete and mild steel.

(Part B)

3. (a) What is the necessity of using high strength steel and high strength concrete in prestressed concrete ?
   (b) What are the advantages of prestressed concrete members over R.C.C members?

4. (a) Explain with the help of neat sketch the Freyssinet system of post tensioning.
   (b) Distinguish between pretensioned and post tensioned members.
   (c) Discuss length and curvature effect in case of curved cables.

5. A prestressed concrete beam of rectangular section 400mm wide and 600mm deep is provided with an inclined tendon with an eccentricity of 50mm above the centroid at supports and 100mm below the centroidal axis at the centre of span. The span of the beam is 6m. The beam carries a point load of 160kN at the centre. The dead load of the beam is 6kN/m. The prestressing force is 1000kN. Determine the stress distribution for the end section and mid section of the beam by following methods.
   (a) Stress concept method.
   (b) Strength concept method. (c) Load balancing method

6. A pretensioned beam 250mm wide and 300mm deep is prestressed by 12 wires each of 7mm diameter initially stressed to 1200N/mm^2 with their centroid located at 100 mm from the soffit. Estimate the final percentage loss of stress due to elastic deformation, creep, shrinkage and relaxation using IS:1343-80 code and the following data:
   Relaxation of steel stress=90N/mm^2
   E_s =210KN/mm^2
   Creep coefficient (φ) = 1.6
   Residual shrinkage strain = 3 x 10^{-4}

7. A prestressed concrete beam 250mm wide and 600mm deep is subjected to an axial prestressing force of 1500kN. Design the end block using Guyon's method.

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Code No: R32015 **R10** **Set No: 3**

III B.Tech. II Semester Supplementary Examinations, January -2014

DESIGN & DRAWING OF CONCRETE STRUCTURES-II

(Civil Engineering)

Time: 3 Hours **Max Marks: 75**

Note: Answer any ONE question from PART-A and THREE question from PART-B

IS Code books are permitted in the examination hall..

PART-A

1. A reinforced concrete grid floor of size 9m by 12m is required for an assembly hall. Assuming rib spacing of 1.5m in the short span direction and 2m in the long span direction, design the grid floor. Adopt M-20 grade concrete and Fe-415 grade tor steel. Live load may be assumed as 4 kN/m^2 .

2. Design a footing for a 250mm thick reinforced concrete wall which supports a load (inclusive of self weight) of 250 kN/m under service loads. Assume a safe soil bearing capacity of 180 kN/m^2 at a depth of 1m below ground. Assume M -20 grade concrete and Fe-415 grade steel for both wall and footing.

(Part B)

3. (a) Define a prestressed concrete member. Explain the advantages and applications of prestressed concrete.
   (b) Explain in detail the Gifford Udal system of prestressing with the help of neat sketch.

4. (a) Differentiate a fully prestressed member and a partially prestressed member
   (b) A prestressed concrete beam of uniform rectangular cross section and span 15m supports a total distributed load of 272kN excluding the weight of the beam. Determine the suitable dimensions of the beam and calculate the area of the tendons and their position. The permissible stresses are 14 N/mm^2 for concrete and 1050 N/mm^2 for the tendons.

5. A prestressed concrete beam section is 250mm x 300mm deep. The initial prestressing force is 470kN at an eccentricity of 65mm. the beam has a span of 6m and has to carry a superimposed load of 7.75 kN/m. Analyse the beam section for the stresses produced at midspan before and after the application of live load. Allow a loss of prestress of 18%. Take the weight of concrete as $24kN/m^3$.

6. A straight post tensioned concrete member is 18m long with a cross section of 425mm x 425mm is prestressed with 920 mm^2 of steel wires. This steel is made up of four tendons with 230mm^2 per tendon. The tendons are tensioned to a stress of 1025 N/mm^2. Determine the loss of prestress in each tendon due to elastic shortening of concerte. Find also the average percentage loss of prestress. If it is desired that after the last tendon is tightened, a stress of 1025N/mm^2 , be maintained in each tendon, calculate the actual stresses to which the individual tendons should be tightened. Take m=6.

7. A prestressed concrete beam is 400mm wide and 800mm deep. The cable is placed axially. The anchor plate is 300mm wide and 200mm deep. The prestressing force is 1000kN. Determine the horizontal section through the centre of anchor plate. Take the shear stress factor as 1.25 and vertical stress factor as -5 respectively. Find also the principal stresses. Use Magnel's method

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Code No: R32015 **R10** **Set No: 4**

III B.Tech. II Semester Supplementary Examinations, January -2014

DESIGN & DRAWING OF CONCRETE STRUCTURES-II

(Civil Engineering)

Time: 3 Hours **Max Marks: 75**

Note: Answer any ONE question from PART-A and THREE question from PART-B

IS Code books are permitted in the examination hall..

PART-A

1. An orthotropic reinforced concrete grid 16m by 20m is required for the roof of an auditorium. The ribs are spaced at 2m intervals. Live load on roof =1.5 kN/m^2. Adopt M-20 grade concrete and Fe-415 grade tor steel. Design suitable reinforcements in the grid beams and sketch the details of reinforcements.

2. Design a combined footing for two columns C_1 (400mmX400mm with 4-25 ϕ bars) and C_2 (500mmX500mm with 4-28 ϕ bars) supporting axial loads P_1 =900kN and P_2=1600kN respectively .The column C_1 is an exterior column whose exterior face is flush with the property line. The centre-to- centre distance between C_1 and C_2 is 4.5m.The allowable soil pressure at the base of the footing ,1.5m below ground level, is 240 kN/m^2 .Assume steel of grade Fe415 in columns as well as footing, and concrete of M30 grade in columns and M20 grade in footing

(Part B)

3. (a)Distinguish between pretensioning and post tensioning systems. Discuss the advantages of prestressed concrete members over R.C.C members.
   (b) Explain with the help of neat sketch Lee-Mechall system of post tensioning.

4. A concrete beam of symmetrical I section spanning 8m has a flange width and thickness of 200 and 60mm respectively. The overall depth of the beam is 400mm.The thickness of the web is 80mm. The beam is prestressed by a parabolic cable with an eccentricity of 15mm at the centre and zero at the supports with an effective force of 100kN. The live load on the beam is 2kN/m. Draw the stress distribution diagram at the central section for
   (a) Prestress+Self weight
   (b) Prestress + Self weight + Live load. Take density of concrete as 24kN/m^3.

5. A prestressed concrete pile is 300mm x 300mm in section and is provided with 40 wires of 3mm diameter distributed uniformly over the section. Initially the wires are tensioned in the prestressing beds with a total pull of 450kN. Determine the final stress in concrete and the percentage loss of stress in the wires. Take E_s = 2.08 x 10^5 N/mm^2, E_c = 3.20 x 10^4 N/mm^2, creep shortening = 32 x 10^{-6} mm/mm per N/mm^2, total shrinkage strain= 200 x 10^{-6}, Relaxation of stress in steel =4.5% of the initial stress.

6. A prestressed concrete beam of rectangular section 400mm x 600mm is provided with a parabolic tendon with zero eccentricity at supports and an eccentricity of 100mm at the centre of span. The span of the beam is 6m. The total external load on the beam is 35kN/m on the whole span. The tendon carries a prestressing force of 1000kN. Calculate the extreme stresses for the mid span section using the following methods
   (a) Stress concept method
   (b) Strength concept method
   (c) Load balancing method

7. A prestressed I section has the following properties.
   Area= 55×10^3 mm^2,
   Second moment of area $=189 \times 10^7$ mm^4,
   Statical moment about the centroid $= 468 \times 10^4$ mm^3,
   Thickness of web = 50 mm.
   It is prestressed horizontally by 24 wires of 5mm diameter and vertically by similar wires at 150 mm centers. All the wires carry a tensile stress of 900 N/mm^2. Calculate the principal stresses at the centroid when a shearing force of 80kN acts upon this section.

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

III B. Tech I Semester Regular/Supplementary Examinations, October/November- 2016
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 simply supported rectangular beam to carry 30kN/m superimposed load over a span of 6m on 460mm wide supports. Use M20 grade concrete and FE 415 grade steel. Check the design for all necessary conditions. Draw to a suitable scale: [28M]
   a) Longitudinal section showing the reinforcement details.
   b) The cross section of the beam at salient points, showing reinforcement details

OR

2 Design a continuous RC slab for a hall 6.5m and 13.5m long. The slab is supported on RCC beams each 240mm wide which are monolithic. The ends of the slab are supported on walls. 300mm 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^2. Use M15 concrete and Fe 415 steel. [28M]
   a) Draw the reinforcement of the slab in plan view
   b) Draw cross section of the slab including beams with reinforcement details.

PART -B

3 a) Define the term 'Partial safety factors' as used in limit state design. Identify the various factors and state the values recommended in IS 456 [7M]
   b) Compare 'Working stress method' and limit state design of RCC structures. Explain the answer with suitable examples. [7M]

4 The T beam floor consists of 12cm thick R.C. slab monolithic with 30cm wide beams. The beams are spaced at 3.5m center to center and their effective span is 8m. If the superimposed on the slab is 6.5kN/m^2, design an intermediate beam and an end beam. Use M20 mix and TMT 415 grade steel. [14M]

5 Design a slender circular column of 35cm diameter with the following data. Unsupported length = 8m. Effective length = 5m. Axial load = 500kN. Moment at top = 60kNm. Moment at bottom = 40 kNm. The column bends in double curvature [14M]

6 Design a square spread footing to carry a column of 1200kN from a 40 cm square tied column containing 20m bars as the longitudinal reinforcement. The bearing capacity of soil is 150 kN/m^2. Consider base of footing as 1m below the ground level. The unit weight of earth is 20 kN/m^3. Use σ_y = 415 N/mm^2 and σ_{ck} = 20 N/mm^2 [14M]

7 The section of a cantilever beam designed for a span of 4.0m is having dimensions 300 x 600mm with 3 numbers 28mm diameter bars in compression and 3 numbers 20mm diameter bars in tension. The beam has been designed for a bending moment of 180kNm (at support) under service loads, of which 60 percent is due to permanent (dead) loads. The loading is uniformly distributed on the span. Assume M20 concrete and Fe 415 steel [14M]

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

III B. Tech I Semester Regular/Supplementary Examinations, October/November- 2016
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 T beam floor consists of 12cm thick R.C. slab monolithic with 30cm wide beams. The beams are spaced at 4.0m center to center and their effective span is 7.5m. If the superimposed on the slab is 7.0 kN/m^2, design an intermediate slab. Use M20 mix and TMT 415 grade steel .draw to scale ; [28M]

a) Longitudinal section showing the reinforcement details
b) The cross section of the beam at salient points, showing reinforcement details

OR

2 Design an isolated square footing for a column 450mm x 450mm reinforced with 8-25mm diameter bars carrying a service load of 2000 kN The bearing capacity of soil is 250 kN/m^2 at a depth of 1.5m below ground. The footing is restricted to 2.0m in one direction Assume M20 grade concrete and Fe 415 grade steel for the footing and M25 concrete and Fe 415 steel for the column. Draw to scale: [28M]

a) Longitudinal section showing the reinforcement details.
b) The plan showing reinforcement details.

PART -B

3 A rectangular beam section is 20cm wide and 40 cm deep up to the center of tension steel, which consist of 4-20 mm TOR bars. Find the position of the neutral axis, the lever arm, forces of compression and tension, cracking moment and safe moment of resistance of concrete is of M20 mix and steel is of Fe500 grade [14M]

4 The flange of a T beam flange of the beam is 90 cm x 10cm and web below is 30cm x 40cm. It is reinforced with 4-20 mm plus 4-12mm Fe 415 steel bars in tension at an effective cover of 60mm. Determine the shear reinforcement needed for a shear force of 200kN (i) If the mix is M20 and (ii) if the mix is M30. Take load factor = 1.2. [14M]

5 a) What is meant by slenderness ratio of a compression member and what are its implications. Distinguish between short and long column. [7M]

b) A short column 40cm square in cross section is reinforced with 4-20 mm bars longitudinally which are bound together with lateral ties. Determine safe axial load on the column [7M]

6 Design a two-way slab simply supported on all the four edges for a room 6m x 3.5m clear in size. The superimposed working load is 3.5 kN/m^2 for (**i**) corners held down and (**ii**) corners not held down. [14M]
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7 A one-way slab has been designed for a simply supported span of 4.0m with an overall depth of 170mm and clear cover of 20mm. using M20 concrete and fe 415 steel. The dead load is taken as 5.0 kN/m2 and live load of 2.0m kN/m^2. The longitudinal bars are designed as 10mm diameter 150mm c/c. verify the adequacy of the thickness provided. [14M]
(a) Applying the limiting span/ effective depth ratio
(b) Actual calculation of total deflections

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

III B. Tech I Semester Regular/Supplementary Examinations, October/November- 2016
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 plain concrete footing for to a rectangular column 30cm x 30cm carrying an axial service load of 330 kN (under service loads due to dead and live loads). The net bearing capacity of soil is 360 kN/m^2 at a depth of 1.0 m below ground level.. Use σ_y = 415 N/mm^2 and σ_{ck} = 20 N/mm^2.Draw to scale : [28M]
   a) Longitudinal section showing the reinforcement details.
   b) The plan showing reinforcement details.

OR

2 Design a simply supported roof slab for a room 4.5 m x 6 m measuring from inside. Thickness of the wall is 400 mm. The superimposed load exclusive of the self weight is 2.5 kN/m^2. The slab may be assumed to be simply supported on all four edges with corners held down. Use M20 mix and Fe 415 grade steel. [28M]
   a) Draw the reinforcement of the slab in plan view
   b) Draw cross section of the slab including beams with reinforcement details.

PART -B

3 Design a rectangular beam for an effective span of 6m.The-superimposed load is 80kN/m and size of the beam is limited to 30cm x 70cm. Use M20 mix and Fe415 grade steel. [14M]

4 An RC beam has an effective depth of 450mm and breadth of 300mm. It contains 5-20mm bars mild steel out of which two bars curtailed at a section where shear force at service load is 100kN. Design the shear reinforcement if the concrete is M20 [14M]

5 Design a section of a ring beam 50cm wide and 65cm deep subjected to a bending moment of 120kNm, twisting moment of 7.5-kNm and shear force of 150 kN at ultimate. Use M20 mix and Fe 415 grade steel [14M]

6 a) Explain clearly the difference in the behavior of one-way slabs and two-way slabs with reinforcement details. [14M]

   b) Explain need for corner reinforcement in two way rectangular slabs whose corners are prevented from lifting up

7 Explain short-term deflection. Explain the difficulty in estimating short term deflection as per IS code procedure when applied moment at service loads is marginally less than the cracking moment Are the nominal detailing requirements of the code adequate for ensuring crack width control? Comment. [14M]

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

III B. Tech I Semester Regular/Supplementary Examinations, October/November- 2016
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 simply supported rectangular beam to carry 35kN/m superimposed load over a span of 5m on 330mm wide supports. Use M20 grade concrete and FE 415 grade steel. Check the design for all necessary conditions. Draw to a suitable scale. [28M]
   a) Longitudinal section showing the reinforcement details.
   b) The cross section of the beam at salient points, showing reinforcement details.

OR

2 Design an isolated square footing for a column 300mm x 300mm reinforced with 8-16mm diameter bars carrying a service load of 1500 kN The bearing capacity of soil is 180 kN/m^2 at a depth of 1.5m below ground. The footing is restricted to 1.8 m in one direction Assume M20 grade concrete and Fe 415 grade steel for the footing and M25 concrete and Fe 415 steel for the column. [28M]

PART -B

3 a) What are the assumptions for the design of a reinforced concrete section for limit state of collapse in bending? [14M]
   b) Show that the limiting depth of neutral axis for a rectangular cross section reinforced with FE415 grade steel in 0.48d.

4 An L beam has flange of the beam is 90 cm x 12cm and web below is 23cm x 50cm. Determine the area of compression and tension steels needed for the cross section if it is to carry a factored bending moment of 400 kNm. Assume M20 concrete and TMT 500 grade steel**.** [14M]

5 An RC beam has an effective depth of 300mm and breadth of 150mm. It contains 4-20mm bars. Determine the shear resistance of the concrete beam if σ_{sv} = 415 N/mm^2 for (i) σ_{ck} = 20 N/mm^2 and (ii) σ_{ck} = 30 N/mm^2 [14M]

6 Design a short circular column 6m long to carry an axial load of 250kN if both ends of the column are fully restrained using (**i**) Lateral ties and (**ii**) helical steel. [14M]

7 Design a simply supported roof slab for a room 8m x 3.5m clear in size if the superimposed load is 5kN/m^2. Use M15 mix and Fe 415 grade steel. [14M]

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

III B. Tech I Semester Supplementary Examinations, May - 2016
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 footing for a column of section 350 × 350 mm which is subjected to an axial load of 1000kN and uniaxial moment of 350kN.m at service state. Consider weight of soil = 20kN /m^3, angle of repose = 30^0, allowable bearing capacity of soil = 150kN/m^3, concrete of grade M20 and steel of grade Fe 415. [28M]

(OR)

2 Design a continuous R.C. slab for a class room 6m wide and 12m long. The roof is to be supported on R.C.C. beams spaced at 3.0m intervals. The width of beam should be kept 230mm. The superimposed load is 3kN /m^2 and finishing load expected is 1kN/m^2. Use M20 concrete and Fe 415 steel. [28M]

PART -B

3 a) Justify the Code specification for the limiting neutral axis depth in Limit State Method. [7M]

b) What is the fundamental assumption in flexural theory? Is it valid at the ultimate state? [7M]

4 A rectangular beam is 200mm wide and 500mm deep. It is reinforced with 6 bars of 20mm diameter in compression with an effective cover of 50mm. Determine the area of tension reinforcement needed to make the beam section fully effective. What then would be the moment of resistance? Use M20 concrete and Fe 415 steel. [14M]

5 a) The provision of minimum stirrup reinforcement is mandatory in all reinforced concrete beams. Why? [7M]

b) Discuss the torque-twist relationship for (**i**) plain concrete, and (**ii**) reinforced concrete members subjected to pure torsion. [7M]

6 Design an axially loaded braced rectangular column for the following data. [14M]
Ultimate axial load P_u = 4000 kN
Unsupported length l = 3.25 m
Effective lengths l_{ex} = 3.0 m and l_{ey} = 2.5 m
Grade of concrete: M20 and grade of steel: Fe 415.

7 a) What are the advantages and disadvantages of providing large clear cover to reinforcement in flexural members? [7M]

b) Describe briefly the load transfer mechanism in a two-column combined footing. [7M]

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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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