Code No: RT32013 **R13** SET - 1

III B. Tech II Semester Regular Examinations, April - 2015
DESIGN AND DRAWING OF STEEL 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:800:2007; IS 875:1987(PART-3); IS 1384:1985; Steel tables is allowed.

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PART –A

1 Design a simply supported plate girder of span 15 m carrying a factred u.d.l. of 48 kN/m, using only end stiffeners. Assume compression flange is laterally supported. Draw to scale the cross section and longitudinal section. [28M]

2 Design a gantry girder to carry an overhead electrically operated crane for the following data: Span of gantry girder=6.0m, span of crane girder =18m, crane capacity =200kN, self weight crane girder=180kN, self weight of trolley=75 kN, Minimum hook approach=1.0 m, Distance between wheels=3.5m, self weight of rails=0.3kN/m, Draw to scale the cross section and longitudinal section. [28M]

PART -B

3 A tie member consisting of an ISA 80x50x8 section of Fe410 grade steel is welded to a 12mm thick gusset plate at site. Design welds to transmit load equal to the design strength of the member. [14M]

4 Determine the design bending strength of ISLB 350at 486N/m considering the beam to be laterally unsupported. The design shear force is less than the design shear strength. The unsupported length of the beam is 3.0m. Assume steel of grade Fe410. [14M]

5 Determine the design loads on the purlins of an industrial building near visakhapatnam, given : Class of building: General with life of 50 years, Terrain category 2. Maximum dimension =40m, width of building=15m, Height at eve's level=10m, Topography= θ less than 3^0, permeability= medium, span of truss = 16 m, pitch=1 in 5, sheeting = A.C. sheets, spacing of purlins= 1.35m, spacing of truss=4m. [14M]

6 Design a built up column of the effective length of 5m to carry an axial load of 900kN using lacing. Design the connections using fillet welds. The grade of the steel is E250. [14M]

7 Design a slab base for a built up column consisting of 2 MC 250 placed back to back separated by a distance of 160mm. The factored axial load on the column is 1200kN. [14M]

Code No: RT32013 **R13** SET - 2

III B. Tech II Semester Regular Examinations, April – 2016
DESIGN AND DRAWING OF STEEL 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:800:2007; IS 875:1987(PART-3); IS 1384:1985; Steel tables is allowed.

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PART –A

1 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 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. Draw to scale Plan and Elevation. [28M]

2 Design a gantry girder for an industrial building to carry an hand operated traveling crane with the following data. Crane capacity is 300 kN. Weight of crane excluding crab is 250 kN. Weight of crab is 6 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. Height of rail section is 75mm. Check the suggested section for bending stresses. Draw to scale the cross section and side view of the girder. [28M]

PART-B

3 a) Classify welds according to the following [7M]
i) According to position ii) According to type
iii) According to type of joint. Explain with neat diagrams.

b) Explain various types of butt welds. Describe procedure for designing a butt weld. [7M]

4 Design a suitable section for a beam of effective span 6m and carrying a superimposed load of 30kN/m including its self weight. Assume that the compression flange is fully restrained against lateral buckling. Apply necessary checks. [14M]

5 a) Explain Euler's formula for buckling of column. Define ideal column. Differentiate columns based on their buckling load for different edge conditions. [7M]

b) What is a column splice? Give various arrangements of providing column splicing. Discuss the design procedure of column splice. [7M]

6 Design the stiffener at 3m from the end of a plate girder of 15m span. It carries a dead load of 35 kN per meter run and a moving load of 50kN per meter run longer than the span. The web is 160cm × 1.2cm in section. Neglect impact. [14M]

7 Explain importance of purlins in a roof truss. List out various types of purlins and details of the loads acting on purlins and design procedure. [14M]

Code No: RT32013 **R13** SET - 3

III B. Tech II Semester Regular Examinations, April - 2016
DESIGN AND DRAWING OF STEEL 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:800:2007; IS 875:1987(PART-3); IS 1384:1985; Steel tables is allowed.

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PART –A

1 Design a suitable section for a simply supported gantry girder for the following data. Spacing of columns = 4m. Crane capacity = 160kN. Weight of the crane excluding the crab = 250kN. Weight of the crab = 60kN. Minimum clearance of cross travel = 0.8m. Wheel base = 4.2m. Centre to centre distance between gantry girders = 20m. Height of the rail = 105mm. Expected number of stress cycles = $2x10^6$. Grade of the steel = E250. Draw neat sketch of elevation of gantry girder with loads, cross section of gantry girder. [28M]

2 Design a welded simply supported plate girder for a span of 28m. The girder is loaded with a uniformly distributed load of the intensity 40kN/m due to dead and live loads. Consider the steel grade as E250. Draw cross section of plate girder and end portions of the plate girder. [28M]

PART –B

3 A tie member consists of two ISMC 250. The channels are connected on either side of a 12mm thick gusset plate. Design the welded joint to develop the full strength of the tie. However the overlap is to be limited to 400mm. [14M]

4 Design a simply supported beam of span 4 m carrying a reinforced concrete floor capable of providing lateral restraint to the top compression flange. The uniformly distributed load is made up of 20kN/m imposed load and 20 kN/m dead load (section is stiff against bearing). Assume Fe 410 grade steel. [14M]

5 Determine the tensile strength of a roof truss member consisting of 2 ISA 90 × 60 × 6 mm connected on either side by long legs to a gusset plate 8 mm thick by 4mm welds over an effective weld length of 200 mm. [14M]

6 An upper storey column ISHB 300 @ 577 N/m carries a factored load of 1200 kN and a factored moment of 12 kN-m. It is spliced with a lower storey column ISHB 400 @ 806 N/m. Design a suitable splice. [14M]

7 Design a gusseted base for a built up column consisting of 2 MC 250 placed back to back separated by a distance of 160mm. The factored axial load on the column is 1200kN. [14M]

Code No: RT32013 **R13** SET - 4

III B. Tech II Semester Regular Examinations, April - 2016
DESIGN AND DRAWING OF STEEL 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:800:2007; IS 875:1987(PART-3); IS 1384:1985; Steel tables is allowed.

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PART –A

1 Design a welded plate girder to carry a superimposed load of 50kN/m and two concentrated loads of 200kN each at one third points of the span. The effective span of the plate girder is 24m. Assume that the girder is laterally supported throughout its length. The yield strength of the steel of both the flanges and the web is 250MPa. Draw cross section of plate girder and end portions of the plate girder. [28M]

2 Design a gusseted base to carry an axial factored load of 3000 kN. The column is an ISHB 450 @ 855 N/m with two 250×22 mm cover plates on either side. The effective height, of column is 5 m. The column is to rest on a M20 concrete pedestal. Draw to scale the plan and elevation. [28M[

PART -B

3 Design a suitable longitudinal fillet weld to connect 120x8mm plate to 150x10mm plate to transmit a pull equal to the full strength of small plate. Assume welding is to be made in the field. [14M]

4 Design a laterally unrestrained beam to carry a uniformly distributed load of 30kN/m. The beam is unsupported for a length of 3m and is simply placed on longitudinal beams at its ends. [14M]

5 Determine the tensile strength of roof truss diagonal of 150×75×10mm connected by its long lag to a gusset plate 8mm thick by 6mm welds. Adopt f_y = 250 MPa. [14M]

6 Design a welded laced column of effective length 8 m to carry a factored axial load of 1000 kN using two channels placed back to back. Provide a single lacing system. [14M]

7 Calculate the design load carrying capacity in compression of discontinuous strut 3.m long consisting of two angle section 75×75×10 mm for: [14M]
i) Connected to the same side of a gusset plate 8mm thick
ii) Connected to both sides of 8mm thick gusset plate.
With welds of 8mm size Adopt f_y = 250 MPa.
