Code No: V3203 **R07** **Set No: 1**

III B.Tech. II Semester Supplementary Examinations, November/December - 2012

DESIGN OF STEEL STRUCTURES

(Civil Engineering)

Time: 3 Hours **Max Marks: 80**

Assume missing data suitably.

Answer ONE from Part-A (32 marks) and any THREE from Part-B (Each carries 16 marks)

IS-800-1984 to be permitted

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PART-A

1. Design the web and flanges of a plate girder for an effective span of 15m if the dead and live loads amount to 25 kN and 50kN respectively. Show curtailment of flanges using either graphical methods or by calculations. Draw to scale Longitudinal and Cross sections.

(Or)

2. 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. Draw to scale the Plan and Elevation.

PART-B

3. (a) Explain various types of fillet welds. Describe procedure for designing a fillet weld with relevant IS code provisions.
   (b) A tie bar consisting of a single angle 60mm× 60mm × 10mm is to be welded to a gusset plate. The tie bar carries a load of 150kN along the centroidal axis. Design the joint if both the side fillets and end fillets are to be provided. The centroidal axis of the angle lies at 18.5mm from the heel of the angle.

4. A girder in an industrial building has an effective span of 12m. Three concentrated loads 50kN are acting on the beam placed dividing the beam into four parts. No lateral restraint is provided in the span. Design the beam in steel to standard requirements.

5. 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.

6. What is lacing? Explain with neat sketches various types of lacings and their arrangement. Describe procedure for designing of lacing.

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.

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Code No: V3203 **R07** **Set No: 2**

III B.Tech. II Semester Supplementary Examinations, November/December - 2012

DESIGN OF STEEL STRUCTURES

(Civil Engineering)

Time: 3 Hours **Max Marks: 80**

Assume missing data suitably.

Answer ONE from Part-A (32 marks) and any THREE from Part-B (Each carries 16 marks)

IS-800-1984 to be permitted

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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.

(Or)

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.

PART-B

3. (a) Classify welds according to the following (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.

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.

5. 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 (ii) on the same side of the gusset plate.

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.

7. A Howe type roof truss is to be designed for a clear span of 15m with upper chord divided into three equal panels to serve as a roof for an Auditorium at Hyderabad. The building height is 12m. The roof covering will consists of asbestos sheet. Compute live loads, dead load and wind load for their combinations. Consider high permeability. Suggest proper purlin for the truss.

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Code No: V3203 **R07** **Set No: 3**

III B.Tech. II Semester Supplementary Examinations, November/December - 2012

DESIGN OF STEEL STRUCTURES

(Civil Engineering)

Time: 3 Hours **Max Marks: 80**

Assume missing data suitably.

Answer ONE from Part-A (32 marks) and any THREE from Part-B (Each carries 16 marks)

IS-800-1984 to be permitted

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PART-A

1. A column in an industrial building has to carry a total load axial load of 1800kN. Its length is 6m and is effectively restrained in position as well as direction at both the ends. Design a double I section with pates on both sides for the column and a slab base for foundation. Take safe compressive stress on concrete as 30MPa. Draw to scale Plan and Elevation.

(Or)

2. 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 and shear stresses. Draw to scale the cross section and side view of the girder.

PART-B

3. (a) Explain various types of butt welds. Describe procedure for designing a butt weld.
(b) A tie bar consisting of a single angle 60mm×60mm ×10mm is to be welded to a gusset plate. The tie bar carries a load of 150kN along the centroidal axis. Design the joint if both the side fillets and end fillets are to be provided. The centroidal axis of the angle lies at 18.5mm from the heel of the angle.

4. A beam ISMB 600 @123 kg/m has an effective span of 9m. Two floor joists transmit the floor load at a distance of 3m from each end. Determine the safe load which two floor joists can transmit on the beam if the beam is effectively restrained laterally by the floor joists.

5. (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?
(b) Design a tension splice to connect two plates of size 300 × 18mm and 250 × 10mm if the design load is 310 kN.

6. (a) Explain Euler's formula for buckling of column. Define ideal column. Differentiate columns based on their buckling load for different edge conditions.
(b) What is a column splice? Give various arrangements of providing column splicing. Discuss the design procedure of column splice.

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.

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Code No: V3203 **R07** **Set No: 4**

III B.Tech. II Semester Supplementary Examinations, November/December - 2012

DESIGN OF STEEL STRUCTURES

(Civil Engineering)

Time: 3 Hours **Max Marks: 80**

Assume missing data suitably.

Answer ONE from Part-A (32 marks) and any THREE from Part-B (Each carries 16 marks)

IS-800-1984 to be permitted

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PART-A

1. Design the web and flanges of a plate girder for an effective span of 14m if the dead and live loads amount to 20 kN and 40kN respectively. Show curtailment of flanges using either graphical methods or by calculations. Draw to scale Longitudinal and Cross sections.

(Or)

2. 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 1750kN. 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.

PART-B

3. (a) Explain various types of butt welds. Describe procedure for designing a fillet weld.
   (b) A tie bar consisting of a single angle 60mm× 60mm ×10mm is to be welded to a gusset plate. The tie bar carries a load of 150kN along the centroidal axis. Design the joint if both the side fillets and end fillets are to be provided. The centroidal axis of the angle lies at 18.5mm from the heel of the angle.

4. Design a floor beam for a warehouse with the following data. Effective span is 7m. Center to center spacing is 3m. Live load is 10kN/m^2. Depth of the beam is restricted to 400mm. it may be assumed that there are no cross girders provided.

5. Design a T section to act as a tension member carrying an axial tension of 220 kN. Check the suggested section for slenderness ratio.

6. What is lacing. Explain with neat sketches various types of lacings and their arrangement. Describe procedure of designing lacing.

7. Explain (a) Low permeability (b).Medium permeability (c).High permeability incorporated in calculation of wind pressure on trusses.

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