Code.No: 07A60103 | R07 | SET-1

**III B.TECH – II SEM EXAMINATIONS, DECEMBER - 2010**
**DESIGN OF STEEL STRUCTURES**
**(CIVIL ENGINEERING)**

**Time: 3hours** **Max.Marks:80**

**Answer any ONE question from PART-A**
**Answer any THREE questions from PART-B**

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**Note: IS code 800-1984, IS 875-Part III Steel tables are permitted.**

**Part – A** **1 x 32 = 32**

1. Design a built up column composed of two channel sections, placed back to back, carrying an axial load of 1400 kN. The length of the column is 7.5 m and is effectively held in position one end is retrained against relation. Design batten plates also. Draw to scale:
   a) Sectional elevation of column
   b) Cross section of column. [32]

2. Design a slab base for a column section ISHB 350 carries an axial load of 1500 kN. The permissible bearing pressure on concrete is 5 $N/mm^2$ and safe bearing capacity of soil is 200 $kN/m^{2.}$ Draw to scale:
   a) Side view of slab base
   b) Plan of the foundation. [32]

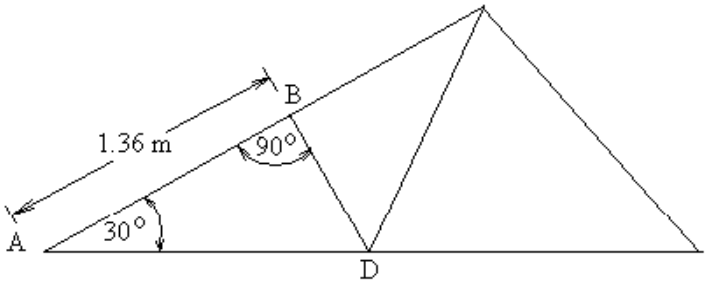
**Part – B** **3 x 16 = 48**

3. a) Explain the advantages of welded connections? With neat sketches explain the butt welds?
   b) The tension member of a truss consists of two angels of 50mm x 80mmx8mm. If the two angles are welded on either side of the gussets plate at the joint, design the joint. Axial tension in the member is 200 kN. Permissible shear stress in the welds is 110 $N/mm^2$. Use 6 mm fillet welds. [6 + 10]

4. a) With neat sketches explain different types of beam connections.
   b) A laterally supported beam having an effective span of 6 m consists of ISMB 550@103.7 kg/m with cover plate of 250 mm x 16 mm connected to each flange by 16 mm rivets. Determine the safe uniformly distributed load the beam can carry in addition to its over weight. [7 + 9]

5. Design a built up column composed of two channel sections placed back to back, carrying an axial load of 1300 kN. The effective length of the column is 5.95 m and $F_y$ = 250 $N/mm^2$. Also design a single lacing system. Sketch the cross-section of the column. [16]

6. The forces in the members of the roof truss at joint A, AB compression 500 kN and AD tension 600kN. Design the members AB and AD and the joint A as shown in the figure. Sketch the joint A including shoe detail. [16]




7. Design a welded plate girder 20 m span and simply supported at the two ends. It carries a uniformly distributed load of 120 kN/m. Design cross section and stiffeners. [16]

**--ooOoo--**

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**DESIGN OF STEEL STRUCTURES**
**(CIVIL ENGINEERING)**

**Time: 3hours** **Max.Marks:80**

**Answer any ONE question from PART-A**
**Answer any THREE questions from PART-B**

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**Note: IS code 800-1984, IS 875-Part III Steel tables are permitted.**

**Part – A** **1 x 32 = 32**

1. A column section ISHB 350@ 674 N/m carries an axial load of 1100 kN. The column is to be supported on a concrete pedestal. The permissible bearing pressure on concrete is 4N/mm$^2$. Design suitable slab base. Draw to scale:
   a) Side view of slab base
   b) Plan of the foundation. [32]

2. A column section ISHB 250 @ 0.51kN/m carries an axial load of 600 kN. Design a slab base for the column. The allowable bearing pressure on concrete is 4 kN/mm$^2$. The allowable bearing stress in the slab base is 185 N/mm$^2$ (MPa). Draw to scale:
   a) Side view of slab base
   b) Plan of the foundation. [32]

**Part – B** **3 x 16 = 48**

3.a) Design a lap joint for connecting two plates of 120mm x 10mm and 180mm x 10mm. The Safe shear stress in the weld is 110N/mm$^2$ and permissible tensile stress in the plate is 150 N/mm$^2$?
   b) A thin cylinder of 600 mm diameter is made by providing a lap joint with 8 mm fillet weld. Based upon the strength of the weld, determine the safe internal pressure that the cylinder can be subjected? [8+8]

4.a) Discuss about effective span and deflection limitations as per I.S code.
   b) Design a laterally un supported rolled steel I section for a simply supported beam with a clear span of 10 m. It carries of uniformly distributed load of 40 kN/m exclusive of self weight. [7+9]

5. Design a compression member of two channels toe-to-toe. The length of the compression member is 10m and carries a load of 1500 kN. The width over the backs of channels is 400mm. The channels are connected by battens Sketch the C/S of the column. [16]

6. Design I section purlin with and without sag bars for a trussed roof from the following data
   Span of roof = 12 m;
   Spacing of purlin along slope of truss = 2 m;
   Spacing of Truss = 4 m;
   Slope of roof truss = 1 vertical, 2 horizontal
   Wind load on roof surface normal to roof = 1200 N/m$^2$
   Vertical load from roof sheets, etc = 200 N/m$^2$. [16]

7. An I section is built up by welding 600 mm x 15 mm (thick) web plate and two flange plates 150 mm x 12 mm (thick). Design the welded joint to develop full strength of the section. Adopt safe stresses as per I.S. Code.

**--ooOoo--**

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**III B.TECH – II SEM EXAMINATIONS, DECEMBER - 2010**
**DESIGN OF STEEL STRUCTURES**
**(CIVIL ENGINEERING)**

**Time: 3hours** **Max.Marks:80**

**Answer any ONE question from PART-A**
**Answer any THREE questions from PART-B**

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**Note: IS code 800-1984, IS 875-Part III Steel tables are permitted.**

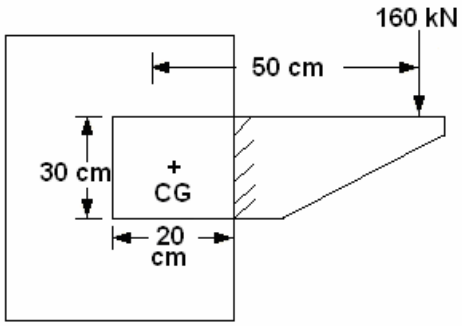
**Part – A** **1 x 32 = 32**

1. A steel stanchion, consisting of ISHB 350 @ 67.4 kg/m carries an axial load of 400 kN and a moment of 50 kN-m in the plane of the web. Design the base of the column with attached base plate and initially tensioned bolts. The allowable bearing pressure on footing is 4 $N/mm^{2.}$ The bolts may be given initial tension of 140 $N/mm^2$. Draw to scale:
   a) Side view of slab base.
   b) Plan of the foundation. [32]

2. Design a riveted plate girder spanning 16 m and supporting a Uniformly Distributed Load of 80 kN/m and two concentrated loads of 400 kN at third points. Assume that the plate girder is effectively supported in lateral direction. Draw to scale:
   a) An elevation showing the plate girds with details.
   b) A plan of the flange showing curtailment of flange plates. [32]

**Part – B** **3 x 16 = 48**

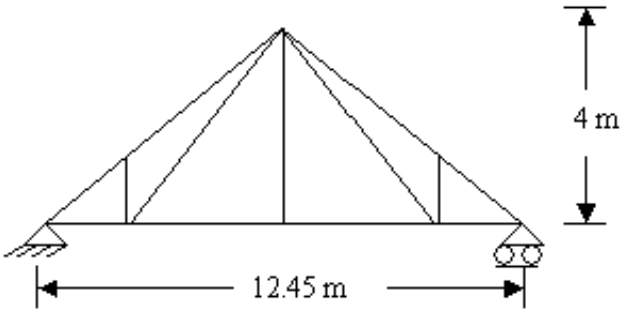
3. a) Explain the advantages of welded connections? With neat sketches explain different types of welds?
   b) Calculate the size of weld required for the welded bracket as shown in figure? [6+10]




4.a) Explain the shear and bearing stresses the beams are subjected to and the maximum permissible stresses as per IS 800.
   b) Design a simply supported beam of 8 m span carrying a uniformly distributed load of 40 kN/m if the beam is laterally unsupported. Each end of the beam is restrained against torsion and ends of compression flanges are fully restrained against lateral bending. [6+10]

5. A column made of ISMB 250 is carrying an axial force of 350 kN. Design base plate and anchor bolt to the column. [16]

6. Design the principal rafter of a steel roof truss shown in Figure for a clear span of 12.0 m. The truss is supported over masonary columns 45 cm x 45 cm. The trusses are placed 3 m c/c and support galvanized iron sheet on rafters and steel purlins. The rise of the truss is 1/3 of span. The design wind pressures may be assumed to be 1000 $N/m^2$.




7. Design suitable bearing for the plate girder bridge with the following data :
Effective span = 16 m
Maximum end reaction for one plate girder = 845.35 kN
Ranking force = 6000 N/mm
Braking force = 327 kN
Tractive force = 378 kN
Allowable concrete bearing strength = 4 $N/mm^2$.

**--ooOoo--**

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**DESIGN OF STEEL STRUCTURES**
**(CIVIL ENGINEERING)**

**Time: 3hours** **Max.Marks:80**

**Answer any ONE question from PART-A**
**Answer any THREE questions from PART-B**

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**Note: IS code 800-1984, IS 875-Part III Steel tables are permitted.**

**Part – A** **1 x 32 = 32**

1. Design a welded plate girder 24 m in effective span and simply supported at the two ends. It carries a uniformly distributed load of 100 kN/m. Design cross section and stiffeners. Draw to scale:
   a) Cross section of plate girder.
   b) Longitudinal elevation of plate girder. [32]

2. Design suitable bearing for the plate girder bridge with the following data:
   Effective span = 16 m
   Maximum end reaction for one plate girder = 845.35 kN
   Ranking force = 6000 N/mm
   Braking force = 327 kN
   Tractive force = 378 kN
   Allowable concrete bearing strength = 4 $N/mm^2$. Draw to scale:
   a) Cross section of plate girder.
   b) Longitudinal elevation. [32]

**Part – B** **3 x 16 = 48**

3.a) Design a lap joint for connecting two plates of 120mm x 10mm and 180mm x 10mm. The Safe shear stress in the weld is 110 $N/mm^2$ and permissible tensile stress in the plate is 150 $N/mm^2$?
   b) A thin cylinder of 600mm diameter is made by providing a lap joint with 8 mm fillet weld. Based upon the strength of the weld, determine the safe internal pressure that the cylinder can be subjected? [8+8]

4. a) With neat sketches explain different types of beam connections.
   b) A freely supported beam spanning 12 m is made up of I section ISMB 500 x 86.9 kg/m with two plates of 250 mm x 12mm in each flange. Calculate the maximum uniformly distributed load the beam can carry of the compression flange is fully restrained. Also design the curtailment of outer most plate in each flange. [6+10]

5. Design the slab base for a column consisting of ISHB 300 @ 588 N/m and carrying an axial load of 1000 kN. Take allowable bearing pressure on concrete as 4 $N/mm^2$. [16]

6. Design a channel section purlin with and without sag bars for a trussed roof from the following data:
Span of roof = 10 m
Spacing of purlin along slope = 1.8 m
Spacing of truss = 4 m
Slope of roof truss = 1 vertical, 2 horizontal
Wind load on roof = 1200 $N/m^2$
Vertical loads from roof sheets = 200 $N/m^2$. [16]

7. It is required to design a suitable mid-span section of built-up plate girder supporting a uniformly distributed load of 90 kN/m including its own weight. The girder has a simply supported span of 23 m. Use 22 mm diameter power driven rivets. [16]

**--ooOoo--**