Code No: RR-320103

Set No: 1

III B.Tech. II Semester Regular Examinations April/May-2005
STRUCTURAL ENGINEERING (DESIGN & DRAWING)(STEEL)
(Civil Engineering)

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

Answer any ONE question from part-A
Answer any THREE questions from part-B

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PART-A

(32 marks)

1. Design a gantry girder of span 6m for an E.O.T. crane of 100kN capacity. Shop width between column centers=16m. load on each carriage wheel=9.75kN.
   Bearing at each support = 15cm
   Wheel base = 3m
   Wt. Of the crab = 25kN
   Dead load of girder and rail = 8 kN.
   Draw to a suitable scale two views of the column bracket supporting the gantry girder, showing the rivets and other details.

2. Design a welded plate girder to cavy a live load of 80kN/m over a effective span of 20m. Draw to a suitable scale, the elevation, plan and section at mid-span showing the details.

PART-B

(48 marks)

3. Design a compound beam to carry a live load of 20kN/m and a central load of 240kN. Perform the usual checks. Sketch the section.

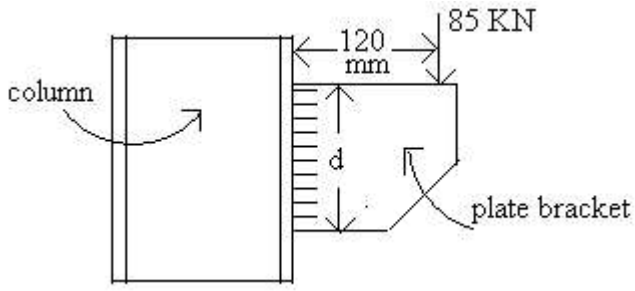
4. The tension member of a roof truss consists of a single ISA100 $\times$ 75mm $\times$ 10mm thick, connected at the end to a gusset plate with the longer leg vertical with 20mm dia rivets. Taking the permissible tensile stress as 150N/mm^2. Find the safe tensile load the member can carry.

5. Design a gusseted base for a column consisting of ISHB 400 $\times$ 806.4 N/m with 300 $\times$ 14mm plates on each flange. The column carries a load of 1900kN. The column is supported on concrete pedestal having a bearing capacity of 4 Mpa. Sketch the details.

6. The principal rafter of a steel roof truss consists of two angles 125 $\times$ 75 $\times$ 10mm placed back to back on opposite sides of a 10 mm gusset with the 75 mm legs turned out. The length of rafter between the nodes is 1.5 m. The purlin reaction is 20kN and acts normal to the rafter at a distance of 600mm from one of the node points. The axial compressive force in the rafter is 200kN. Check the adequacy of the section the permissible bending stress is limited to 165N/mm^2. Take f_y=250N/mm^2.

Contd……2

7. A 12 mm thick plate bracket is hitt welded to the flange of a column as shown in the figure.1. The bracket transmits an end reaction of 85kN at a distance of 120mm from the face of the column. Design the joint the permissible bending stress = 165N/mm^2 for estimating the depth of the bracket.



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Code No: RR-320103 **Set No: 2**

III B.Tech. II Semester Regular Examinations April/May-2005
STRUCTURAL ENGINEERING (DESIGN & DRAWING)(STEEL)
(Civil Engineering)

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

Answer any ONE question from part-A
Answer any THREE questions from part-B

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PART-A

(32 marks)

1. Design a suitable section for a gantry girder to be used in a mill building to carry on elective overhead traveling crane for the following data:
   C/C distance between columns = 8m
   C/C of gantry rails = 15 m
   Crane capacity = 160kN.
   Minimum distance from face of the side column to the center of sentry rail=30cm.
   Approximate distance from center of side column to the center of gantry rail=45cm
   Approximate minimum approach of crane hook to the gantry girder = 1m
   C/C of carriage wheel ie wheel base = 3m
   Weight of crane girder excluding moving trolley = 200kN
   Weight of trolley, electric motor hooks etc = 60kN.
   Draw to a suitable scale two important views showing details, liveting etc.

2. A plate girder of span 18m has to carry a live load of 120kN/m. Design the section of the girder and the curtailment of flange plates. Draw to a suitable scale the elevation and section showing details.

PART-B

(48 marks)

3. A simply-supported beam of span 12m is made up of an ISMB500×852.5 N/m with two flange plates in each flange of 250×12mm each. If the permissible bending stress is 165 N/mm^{2}find the u.d.l. the beam can carry. The compression flange is fully restrained and 18mm dia. meters are used. At what distance from ends can you curtail the outer most plate in each flange? Design the rivets also in each flange?

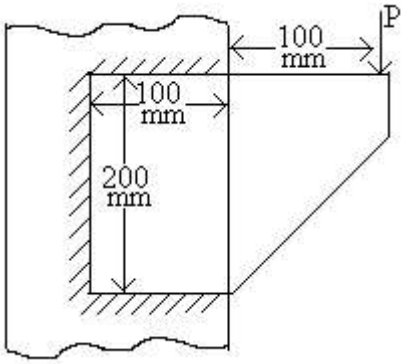
4. The tie of a truss carries an axial tension of 225kN. Design the section of member and also its connection to a 10 mm thick gusset plate. Use 20mm dia. rivets.

5. Design the base plate for a column ISHB 300×576.8N/m carrying a load of 600kN and a B.M of 10kN-m. It is supported on a concrete pedestal having bearing capacity of 4.2Mpa. Design concrete pedestal also if SBC=300kN/m^2.

Contd……2

6. Design a column section to support a load of 1000kN. The section shall consist of 4 equal angles, the overall dimensions of the section being 240mm×240mm. The column has an effective length of 4m. Take f_y=250N/mm^2.

7. The Figure shows eccentric welded connection with 8mm fillet welds. Determine the max. load "P" per bracket plate which can be applied on the connection. Shear stress in the weld is not to exceed 110N/mm^2.



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Code No: RR-320103 **Set No: 3**

III B.Tech. II Semester Regular Examinations April/May-2005
STRUCTURAL ENGINEERING (DESIGN & DRAWING)(STEEL)
(Civil Engineering)

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

Answer any ONE question from part-A
Answer any THREE questions from part-B

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PART-A

(32 marks)

1. Design a crane girder to be used in a workshop, where the columns are placed at 16 m C/C. Other data is
   Crane capacity = 100kN
   Weight of crab = 40kN
   Weight of crane excluding crab = 160kN
   Wheel base = 3.5m
   C/C distance of crane girders = 25m
   Minimum clearance between center of crane girder and travel = 1.2m
   Draw to a suitable scale two views of the column bracket supporting the gantry girder, showing the rivets and other details.

2. Design a welded plate girder to carry a live load of 100kN/m over an effective span of 24m
   Draw to a suitable scale the elevation, sectional plan and section at mid span showing details.

PART-B

(48 marks)

3. Design a simple beam of span 8m to carry a live load of 24kN/m. Perform the usual check. Sketch the C.S.

4. Design the section of a tension member of a roof truss if it carries an axial tension of 250kN. Take the dia. of connecting revits as 20 mm. Safe stress in tension = 150 N/mm^2. Sketch the section.

5. Design a built up column of effective length 4.75 m to support an axial load of 2000 kN. The column shall consists of 4 angles so that the overall plan dimensions of the column shall be 400mm×400mm. Take f_y=250N/mm^2 Design the lacing also. Sketch the details.

6. A steel column ISHB 250×54.7kg/m supports a total load of 750kN. Design a slab base for the column. The column is supported on a concrete pedestal whose bearing capacity may be taken as 4N/mm^2. D4esign the concrete pedestal also, if the safe bearing capacity of soil=300kN/m^2.

7.a) Illustrate the different types of roof trusses with sketches giving their suitability.
b) Design of welds subjected to moment acting in the plane of the joint.

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Code No: RR-320103 **Set No: 4**

III B.Tech. II Semester Regular Examinations April/May-2005
STRUCTURAL ENGINEERING (DESIGN & DRAWING)(STEEL)
(Civil Engineering)

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

Answer any ONE question from part-A
Answer any THREE questions from part-B

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PART-A **(32 marks)**

1. Design a 8m gantry girder for a 156kN E.O.T. crane with 3m wheel base. The max load on each carriage wheel is 100kN. Allow an impact of 30%. Assume the effect of lateral forces to be carried equally by all the wheels of crane girders to $1/7^{th}$ crane capacity treated as live load. Draw to a suitable scale two important views showing the details, rivet spacing etc.

2. Design a riveted or welded plate girder of 20m span to carry a live load of 100kN/m. Draw to a suitable scale the elevation, plan and section showing details.

PART-B **(48 marks)**

3. Design a suitable section for a beam to carry a live-load of 20kN/m over a span of 8m. Carry out the usual checks. Sketch the section.

4. Design a horizontal tension member of a roof truss to carry a tensile load of 600kN. The member is of length 3m. It is connected to a 45mm thick gusset plate by 20mm dia. rivets.

5.a) Design a suitable R.S. section to carry a load of 400kN, if the height of column is 5m. Take the ends unrestrained in direction only.

b) Design a slab base for a column ISHB 300×576.8N/m carrying a load of 700kN. It is supported on a concrete pedestal having bearing capacity of $4N/mm^2$. Sketch the plan showing details.

6. A pitched roof is to be provided for a workshop of span 18 m. The trusses are spaced at 4m C/C and purlins at 1.6m C/C. The pitch of the roof is 30^o. The weight of the roofing material is $160N/m^2$ and the normal wind pressure is $1200\ N/m^2$. Design an angle purlin take the allowable bending stress=$165\ N/mm^2$.

7. Find the maximum force per mm run on the weld for the bracket connection shown in the figure 1. Find a suitable size of the weld, if the permissible shear stress in the weld=$110N/mm^{2.}$

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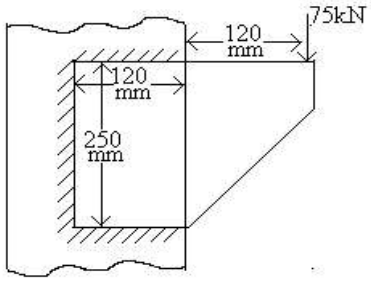
75kN
120
mm
120
mm
250
mm

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