Code No: RR320103

Set No. 1

III B.Tech. II Semester Regular Examinations, November-2005

STRUCTURAL ENGINEERING DESIGN & DRAWING-II (Steel)

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

PART-A

Note: Assume suitable date wherever necessary
Answer any ONE question from PART-A
and any THREE questions from PART-B
Use of IS codes & Structural Tables is permitted

PART-A(Bridges) **(Marks:32)**

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1. Design a crane girder for the following data :-

c/c of columns	=	16 m
crane capacity	=	100 kN
Wt. of crab	=	40 kN
Wt. of crane excluding crab	=	160 kN
c/c of crane girders	=	25 m
Wheel base	=	3.5 m

Minimum clearance between centre of crane girder of travel = 1.2 m. [24]
Draw to a suitable scale the details. [8]

(OR)

2. Design the compression member carrying maximum force and the tension member carrying minimum force for the roof-truss shown in Figure 1. [24]
Draw to a suitable scale the details. [8]

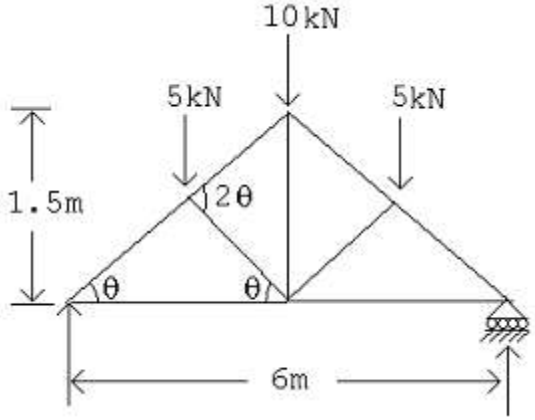

Figure: 1

Contd..2

PART-B **(16X3=48)**

3. A circular plate of 150mm diameter is welded to another plate by means of 6mm fillet weld. Calculate the maximum twisting moment that can be resisted by the weld. The permissible shearing stress in the weld = 110 N/mm^2. [16]

4. An ISMB 400？61.6 kg/m with cover-plates at top and bottom is used as a beam of 4m span to support a u.d.l. of 35 kN/m together with a central load of 20kN. Find the size of the cover plates. Sketch the section if the permissible stresses in bending and shear are 165 and 100 N/mm^2 respectively. [16]

5. Design a column section consisting of 4 equal angles to carry a load of 1000 kN, if the overall dimensions of the section are 240？240mm. The effective length of column = 4m and f_y = 250 Mpa. [16]

6. A column ISMB 300？200 with one cover plate (300？25mm) for each flange carrier an axial load of 2300 kN. Design a gusseted base plate for the column. Use 18 mm diameter rivets or suitable weld. [16]

7. Design the flange splice in a plate girder if a 10 mm thick flange plate has to be spliced at a section 5m from left support. The stress in the flange at the splice section = 161.2 N/mm^2. Use 20 mm diameter rivets or suitable welding. [16]

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Code No: RR320103

Set No. 2

III B.Tech. II Semester Regular Examinations, November-2005

STRUCTURAL ENGINEERING DESIGN & DRAWING-II (Steel)

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

PART-A

Note: Assume suitable date wherever necessary
Answer any ONE question from PART-A
and any THREE questions from PART-B
Use of IS codes & Structural Tables is permitted

PART-A(Bridges) **(Marks:32)**

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1. Design a 8m gantry girder for a 156 kN E.O.T. with 3m wheel base. The maximum load on each carriage wheel is 100 kN. Allow an impact of 30%. Assume the lateral forces to be carried equally by all the wheels of crane girders to $1/7^{th}$ capacity of the crane treated as a live load. [24]

   Draw to a suitable scale the details. [8]

(OR)

2. Design one tension member and one compression member carrying minimum forces of the roof truss loaded as shown in Figure 1. [24]

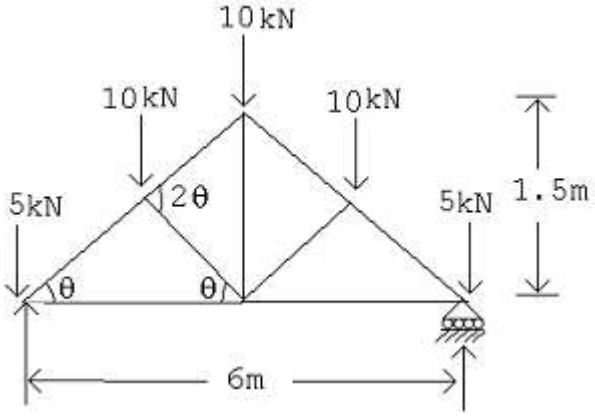

Figure: 1

Draw to a suitable scale the details. [8]

Contd…2

PART-B **(Marks: 3X16=48)**

3. Design a lap joint for connecting two plates of sizes 150？10mm and 200？10mm if the safe shear stress=110N/mm^2 in the weld. The permissible tensile stress in the plate = 150N/mm^2.
(Note:- design the joint for the maximum strength of smaller plate) [16]

4. Design a simply supported beam to carry a live load of 30 kN/m over a span of 6m assuming the compression flange is laterally restrained throughout the length. Take f_y = 250 N/mm^2. [16]

5. Design the lacing for a column designed to carry an axial load of 1000 kN. The effective length is 10 m and f_y = 250 Mpa. The section consists of two channels ISLC(350？100？38.8kg/m) placed back to back at a spacing of 230mm. [16]

6. Design a slab base for a column ISHB 300？250？58.8 kg/m carrying an axial load of 700 kN. It is supported on a concrete pedestal having bearing capacity of 4 N/mm^2. [16]

7. Fix up the section of a plate-girder to carry a live load of 100 kN/m over an effective span of 24m. Check the section. [16]

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Code No: RR320103

III B.Tech. II Semester Regular Examinations, November-2005

Set No. 3

STRUCTURAL ENGINEERING DESIGN & DRAWING-II (Steel)

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

PART-A

Note: Assume suitable date wherever necessary
Answer any ONE question from PART-A
and any THREE questions from PART-B
Use of IS codes & Structural Tables is permitted

PART-A(Bridges) **(Marks:32)**

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1. Design a grantry girder of 6m span for an E.O.T. crane of capacity 100kN.

Shop width between column	=	16m c/c.	
Load on each carriage wheel	=	97.5kN	
Weight of crab	=	25kN	
Wheel base	=	3m	
Span of crane	=	15.2m	
Bearing at each support	=	150mm	
c/c of bearings	=	5.85m	[24]
Draw to a suitable scale the details.			[8]

(OR)

2. Design the tension member carrying maximum force and the compression member carrying minimum force for the roof-truss loaded as shown in Figure 1. [24]
Draw to a suitable scale the details. [8]

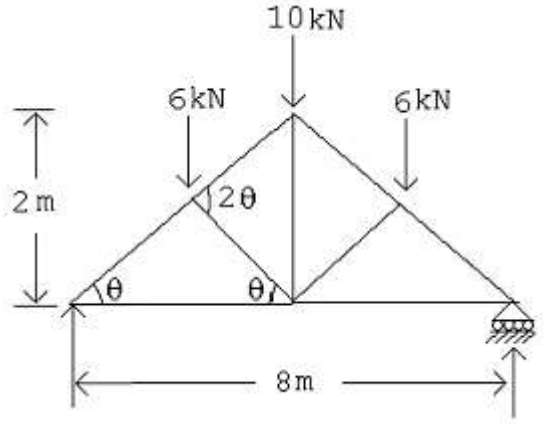

Figure: 1

Contd…2

PART-B **(Marks: 3X**16=**48)**

3. Find the size of weld required for the welded bracket loaded as shown in the Figure 2, if the allowable shear stress in the weld = 100 N/mm^2. [16]

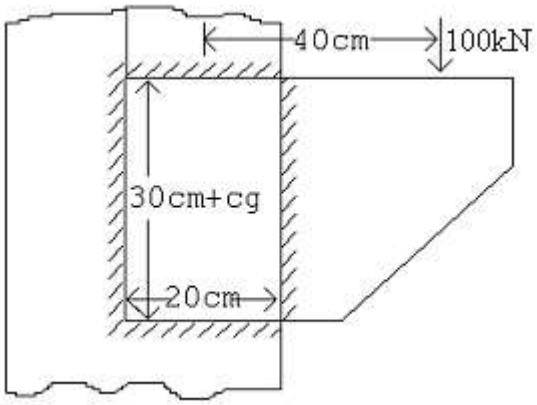

Figure: 2

4. Design a compound beam of span 12m carrying a u.d.l. of 2kN/m and point loads of 200kN at third points the permissible stresses in bending and shear are 165 and 100 N/mm^2. [16]

5. Find the safe load that can be carried by a tension member consisting of two angles 50?50?6mm placed back to back and connected on opposite sides of 8mm thick gusset by 16mm diameter rivets. [16]

6. Design a slab base plate for a steel column ISHB 350?67.4 kg/m carrying a total load of 900kN. The bearing strength of pedestal concrete = 4N/mm^2. [16]

7. Design a plate girder section to carry a live load of 120kN/m over a span of 18m. The pemissible stresses in bending and shear are 165 and 100 N/mm^2 respectively. [16]

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Code No: RR320103

Set No. 4

III B.Tech. II Semester Regular Examinations, November-2005

STRUCTURAL ENGINEERING DESIGN & DRAWING-II (Steel)

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

PART-A

Note: Assume suitable date wherever necessary

Answer any ONE question from PART-A

and any THREE questions from PART-B

Use of IS codes & Structural Tables is permitted

PART-A(Bridges) **(Marks:32)**

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1. Design a gantry girder for the following data: -

Effective span of gantry girder	=	7.3m
Effective span of crane girder	=	17 m (c/c of gantry rails)
Distance between the pair of carriage wheels moving on each rail = 3.6m		
Capacity of overhead crane	=	150kN
Weight of crab	=	50kN
Total weight of crane girder excluding crab	=	180kN
Weight of gantry girder inclusive of rail	=	1.8kN/m
Impact for vertical wheel loads	=	25%
Lateral load due to horizontal surge	=	10% of lifted weight of weight of crab. [24]

Draw to a suitable scale the details. [8]

(OR)

2. Design one compression member and one tension member carrying maximum forces of the roof-truss loaded as shown in Figure 1. [24]

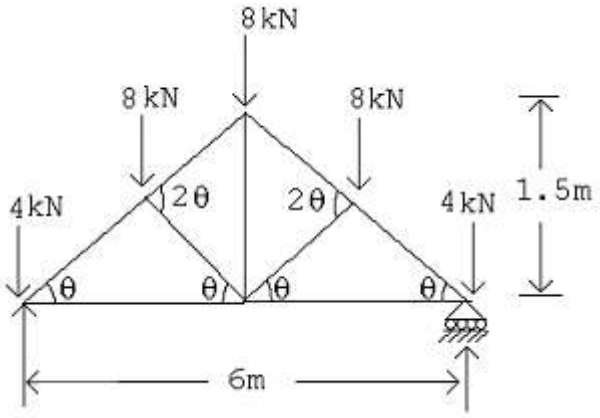

Figure: 1

Draw to a suitable scale the details. [8]

Contd…2

PART-B **(Marks: 3X**16=**48)**

3. Find the size of the weld for the bracket connecting a plate to a column flange shown in Figure 2, taking the permissible shear stress in the weld = 100N/mm^2. [16]

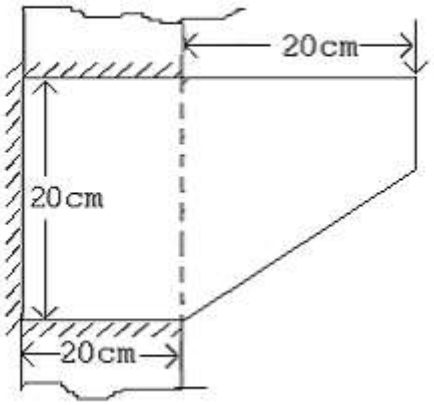

Figure: 6

4. Design a simply-supported beam of span 4.75m carrying a live load of 30kN/m. The safe stress in bending = 165N/mm^2 and in shear = 100N/mm^2 [16]

5. Design a single angle strut of a truss to carry a compressive load of 25kN, if its effective length = 2.75m. [16]

6. A steel column ISHB 250？ 54.7kg/m supports a total load of 750kN. Design the slab base for the column. The bearing strength of concrete pedestal = 4N/mm^2. [16]

7. The section of a plate girder designed for a live-load of 100kN/m over an effective span of 24m consists of web plate 2000？1mm
2 Flange plates 440？20mm for each flange
2 Flange angles 150？150？15mm for each flange
Flange angles are connected to the plates by 2 rivets in each angle by staggered riveting 20mm diameter.
Design the curtailment of top plate and sketch the details. [16]

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