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Question Paper Code : 33238

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2013.

Sixth Semester

Civil Engineering

CE 1352 /CE 1354/ 070100047 — DESIGN OF STEEL STRUCTURES

(Regulation 2004/2007)

(Common to B.E (Part-Time) Fifth Semester – Civil Engineering – Regulation 2005)

Time : Three hours Maximum : 100 marks

Instructions :

(1) Answer ALL questions

(2) IS 800 and Steel tables are permitted

(3) Use yield stress of steel as 250 MPa and assume suitable data wherever necessary.

PART A — (10 × 2 = 20 marks)

1. What is a high tension bolt? How is it different from common black bolt?

2. List the advantages of welded connection over bolted connection.

3. Write the use of lug angle in tension connection.

4. What is shear lag effect?

5. Draw a neat sketch of a slab base and name the parts.

6. What is the purpose of lacing in a built up laced column?

7. Draw a neat sketch of plate girder and indicate the vertical and horizontal stiffeners.

8. Under what circumstances, load bearing stiffeners are used in plate girder?

9. Which section is best suited for a purlin?

10. How is the selection of section made for roof truss elements?

PART B — (5 × 16 = 80 marks)

11. (a) A plate bracket carrying a load of 120 kN at an eccentricity of 120 mm is connected to the face of a steel stanchion ISMB 300 by fillet welds on both the sides of the bracket plate as shown in fig Q. 11 (a)

(i) Determine the size of the fillet weld required (ii) If 8 mm fillet weld is used, determine the depth of the bracket. (iii) If 8 mm fillet weld is used with a bracket of 300 mm depth, calculate the resulting stress in the weld. Thickness of the bracket is 10 mm. Depth of weld = 350 mm.

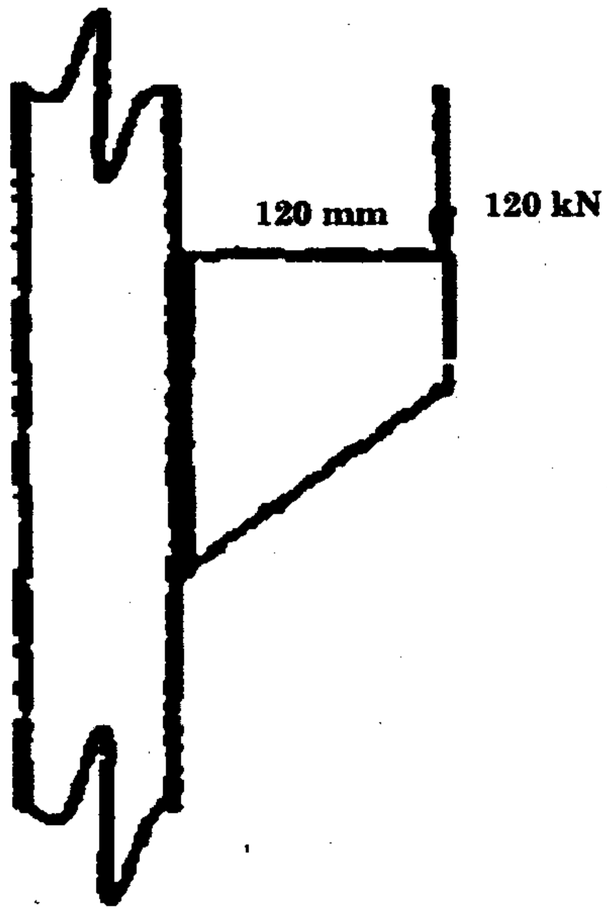

Fig Q. 11 (a)

Or

(b) Check the safety of the bolted connection. Edge distance = 50 mm Vertical distance between bolts = 65 mm, horizontal distance between bolts = 55 mm. Diameter of bolts is 24 mm. Inclination of the load with the horizontal is 40°. Refer Fig. Q. 11(b)

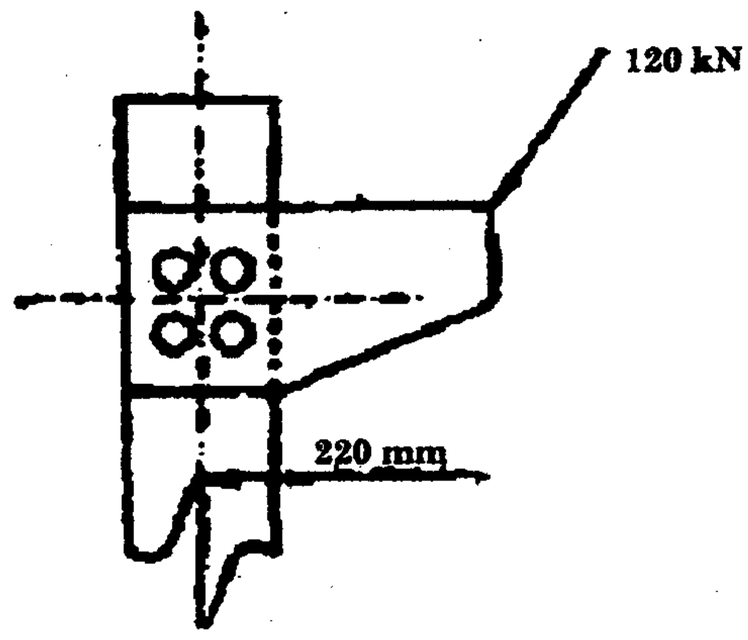

Fig. Q 11 (b)

12. (a) A diagonal member of a roof carries a maximum axial full of 300 kN Design the section and the connections with a 14 mm gusset plate. The length on the gusset plate available for making the connection is 310 mm. Design the lug angle also if required. The steel is of yield stress of 250 N/mm^2.

Or

(b) Design a splice for tension member sections 160×10 mm and 250×14 mm. The member is subjected to a pull of 200kN. Assume f_v = 250N/mm^2.

13. (a) Design completely a built–up column composed of channel sections placed back to back and carrying an axial load of 1500 kN. Its length is 6 m and it is effectively held in position at both ends and restrained against rotation at one end. Take f_y = 250 N/mm^2.

Or

(b) Design a gusseted base for a column ISHB 450@ 87.2kg/m, carrying an axial load of 2000 kN. Take the allowable bearing pressure on concrete as 4N/mm^2.

14. (a) The ISHB 400 @ 77.4 kg/m is used as a laterally unsupported beam with a cover plate of 250 mm × 12 mm provided on either flanges and connected through 20 mm diameter common bolts in two rows along the span of 8 m. Determine the moment of resistance of the section if each end of the beam is restrained against torsion and ends of the compression flange are fully restrained against lateral bending (they are not free to rotate in plan at bearings)

Or

(b) A normal I section (symmetrical) plate girder is simply supported over a span of 15 m carries uniformly distributed load of 100 kN/m inclusive of its own weight. Design the section with the provisions for bearing stiffeners at the ends, intermediate vertical stiffeners and its welded connections and horizontal stiffeners and its connections.

15. (a) Design a purlin for a roof truss having the following data:

Span of the truss = 6.0 m

Spacing of truss = 3 mc/c

Inclination of roof = 30°

Spacing of purlin = 2m c/c

Wind pressure = 1.5 kN/m^2

Roof coverage = AC. sheeting weighing 200 N/m^2

Provide a channel section as purlin.

Or

(b) Design a gantry girder to be used in an industrial building carrying an EOT crane for the following data:

Crane capacity = 200 kN

Total self weight of all components = 240 kN

Minimum approach at the crane hook of gantry girder = 1.2 m

Wheel base = 3.5 m

C/c distance between gantry rails = 16 m

C/c distance between columns = 8 m

Self weight of rail section = 300 N/m

Yield stress = 250 N/mm^2

Design the main gantry section. Connection design not required.
