Register Number ……..

B.E. DEGREE EXAMINATIONS: APRIL / MAY 2010

Sixth Semester

CIVIL ENGINEERING

U07CE603: Design of Steel Structures

(IS 800-2007, IS 875, Steel Tables may be permitted) (Assume suitable data's if needed)

Time: Three Hours **Maximum Marks: 100**

Answer ALL Questions:-

PART A (10 x 1 = 10 Marks)

1. Tension members are also known as _____

   a. Horizontal member b. Tie member c. Beam d. Lateral members

2. How many minimum numbers of bolts or rivets should be used for attaching lug angle to gusset plate

   a. 2 numbers b. 4 numbers c. 3 numbers d. 1 number

3. Compression members in trusses is called as _____

   a. Column b. strut c. short column d. Purlin

4. Lacing bars shall be inclined at _____ degree to the axis of built up member

   a. 30 b. 40 c. 80 d.25

5. When a structural member length is larger than cross section is called _____

   a. Gusset b. purlin c. Rafter d. column

6. _____ is a member which rest between roof trusses and supports roof sheeting

   a. Rafter b. purlin c. Cleat angles d. beam

7. The member which do not belong to top or bottom chord but are mainly subjected to tension is called _____

   a. Slings b. strut c. Slag tie d. purlin

8. Expand ISHB

   a. Indian Standard High Beams b. Indian Standard Height Beam

   c. Indian Standard Heavy Beam d. Indian Standard Heat Beam

9. Advanced Codal Provision for Designing Steel Structures

   a. IS 800-1983 b. IS 800- 1987 c. IS 800-2000 d. IS 800-2007

10. The design of wind pressure is given by

    a. 0 .6 V_z^2 b. 0.4 V_z^2 c. 1.2 V_z^2 d. 0.7 V_z^2

PART B (10 x 2 = 20 Marks)

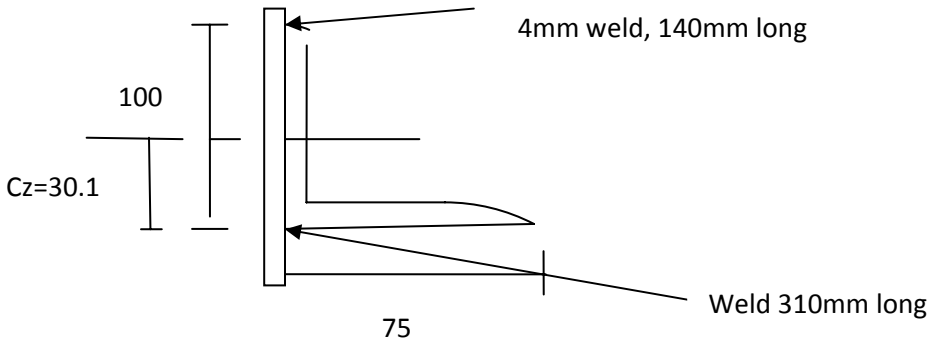
11. Define tension member
12. What is a lug angle? Why lug angles are used?
13. Define Slenderness Ratio.
14. Define Radius of Gyration.
15. What do you understand about beam?
16. What are the two types of beams based on lateral supports?
17. Define pitch of trusses.
18. What are the main loads to be considered for truss?
19. List the two types of steel chimney?
20. List the various types of steel tank?

PART C (5 x 14 = 70 Marks)

21. a) Design a double angle tension member connected on each side of a 10mm thick gusset plate, to carry an axial factored load of 375kN. Use 20mm black bolts. Assume shop connection.

(OR)

b) Determine the tensile strength of the roof truss diagonal 100X75X6mm, fy=250MPa connected to the gusset plate by 4mm weld as shown in fig



22. a) A Column 4m long has to support a factored load of 6000kN. The column is effectively held at both the ends and restrained direction at one of the ends. Design the column.

(OR)

b) Design a laced column with two channels back to back of length 10m to carry an axial load of 1400 kN. The column may be assumed to have restrained in position but not in direction at both ends (hinged ends).

23. a) An ISMB 500 section is used as a beam over a span of 6m, with simply supported ends. Determine the maximum factored uniformly distributed load that the beam can carry if the ends are restrained against torsion but compression beam is laterally unsupported.

(OR)

b) A no sway column in a Building frame with flexible joints is 4m high and subjected to the following load and moment:

Factored axial load = 500kN

Factored moment of top column = 27kN.m

Factored moment of bottom = 45kN.m

Assuming fy=250N/mm$^{2.}$ Take the effective length of the column as 0.8L along both the axis.

24. a) Design a purlin on a sloping roof the dead load of 0.15k N/m^2 , a live load 2 kN/m^2 and wind load of 0.5k N/m^2. The purlins are 2m centre to centre and of span 4m, simply supported on a rafter at a slope of 20 degrees, provide a channel section.

(OR)

b) Design a simply supported Gantry girder to carry one electric overhead travelling crane, given:

Span of gantry girder = 6.5m

Span of crane girder = 16m

Crane capacity = 250kN

Self weight of crane girder excluding trolley =280kN

Self weight of trolley = 50kN

Minimum hook approach = 1m

Distance between the wheels = 3.5m

Self weight of the rails = 0.3kN/m

25. a) Design an overhead riveted steel rectangular flat bottom tank of capacity the available width of plate is 1.22m and length up to 6.1m. The staging consists of 4 columns spaced at 4.88X3.66m and the bottom of the tank is 9.14m above G.L. Design also the supporting beams.

(OR)

b) A self supporting steel stack chimney is 80m high and its diameter at the top is 3m. Design the plates for stack. Adopt the wind force as per IS 875. The location of the place is such that the intensity of wind pressure up to 30m high is 1.50kN/^{2}.

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