B.E. DEGREE EXAMINATIONS: APRIL/MAY 2011

Sixth Semester

CIVIL ENGINEERING

U07CE603: Design of Steel Structures

Use IS 800 and Steel Tables are permitted.

Time: Three hours   **Maximum Marks: 100**

Answer ALL Questions:-

PART A (10 x 1 = 10 Marks)

1. The maximum slenderness ratio permissible in steel ties is

    a) 250   b) 350   c) 450   d) 400

2. Minimum number of rivets to connect lug angle is

    a) 2   b) 1   c) 3   d) 4

3. Radius of gyration (r) is

    a) $\sqrt{I/A}$ b) $\sqrt{A/I}$ c) $I/\sqrt{A}$ d) $\sqrt{A/R}$

4. Effective length of battened column should be increased by

    a) 20%   b) 10%   c) 25%   d) 5%

5. A structural member carrying axial compressive force is known as

    a) Slab   b) strut   c) Beam   d) Wall

6. Maximum shear stress occurs at

    a) Neutral axis   b) Central axis   c) Vertical axis   d) Horizontal axis

7. A beam supported by roof truss is called

    a) Header   b) Girt   c) Lintel   d) Purlin

8. Economical spacing of truss is

    a) 2/3 to 1/5   b) 1/3 to 1/5   c) 1/5 to 1/8   d) 2/3 to 2/5

9. The height of the water tank will be multiples of

    a) 1.55m   b) 1.0m   c) 1.25m   d) 2.25m

10. The height of the flared base of chimney varies from

    a) 1/8th to 1/4th   b) 1/6th to 1/8th   c) 1/2th to 1/4th   d) 1/3th to 1/8th

PART B (10 x 2 = 20 Marks)

11. Draw a neat sketch a tension member connected using Lug angle.

12. What are the different modes of failure in tension member?

13. What is slenderness ratio?

14. Mention the types of lateral systems used in built up columns.

15. What is meant by web buckling?

16. What is meant by laterally supported beam?

17. What is meant by risk coefficient?

18. Draw any two types of steel roof truss.

19. Give the reasons for providing lining in steel chimneys.

20. Mention the different types of water tanks.

PART C (5 x 14 = 70 Marks)

21. a) A Single unequal angle 100 x 75 x 6 is connected to a 10mm thick gusset plate at the ends with six 16mm diameter bolts to transfer tension as shown in Fig.1. Determine the design tensile strength of the angle. The gusset is connected to the 100mm leg.

(OR)

b) Design a splice to connect a 300 x 20mm plate with a 300 x 10mm plate. The design load is 500KN use 20mm black bolts, fabricated in the shop.

22. a) Design a laced column 10-m long to carry a factored axial load of 1100 KN. The column is restrained in position but not in direction at both ends. Provide single lacing system with bolted connection. Design the column with two channels back-to back.

(OR)

b) Write down the steps followed by the design of column splices.

23. a) Design a simply supported beam of effective span 3m carrying a factored concentrated load of 360KN at mid span.

(OR)

b) Design a welded plate girder of span 30m to carry on superimposed load of 35 KN/m. Avoid use of bearing and intermediate stiffeners. Use fe 415 steel.

24. a) The trusses for a factory building are spaced at 4.5 m c/c and the purlins are space at 1.8m c/c. The pitch of truss is ¼ and the span of the roof is 10m. The vertical load from roof sheet is 180N/m^2 while the wind load on normal to the roof is equal to 1200N/m^2. Design the purlin. Take stress in bending tension=165N/mm^2

(OR)

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

Span of gantry girder = 6.5m

Span of crane girder = 16m

Crane capacity = 250 kN

Self w eight of crane girder excluding trolley = 280 kN

Self weight of trolley = 50KN

Minimum hook approach = 1.0m

Distance between wheels = 3.5m

Self weight of rails = 0.3KN/m

25. a) Design a rectangular steel water tank 7.5m x 6.25m x 2.5m deep supported at 9m above ground level.

(OR)

b) Design for Delhi a self-supporting chimney of height 60m above the foundation and the diameter of cylindrical part 4.25.Assume the 100mm thick lining is supported by the stack throughout the height.

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