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**Question Paper Code : 91313**

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2019  
Sixth Semester  
Civil Engineering  
CE 6603 – DESIGN OF STEEL STRUCTURES  
(Common to PTCE 6603 – Design of Steel Structures for B.E. (Part-Time) –  
Fourth Semester – Civil Engineering (Regulations – 2014))  
(Regulations 2013)

Time : Three Hours

Maximum : 100 Marks

Use of IS 800-2007, IS 875- Part 3 and steel tables is permitted.  
Relevant data may be suitably assumed if found necessary.  
Answer ALL questions.

PART – A

(10×2=20 Marks)

1. How is the ductility of steel measured ?
2. Can bolted connections be hundred percent efficient ? Why ?
3. What are the various types of tension members ?
4. What is net sectional area ?
5. What is meant by short strut ?
6. What is the purpose for providing anchors bolt in base plate ?
7. What do you mean by castellated beam ?
8. What do you mean by curtailment of flanges ?
9. Write the equation to calculate the design wind pressure.
10. What is a purlin ?

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PART - B

(5×13=65 Marks)

11. a) A column ISHB 350 @ 661.2 N/m carries an axial compressive factored load of 1700 kN. Design a suitable bolted gusset base. The base rests on M 15 grade concrete pedestal. Use 24 mm diameter bolts of grade 4.6 for making the connections. (13)

(OR)

- b) Design an I section purlin, for an industrial building situated in the outskirts of Allahabad, to support a galvanised corrugated iron sheet roof of the following data :

Spacing of the truss  $c/c = 6.0$  m

Span of truss = 12.0 m

Slope of truss =  $30^\circ$

Spacing of purlins  $c/c = 1.5$  m

Intensity of wind pressure =  $2 \text{ kN/m}^2$

Weight of galvanised sheets =  $130 \text{ N/m}^2$ .

Grade of steel = Fe 410 (13)

12. a) Design an angle section to carry a factored tensile force of 200 kN. Bolts of 20 mm diameter of grade 4.6 are to be provided for the connection of the members to the gusset plate. Use  $f_y = 250 \text{ MPa}$  and  $f_u = 410 \text{ MPa}$ . (13)

(OR)

- b) A tension member consists of two angles  $80 \times 10 \times 6$  mm bolted to opposite sides of 12mm thick gusset plate using single row of 5 nos. of 20 mm diameter bolts at a distance of 35 mm from toe of the angle. Take pitch as 50 mm and end distance = 40 mm. The length of the member is 4 m. Use Fe 410 grade steel. Determine the maximum load that the member can carry. What will be the load carrying capacity if the angles are connected on the same side of the gusset ? (13)

13. a) Design a built up column 6 m long to carry a load of 400 kN. The column is restrained in position but not in direction at both the ends. Provide single angle lacing system with bolted connections. (13)

(OR)

- b) A built up column consists of ISHB 400 @ 77.40 kg/m with one 300 mm  $\times$  12 mm flange plate on each side. The column carries an axial load of 2600 kN. Design a gusseted base if the column is supported on concrete pedestal with a bearing pressure of  $5 \text{ N/mm}^2$ . (13)



14. a) Design a laterally restrained beam of effective span 7 m to carry a factored bending moment of 100 kNm and a factored shear force of 225 kN. (13)  
(OR)
- b) Find the plastic moment capacity about the Z-Z axis of the section shown in Figure Q.14 (b). (13)

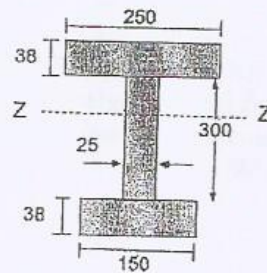


Figure Q. 14 (b)

15. a) Calculate the dead load, live load and wind load at the nodes of a pinned end fink truss with the following data :  
Span of truss = 16 m  
Rise of truss = 4m  
Spacing of truss = 4m  
Self weight of purlins = 300 N/m  
Height of column = 10m  
Roofing shall be of GI sheets  
Building is located in Chennai. Use Fe 410 steel. (13)  
(OR)
- b) Explain step by step procedure in the design of gantry girders. Also explain the loads that would be considered in the design. (13)

PART - C

(1×15=15 Marks)

16. a) Design a bridge truss diagonal subjected to a factored load of 300 kN. The length of the diagonal is 3m. The Tension member is connected to a gusset plate 16 mm thick with one line of 20 mm dia bolts of grade 8.8.  
(OR)
- b) Elaborate the step by step procedures for the design of analysis of roof trusses.