

**PRESIDENCY UNIVERSITY  
BENGALURU**

**SCHOOL OF ENGINEERING**

**END TERM EXAMINATION – AUGUST-2024**

**Even Semester:** 2023 - 24

**Course Code:** CIV 6008

**Course Name:** ADVANCED DESIGN OF STEEL STRUCTURES

**Program & Sem:** M.TECH (BCT) & II

**Date:** 20 August 2024

**Time:** 9.30AM -12.30PM

**Max Marks:** 100

**Weightage:** 50%

**Instructions:**

(i) Assume any data if required.

(ii) Use of IS800 and SP-6(1) Steel tables are allowed

**Part A [Memory Recall Questions]**

**Answer any FOUR Questions. Each question carries 05 marks.**

**(4Qx 5M= 20M)**

1. Write short notes on framed connection and seated connection. (C.O.No.1) [Knowledge]
2. Determine the shape factor rectangular section of  $b \times d$ . (C.O.No.2) [Knowledge]
3. Write the difference between Elastic analysis and plastic analysis. (C.O.No.2) [Knowledge]
4. Determine the collapse load for simply supported beam with point load ( $W$ ) at the center of the span ( $L$ ). (C.O.No.2) [Knowledge]
5. Write the requirements required for fire resistance level of steel structures. (C.O.No.4)[Knowledge]
6. Enumerate the procedure to calculate the period of structural adequacy (PSA). (C.O.No.4)[Knowledge]

**Part B [Thought Provoking Questions]**

**Answer any FOUR Questions. Each question carries 10 marks.**

**(4Qx10M=40M)**

7. Determine the plastic moment capacity and shape factor of I-section as shown in Fig.Q.7. Take  $f_y = 250\text{MPa}$ . (C.O.No.2) [Comprehension]

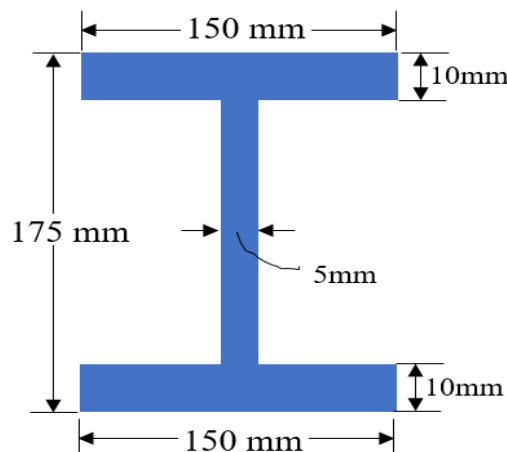


Fig. (Q.No.7)

8. Find the collapse load for simply supported beam with uniformly distributed load ( $w/m$ ) over the entire span of length  $L(m)$ . (C.O.No.2) [Comprehension]
9. Design the principal rafter of a fink type roof truss for the following data:  
Design compressive load = 175 kN, design tensile load = 70 kN, length of rafter panel = 2.235m, Use Fe415 grade steel. Take  $\gamma_{m0} = 1.10$  and  $\gamma_{mb} = 1.25$ . (C.O.No.3) [Comprehension]
10. Design the compression member of a roof truss for the following data.  
Design compressive load = 165kN  
Design tensile load = 60kN,  
Length of rafter panel = 3m  
Use Fe415 grade steel. Take  $\gamma_{m0} = 1.10$  and  $\gamma_{mb} = 1.25$ . (C.O.No.3) [Comprehension]
11. Fire protection methods are basically dependent on the fire load, fire rating and the type of structural members. Explain in detail the commonly used fire protection methods. (C.O.No.4) [Comprehension]

### Part C [Problem Solving Questions]

**Answer any TWO Questions. Each question carries 20 marks (2Qx20M=40M)**

12. Design a gantry girder to be used in an industrial building carrying manually operated overhead travelling crane for the following data:  
Crane Capacity = 220 kN , Self-Weight of Crane Girder excluding Trolley = 200 kN  
Self-Weight of Trolley, Electric Motor, Hook, etc. = 40kN  
Appr. Minimum Approach of Crane Hook to the Gantry Girder = 1.20 m ,  
Wheel Base = 3.2 m  
Centre-to-Centre Distance between Gantry Rails = 17 m  
Centre-to-Centre Distance between Columns (Span of Gantry Girder) = 8 m  
Self-Weight of Rail Section = 300 N/m, Diameter of Crane Wheels = 150mm  
Assume  $f_u = 410$  MPa,  $f_y = f_{yw} = f_{yf} = 250$  MPa. (C.O.No.3) [Application]
13. Design the principal tie member of a fink type roof truss for the following data. Design also its connection with a 12mm thick gusset plate using 20mm diameter bolts of grade 4.6.  
Design tensile load = 200 kN  
Design compressive load = 60kN  
Length of rafter panel = 5m  
Use Fe415 grade steel. Take  $\gamma_{m0} = 1.10$  and  $\gamma_{mb} = 1.25$   
Perform check for block shear strength. (C.O.No.3) [Application]
14. Determine a) Heated perimeter b) section factor c) limiting steel temperature d) exposed area to mass ratio and e) the time at which limiting temperature is attained for the I-Section ISMB 500 @ 86.9 kg/m beams supporting a concrete floor for the following cases:  
Case 1: 3-sided Exposure  
Case 2: 4-sided exposure  
Take load factor  $r_f = 0.866$  and mass of steel = 7850kg/m<sup>3</sup> (C.O.No.4) [Application]