

Roll No. ....

**23431**

**M. E./M. Tech. 2nd Sem. (Civil Engg.)  
Examination – June, 2023**

**ADVANCED STEEL DESIGN**

Paper : CE-616

*Time : Three Hours ]*

*[ Maximum Marks : 100*

*Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.*

*Note : Attempt any five questions. All questions carry equal marks. Use of relevant IS Code is permitted.*

1. (i) What are the loads that will act on roof trusses ?
- (ii) Differentiate between self-supporting steel chimneys and guyed steel chimneys.
- (iii) Classify the column bases provided for steel structures.
- (iv) What are light gauge steel structures ?  $4 \times 5 = 20$

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2. A knee braced roof truss over an industrial building of 36 m long has span of 16 meters. The spacing of the roof truss is 3.6 m. The pitch of the roof is 1 in 4. The height of the eaves above ground level is 8.6 m. Prepare a suitable type of truss. Also, determine the loads at various panel points. Weight of sheeting including bolts =  $126 \text{ kN/m}^2$  Live load =  $0.5 \text{ kN/m}^2$  Wind load =  $1.8 \text{ kN/m}^2$ . 20
3. (a) Explain the different failure modes of steel silos. 10  
 (b) Distinguish between bunker and silo with the help of diagram. 10
4. A beam ISMB 400 @  $61.6 \text{ kg/m}$  transmits an end shear of  $150 \text{ kN}$  to the flange of a stanchion ISHB 300 @  $58.8 \text{ kg/m}$ . Design an unstiffened welded seat connection using shop welds. 20
5. Analyze and design only the chimney of a self-supporting stack of effective height 30 m, having its diameter at top equal to 2 m. Take wind pressure intensity as  $1.5 \text{ kN/m}^2$  uniform throughout its height. Assume uniform values of permissible tensile and compressive stresses as  $120 \text{ N/mm}^2$  and  $90 \text{ N/mm}^2$ . 20

6. Design the following components of a circular elevated water tank for a capacity of 170000 liters. The height of the tank bottom above the ground level is 7m. The tank is supported over eight columns and is situated at the railway station in Allahabad.
- (a) Size of tank.  
 (b) Thickness of plates.  
 (c) Connections 20
7. Design a column to support a factored load of  $1200 \text{ kN}$ . The column has an effective length of 8m with respect to z-axis and 4m with respect to y-axis. Use steel grade Fe410. 20
8. Write short notes on :
- (a) Different types of independent mechanisms. 10  
 (b) Redistribution of the moment, plastic hinge and rotation capacity. 10