Registration No.: | | | | | | | | | | |

Total Number of Pages: 02 **Course: IDD (B.Tech and M.Tech)**
Sub_Code: RCI6C001

6th Semester Regular/Back Examination: 2024-25
SUBJECT: Design of Steel Structures
BRANCH(S): C&EE, CIVIL, CE
Time: 3 Hours
Max Marks: 100
Q.Code: S203

Answer Question No.1 (Part-I) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right hand margin indicate marks.
(Use of relevant IS codes is permissible)

Part-I

Q1 **Answer the following questions:** **(2 x 10)**

a) List out the important properties of structural steel.
b) Distinguish between characteristics loads and design loads.
c) State the principles observed in the design of connections in steel structures.
d) Define design strength of a tension member.
e) Explain the term pitch of bolts and gauge distance.
f) Define slenderness ratio of a column.
g) How torsional rotation of a beam is prevented?
h) What is lug angle? Why lug angles are used?
i) What is a plate girder? Where it is used?
j) In class 4.6 bolts, what do the number 4 & 6 indicate?

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** **(6 x 8)**

a) Explain the advantages and disadvantages of using steel structures.
b) List the assumptions made in the design of bearing bolts.
c) Discuss different types of welded joints with neat sketches.
d) Explain different modes of failure of tension members.
e) Two plates 16 mm are to be jointed using M20 bolts of grade 4.6 in lap joint. Determine the bolt value.
f) Two 12 mm thick plates are joined by 160 mm long (effective) butt weld. Determine the strength of the joint if a double U butt weld is used.
g) With neat sketches explain different types of column bases.
h) Discuss lacing and battening column systems with neat sketches.
i) Differentiate between web bucking and web crippling of a beam.

j) State some advantages and disadvantages of plate girders over trusses.

k) Determine the design axial load capacity of the column ISHB 300 @ 577N/m. If the length of the column is 3 m and its both ends pinned.

l) Derive the expression for the economical depth of a plate girder. Assume moment is resisted by flanges only.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four) **(16 x 2)**

Q3 Design a suitable longitudinal fillet weld to connect 120 x 8 mm plate to 150 x 10 mm plate to transmit a pull equal to full strength of small plate. Assume welding is to be made in the field. **(16)**

Q4 Design a tension member to carry a factored force of 340 kN. Use 20 mm diameter black bolts and a gusset plate of 8 mm thickness. **(16)**

Q5 Design a gusseted base to carry an axial factored load of 3000 kN. The column is ISHB 450 @ 855 N/m with two 250 x 22 mm cover plates on either side. The effective height of the column is 5 m. The column is rest on M20 concrete pedestal. **(16)**

Q6 Design a simply supported beam of 5 m effective span carrying a load of 20 kN/m. The compression flange is laterally unsupported. Assume *fy* =250 Mpa. **(16)**