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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)

- List out the important properties of structural steel.
- Distinguish between characteristics loads and design loads.
- State the principles observed in the design of connections in steel structures.
- Define design strength of a tension member.
- Explain the term pitch of bolts and gauge distance.
- Define slenderness ratio of a column.
- How torsional rotation of a beam is prevented?
- What is lug angle? Why lug angles are used?
- What is a plate girder? Where it is used?
- 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)

- Explain the advantages and disadvantages of using steel structures.
- List the assumptions made in the design of bearing bolts.
- Discuss different types of welded joints with neat sketches.
- Explain different modes of failure of tension members.
- Two plates 16 mm are to be jointed using M20 bolts of grade 4.6 in lap joint. Determine the bolt value.
- 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.
- With neat sketches explain different types of column bases.
- Discuss lacing and battening column systems with neat sketches.
- 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 $f_y = 250$ Mpa. **(16)**