## Oct.-22/TE/Insem-517

## T.E. (Civil)

# DESIGN OF STEEL STRUCTURES

## (2019 Pattern) (Semester - I) (301003)

*Time : 1 Hour]* *[Max. Marks : 30*

*Instructions to the candidates:*

1) *Answer Q1 or Q2, Q3 or Q4.*

2) *Neat diagrams must be drawn wherever necessary.*

3) *Figures to right indicates full marks.*

4) *Use of electronic pocket calculator, IS 800: 2007 and steel table is allowed.*

5) *Take grade of steel as Fe 410.*

6) *Take ultimate stress in bolt $F_{ub}$ = 400 MPa*

7) *Assume suitable data if necessary.*

*Q1)* a) Explain in detail different types of steel structures. **[6]**

b) A single unequal angle ISA 90 × 60 × 6 mm is connected to 10 mm thick gusset plate at the ends with 5 nos of 16 mm bolts to transfer tension. Determine design tensile strength of angle section if a gusset is connected to 90 mm leg. **[9]**

OR

*Q2)* a) State in detail design philosophy for strength and serviceability. **[5]**

b) Design a double angle tension member connected on each side of 10 mm thick gusset plate to carry an axial factored load of 375 kN. Use 20 mm diameter bolts. Assume shop connection. **[10]**

*Q3)* a) Distinguish between lacing and battening in built up column section on the basis of general and design consideration. **[4]**

b) Find out design compressive strength of a single angle discontinuous strut carrying a axial factored load of 110 kN. Unsupported length of members is 2.5m. **[6]**

*P.T.O.*

c) A 8m column is effectively held in position at both end and restrained against rotation at one end. If ISHB 400 @ 77.4 kg/m is used, calculate design compressive strength of the column. **[5]**

OR

*Q4)* a) What are the parameters that affect design strength of compression members? **[4]**

b) Analyze the discontinuous strut consisting of 2 ISA $70 \times 70 \times 6$ @ 6.3 kg/m connected back to back of 8 mm thick gusset plate. Length of strut is 2.8m. **[6]**

c) A column 10 m long consists of 2 ISMC 300 @ 35.8 kg/m spaced 220mm back to back to carry a factored load of 1100 kN. The column is restrained in position but not in direction at both ends. Design a single lacing system with bolted connection. **[5]**

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