[4860] - 41
M.E. (Civil) (Structures) (Semester - I)
ADVANCED DESIGN OF METAL STRUCTURE
(Elective - II (a)) (2008 Pattern)

Time : 4 Hours] *[Max. Marks : 100*

Instructions to the candidates:

1) *Solve any two questions from each section.*
2) *Answers to the two sections should be written in separate answer books.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Figures to the right side indicate full marks.*
5) *Use of calculator and relevant IS codes is allowed.*
6) *Assume suitable data if necessary.*

SECTION - I

Q1) Suggest structural configuration of hoarding structure to be installed at height of 15 m above ground level. The display board is of dimensions 30 m wide, 8 m height. Calculate the loads due to wind on the members of support structure. Draw free body diagram of structures showing the forces and reactions. **[25]**

Q2) Design a castellated beam for a span of 30m subjected to factored UDL of 20 kN.m inclusive of dead load and live load. Assume that compression flange is fully restrained. **[25]**

Q3) a) Compare steel and aluminum structural sections and applications. **[10]**

b) Find flexural and shear stresses in IS ALB 150 at 12.1 kg/m when loaded with udl of 30 KN/m on span of 3.5m. **[15]**

SECTION - II

Q4) a) Explain with sketches any three types of bracing systems used for lattice towers. **[5]**

b) Determine the maximum compression and maximum tension in legs of the transmission towers 60m high for following data: **[20]**

Weight of antenna = 10 kN

Weight of platform at top = 1 kN/m²

Weight of railing at top = 0.25 kN/m²

Weight of ladder and cage = 0.75 kN/m

Weight of miscellaneous items = 2.50 kN

Q5) a) State codal provisions for tubular structures. **[10]**

b) A tension member of a truss carrying a tensile force of 75 kN meets a principal rafter carrying a compressive force of 100 kN at 45° angle. The panel length along principal rafter is 2m. Design both the members and welded connection for the same. Consider tubes of grade IS 1161 Grade Yst = 240 and allowable stress in fillet weld as 110 N/mm². **[15]**

Q6) a) Explain types of cold form section and its suitability. **[10]**

b) Determine the safe load a hat section 100 mm x 80 mm x 4 mm as lip of 25mm dimension can carry. Consider compression flange heavier as compared to tension flange. The effective length of member is 3m. Determine the safe load a hat section 100 mm x 80 mm x 4 mm as lip of 25 mm dimension can carry. Consider compression flange heavier as compared to tension flange. The effective length of member is 3m. **[15]**

❀ ❀ ❀