Total No. of Questions :8]

SEAT No. :

P4015

[Total No. of Pages : 3

[5255]-512

M.E. (Civil - Structures Engg.)

ADVANCED DESIGN OF STEEL STRUCTURES

(2013 Pattern) (Semester - I)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any five from eight questions.***
2) ***Figures to the right indicate full marks.***
3) ***Use IS-IS: 800 - 2007, IS: 800-1984, IS:801, IS : 802, IS 811, SP-34 and Non- programmable calculator.***
4) ***Neat diagram must be drawn wherever necessary.***
5) ***More reproduction from IS code as answer, will not be given full marks.***
6) ***Assume suitable data, if necessary.***

Q1) a) Sketch various schematic arrangements used for hoarding. **[3]**

b) The hoarding structure is to be installed on the top of the building (2.5 m height). The hoarding carries display board 12m × 5m. Suggest the suitable hoarding structure to carry this board. Calculate all the loads acting on the hoarding structure. Draw FBD of the suggested structures, showing calculated forces on it. **[7]**

Q2) a) Write down the guideline for web opening and stiffeners for castellated beams. **[3]**

b) Design a castellated beam in grade Fe410 steel to carry an imposed load of 6 kN/m and dead load of 5 kN/m over a simply supported span of 20m. Assume that the compression flange is fully restrained. **[7]**

Q3) a) What is mean by microwave tower, explain with examples. **[3]**

b) Determine the various forces (lateral forces due to wind, longitudinal forces, if any, torsional forces, if any and dead load) acting on the tower under the following conditions:

i) Normal operating conditions.

ii) Top-most power conductor in broken condition.

iii) Ground wire in broken condition. Refer figure-1 **[7]**

P.T.O.

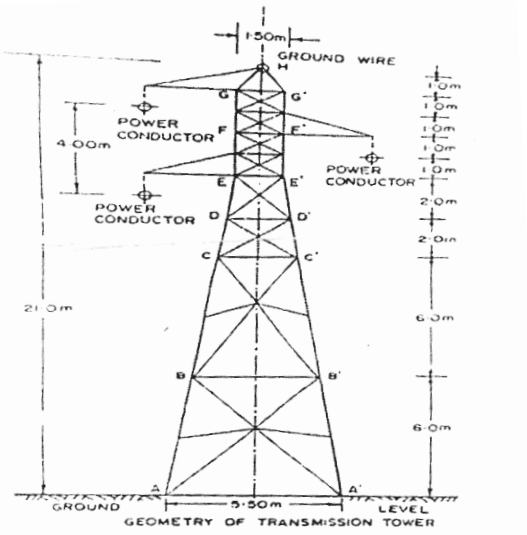

Figure 1

Q4) a) Draw figures and explain typical free standing towers. **[3]**

b) A 65 m high microwave antenna lattice tower is to be built near Agra where the terrain at the site is nearly a level ground with terrain of category 2. The diameter of the hemispherical antenna disc, fixed at the top is 3m. The width of the tower at the top is 3.5m. Select a suitable configuration for the tower and determines maximum compressive fore and tension in the tower legs and also the maximum shear at the base, for the following data.

Weight of antenna disc and fixtures : 9kN

Weight of platform at the top : 0.82 kN/m^2

Weight of railing at top : 0.30 kN/m^2

Weight of ladder and the cage : 0.65 kN/m

Weight of miscellaneous item : 2.5 kN **[7]**

Q5) a) What are tubular structures? Write down its various purpose and its important advantages. **[3]**

b) Find the column section properties and allowable load for the column section shown in figure 2. The effective length of column is 3.2 m. Take fy =235 MPa. **[7]**

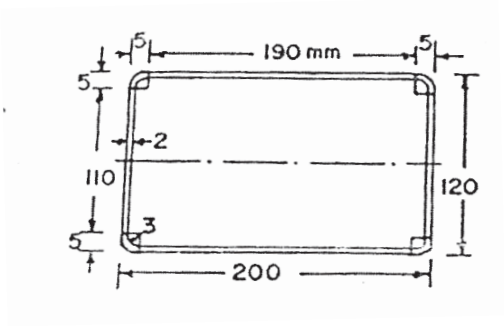

Figure 2

Q6) a) What are the advantages and disadvantages of light gauge sections and draw different forms of it. **[3]**

b) Design a member of a tubular truss. A tension member of a truss, carrying tensile forces of 22 kN, meets the principal rafter, carrying a compressive force of 110kN, at right angle. The panel length along the principal rafter is 2.5 m. design both the members, using IS : 1161 grade, Yst 240 tubes. Also, design the welded joint for the members, Taking the allowable stress in fillet weld as 110N/mm^2. **[7]**

Q7) a) State the difference between bolted and welded connections. **[3]**

b) A column section ISHB250@ 907.4 N/m is subjected to following factored loads. Axial compressive load, P=500kN

Moment, M = 45 kN.m

Assuming M25 grade of concrete for the pedestal and a square base plate, design the thickness of base plate. **[7]**

Q8) a) What are the types of chimneys? State the factor influencing the design of chimney. **[3]**

b) Find thickness of the supporting lined chimney to the following particulars.

Height of the chimney = 72 m.

Diameter of the chimney = 3.0 m

Thickness of the lining = 100 mm.

Wind Pressure = 1300 N/mm^2 on flat vertical surface.

Take safe tensile stess = 120 N/mm^2.

The foundation has to rest on medium soil having bearing capacity = 200 kN/m^2. **[7]**