

Total No. of Questions : 8]

SEAT No. :

P4415

[4860] - 1030

[Total No. of Pages : 2

M.E. (Civil - Structures)

**ADVANCED DESIGN OF STEEL STRUCTURES
(2013 Credit Pattern) (Semester - I)**

Time : 3 Hours]

[Max. Marks : 50

Instructions to the candidates:

- 1) *Answer any five from eight questions.*
- 2) *Neat sketches must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of non-programmable calculator, IS : 800-2007, 801, 802, 811 and steel tables is allowed.*
- 5) *Assume suitable data, if necessary.*

- Q1)** a) Draw line sketches for different types of hoarding systems used. **[4]**
b) The forces coming in a member of a hoarding structure are 200 kN tensile and 150 kN compressive due to reversal of stresses due to wind load. Design the member using double angle section back to back on opposite faces of 8 mm thick gusset plate using M20 black bolt of 4.6 grade. Assume Fe-415 grade of steel. Draw the design sketch. Take length of member as 3.0 m. **[6]**
- Q2)** a) Briefly state the guidelines to be followed for web openings and stiffeners to be used in design of castellated beams. **[3]**
b) Design a castellated beam in grade Fe410 steel to carry an imposed load of 4.5kN/m and dead load of 2.5 kN/m over a simply supported span of 10m. Assume that the compression flange is fully restrained. **[7]**
- Q3)** a) What are the various forces to be considered in design of Microwave tower and transmission tower? **[4]**
b) A 35 m high microwave antenna lattice tower is to be built near Pune 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 2.5 m. The width of the tower at the top has to 2.5 m. Select a suitable configuration for the tower and determine maximum compressive force and tension in the tower legs and also the maximum shear at the base, for the following data. **[6]**

P.T.O.

Weight of antenna disc and fixtures : 6kN

Weight of platform at top : 0.82 kN/m²

Weight of railing at top : 0.30 kN/m²

Weight of ladder and the cage : 0.45kN/m

Weight of miscellaneous item: 2.5kN

- Q4)** a) List out the types of bracings used with their advantages. [4]
b) Explain structural configuration (tower geometry) and material. Briefly explain the design steps for transmission tower. [6]
- Q5)** a) List out the advantages of using tubular structures. [5]
b) A tubular column hinged at one end and roller at other end has the outside diameter of tube 150 mm and is of heavy gauge (i.e. @16.2 kg/m). The length of the column is 3.0m. Determine the safe load and column can carry if the column is of IS 1161 grade Yst 240 steel. [5]
- Q6)** a) List out the advantages and disadvantages of light-gauge sections. [4]
b) Design a simply supported beam using light-guage section carrying a udl of 4 kN/m (inclusive of self wt). Span of the beam is 4.5 m and consider it to be laterally supported. [6]
- Q7)** a) List out the various forces to be considered in the design of chimneys?[4]
b) Find the thickness of the self supporting lined chimney to the following particulars. [6]
Height of the chimney = 50 m
Diameter of the chimney = 3.0 m.
Thickness of the lining = 60 mm.
Wind Pressure = 1000 N/mm² on flat vertical surface.
Take safe tensile stress = 120 N/mm².
- Q8)** Design a slab base with anchor bolts and the foundation for the column ISMB 300 subjected to an axial factored load of 800 kN and a factored bending moment @ its major axis of 20 kNm, The base plate rests on concrete of grade M25, and the bearing capacity of soil is 250kN/m². [10]

