Total No. of Questions : 8]

SEAT No. :

P252

[Total No. of Pages : 3

[6003]-329
T.E. (Civil)
DESIGN OF STEEL STRUCTURES
(2019 Pattern) (Semester - I) (301003)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.***
2) ***Neat sketches must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Take f_y = 250 and f_e = 410 grade of steel.***
5) ***Take ultimate stress in bolt, f_{ub} = 400 N/mm^2.***
6) ***Assume suitable data, if necessary.***
7) ***Use of electronic pocket calculator, IS : 800-2007 and steel table are allowed.***
8) ***Use of cell phone is prohibited in the examination hall.***

Q1) a) State and explain in brief type of column bases. **[3]**

b) Check the adequacy of ISHB 450 @ 87.2 kg/m to carry a factored axial load of 850 kN at an eccentricity of 250 mm about major axis. The effective length of column is 3 m. Consider only section strength. **[14]**

OR

Q2) a) Differentiate between slab base and gusseted base. **[3]**

b) A column having effective length of 4 m is subjected to factored axial load of 500 kN and factored moment of 75 kNm. Design the column section. Check for section strength only. **[14]**

Q3) a) Explain in brief web buckling and web crippling with suitable sketches. **[4]**

b) A simply supported steel joist of 5 m effective span carries a working uniformly distributed load 50 kN/m on entire span and a point load of 70 kN at mid span. The section is laterally supported throughout the span. Design an appropriate section. Apply usual checks for strength along with check for deflection. **[14]**

OR

Q4) a) Classify the section ISLB500@75.0 kg/m and ISA 100 × 75 × 8 mm @ 10.5 kg/m used as a beam. **[4]**

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b) A simply supported beam carries a uniformly distributed load of magnitude W kN/m on entire span of 5 m. The compression flange is laterally unsupported throughout the span. Find the intensity of uniformly distributed load the section ISMB 500@ 86.9 kg/m can carry for the beam safely. Both ends of beam are fully restrained against torsion. **[14]**

Q5) Determine panel point dead load, imposed load and wind load for a truss as shown in Figure 1. Assume design wind pressure as 1170 N/m^2, use G.I. Sheet and the centre to centre spacing of truss as 3.5 m. Assume self weight of purlin as 20 N/m^2 on plan area. **[17]**

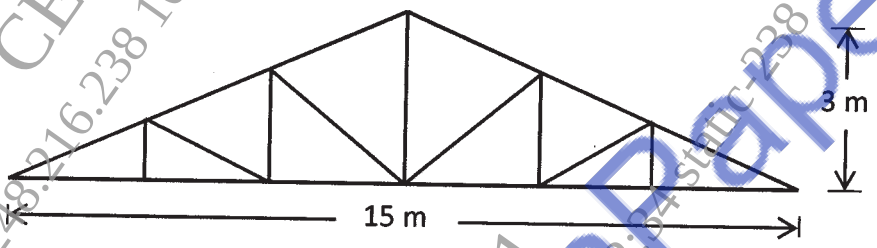

Fig. 1

OR

Q6) Design a gantry girder supporting an electronically operated crane for following data : **[17]**

a) Capacity of crane = 120 kN.

b) Span between crane rails = 20 m.

c) Self-weight crane girder = 100 kN.

d) Weight of crab, electric motor, hook etc. = 15 kN.

e) Minimum hook approach = 1.2 m.

f) Wheelbase = 2 m.

g) Span of Gantry 5.5 m.

h) Weight of rails = 0.3 kN/m.

Q7) a) Explain in brief IS provisions for length and spacing of intermittent weld. **[4]**

b) Design the cross-section of a simply supported welded plate girder with an effective span of 20 m. The girder is subjected to a working uniformly distributed load of 43 kN/m throughout the span, including self-weight. Assume that the compression flange is laterally supported throughout the span. Apply checks for bending and shear. **[14]**

OR

Q8) a) Explain in brief flange curtailment of plate girder. **[4]**

b) A simply supported welded plate girder is designed for the span of 24 m. It is subjected to a shear force of 2300 kN and bending moment of 20700 kNm. A section used for plate girder to carry above load is as given below - **[14]**

Flanges - 780 mm wide and 50 mm thick.

Web - 16 mm thick and 2600 mm deep.

Design intermittent welded connection between flange and web. Also design end bearing stiffener. Assume stiff bearing length as 300 mm near support.