Total No. of Questions : 8]

SEAT No. : ____

PB-3745

[Total No. of Pages : 3

[6262]-3
T.E. (Civil)
DESIGN OF STEEL STRUCTURES
(2019 Pattern) (Semester - I) (301003)

Time : 3 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) Define beam-Column with suitable sketches. **[3]**

b) Design a moment resisting base plate that can resist the given factored axial compressive load of 1500 kN and factored bending moment of 100 kNm, assuming that the concrete pedestal used is of M20 grade. The column section to which the base plate will be attached is ISHB 350 weighing 67.4 kg/m. **[14]**

OR

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

b) A column having effective length of 3.5 m is subjected to factored axial load of 400 kN and factored moment of 45 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 3.5 m effective span carries a working uniformly distributed load 50 kN/m on entire span and a point load of 30 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

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Q4) a) Explain modes of failure of beam with suitable sketches. **[4]**

b) Design a suitable I section for simply supported beam of span 4.5 m carrying a dead load of 30 kN/m and imposed load of 50 kN/m. The beam is laterally unsupported throughout the span. **[14]**

Q5) Design a gantry girder supporting an electronically operated crane to the 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 = 2m

g) Span of Gantry = 5.5m

h) Weight of rails = 0.3 kN/m

OR

Q6) Determine panel point dead load, imposed load and wind load for the truss as shown in Figure 1. Assume design wind pressure as 1200 N/m^2, use A.C. Sheet and the C/C spacing of truss is 6 m. Assume self-weight of purlin as 120 N/m. **[17]**

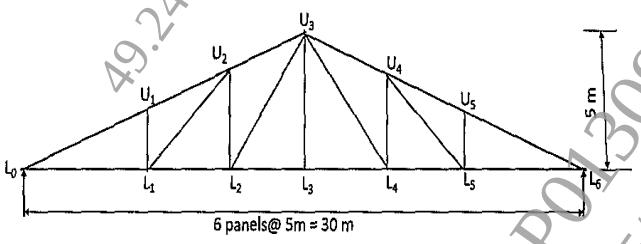

Fig. 1

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 25 m. The girder is subjected to a working uniformly distributed load of 50 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 has been designed for a span of 20 m and is subjected to a shear force of 1800 kN and a bending moment of 18500 kNm. The girder's cross-section comprises flanges that are 800 mm wide and 50 mm thick and a web that is 20 mm thick and 2500 mm deep. Assume stiff bearing length at support as 300 mm.

Design the intermittent welded connections between the flange and web, as well as the end bearing stiffener for the girder. **[14]**

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