Total No. of Questions : 10]

SEAT No. :

P2831

[Total No. of Pages : 3

[4958]-1003
T.E.(Civil)
STRUCTURAL DESIGN-I
(2012 Course) (Semester-I)(End Semester)

Time :3Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2,Q3or Q4, Q5 orQ 6 , Q 7 or Q8, Q9 or Q10.***
2) ***Neat sketches must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Take Fe 410 grade of steel.***
5) ***Take ultimate stress in bolt,f_{ub}=400N/mm^2***
6) ***Assume suitable data if necessary.***
7) ***Use of electronic pocket calculator IS:800-2007 and steel table allowed.***
8) ***Use of cell phone is prohibited in the examination hall.***

SECTION-I

Q1) a) Explain advantages of Limit state method over working stress method. **[4]**

b) Determine design compressive strength of an ISA 125 ×95×10 @ 16.5kg/m in which longer leg connected to the gusset plate of thickness by 3number of M20 black bolts of 4.6 grade. **[6]**

OR

Q2) a) The built-up sections are preferred instead of rolled steel sections for a column of industrial building. Justify it. **[4]**

b) Design a suitable single equal angle section to carry a factored tensile force of 200kN. Use 5 mm size of fillet weld. **[6]**

Q3) Design a gusseted base for a built up column ISHB 350 @67.8kg/m with two plates 450×22 mm carring an axial factored load of 3000 kN. The column is supported on concrete pedestal of M20grade. Draw the design sketches. **[10]**

OR

Q4) a) Define a beam-column with suitable sketches. **[4]**

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b) In a truss a principal rafter 2.1 m long consist of 2 ISA 100×100×6 mm connected to gusset by fillet weld. Find the design compressive strength of the member. **[6]**

Q5) a) Explain modes of failure of beam with suitable sketches. **[6]**

b) Design a simply supported, laterally supported beam of effective span 10 m carrying a total factored load of 60kN/m including self-weight. The depth of beam is restricted to 500 mm. Assume stiff bearing length is 175mm. **[10]**

OR

Q6) Determine the safe uniformly distributed load excluding self weight the section ISLB 600 @ 99.5 kg/m has been used as a simply supported beam over 7.2 m span. The compression flange is unrestrained against lateral buckling.At the end beam is fully restrained in torsion but both the flanges are free to wrap at the ends. **[16]**

SECTION-II

Q7) a) A beam ISLB 300 @ 37.7 kg/m carrying uniformly distributed load 50kN/m has an effective span of 8m is to be connected to the web of beam ISMB450 @ 72.4Kg/m. Design the framed connection using M20 black bolts. **[8]**

b) An ISMB 450 @ 72.4 kg/m is connected to the flange of a column ISHB 300 @58.8Kg/m. The end reaction is transmitted by the beam is 120kN. Design an unstiffened seated connection using M20 black bolts. **[8]**

OR

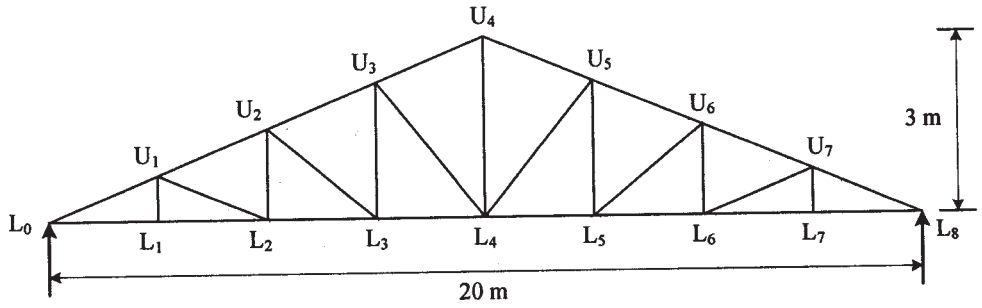
Q8) A plate girder subjected to a maximum factored moment 4000 kN-m and a factored shear force 600kN. Find the preliminary sections for the following condition and cross-sections. **[16]**

a) Girder without any stiffener.

b) Girder with end bearing transverse stiffener.

c) Girder with end bearing as well as intermediate transverse stiffener.

Q9) A truss shown in Figure is spaced at 5m c/c used for an industrial building situated at Pune. The truss is covered with AC sheets of weight 180N/m^2. Calculate the panel point dead, live, and wind load. Design members L_0,L_1, U_1,L_1 and L_0U_1. Assuming k_1=1,k_2=0.98 and k_3=1 and (Cpe-Cpi) = $\pm$0.8. Draw the design sketches. **[18]**



OR

Q10)Design a gantry girder supporting an electronically operated crane to the following data: **[18]**

Capacity of crane = 120 kN

Span between crane rails=20 m

Self-weight crane girder = 100 kN

Weight of crab, electric motor, Hook etc.= 15kN

Minimum hook approach = 1.2m

Wheel Base = 2 m

Span of Gantry = 5.5 m