Total No. of Questions : 10]

SEAT No :

P1683

[Total No. of Pages : 3

[5058]-303
T.E.(Civil)
STRUCTURAL DESIGN - I
(2012 Course) (Semester -I) (End Semester)

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

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3, or Q.4, Q.5or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
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, fub = 400 N/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 in brief design philosophy of limit state for strength and serviceability. **[4]**

b) Design a single angle discontinuous strut which carry factored load of 100 kN. Unsupported length of member is 3 m. **[6]**

OR

Q2) a) Differentiate between lacing and battening in a built - up column on the basis of general and design consideration. **[4]**

b) Design a suitable single equal angle section to carry a factored tensile force of 250 kN. Use 5 mm size of fillet weld. **[6]**

Q3) a) Determine the design compressive strength for a column ISHB 350 @ 72.4 kg/m of 3.5m length. The column is restrained in direction and position at both the ends. **[4]**

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b) A column ISHB 350 @ 67.4 kg/m carries an axial factor load of 1700 kN. Design a suitable gusseted base (Design of not expected). the base is rest on M20 grade of concrete pedestal. **[6]**

OR

Q4) a) Design a column of a building with an effective length of 3.2 m subjected to a factored load of 500 kN and a factor moment of 5 kNm. Check for section strength only. **[6]**

b) Design a laced column with 2 channel section placed back to back has an effective length of 11 m carries a factored load of 1200kN. Calculate spacing between two channels. **[4]**

Q5) a) Explain laterally supported and unsupported beam with suitable example.**[4]**

b) Design a laterally supported simply supported beam of 7 m effective span. It carries a load of 250 kN which is uniformly distributed load over the whole span. In addition the beam carries a point load of 100kN at mid span. **[12]**

OR

Q6) An ISLB 600@ 99.5 kg/m has been used as a simply supported beam over 7.2m span. Determine the intensity of uniformly distributed load excluding self weight so that the beam carries in flexure. Assume the compression flange of the beam is laterally unrestrained throughout the length against lateral buckling. **[16]**

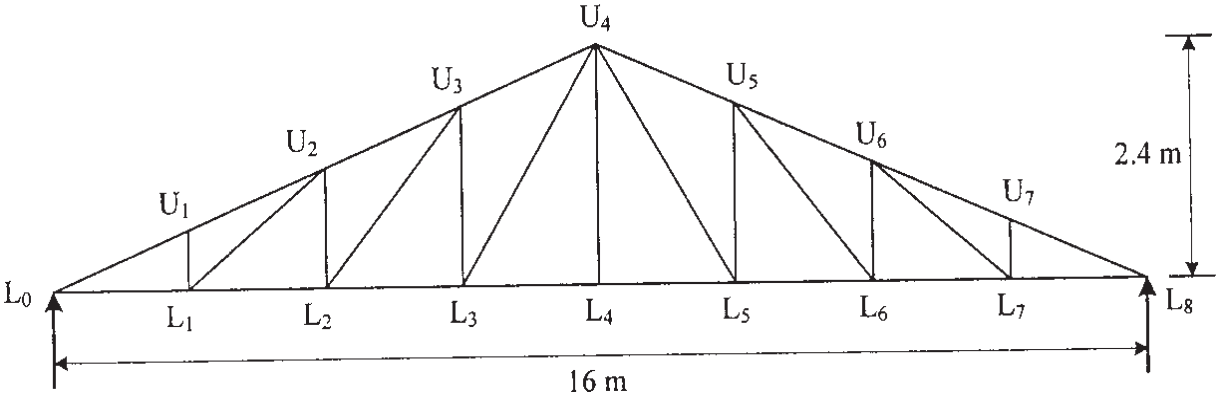
Q7) a) Differentiate between stiffened and un-stiffened seated connection with suitable sketches. **[6]**

b) An ISLB 300 @ 37.7 kg/m transmit an end reaction of 385 kN, under factored factor load to the web of ISMB 450 @ 72.4kg/m. design a bolted framed connection assuming bolt 4.6 grade. **[10]**

OR

Q8) A simply supported welded plate girder of an effective span of 26 m subjected to uniformly distributed load 35 kN/m throughout the span excluding self weight. Assume compression flange to be laterally supported design cross section of the girder. Also design end bearing and intermediate stiffener. **[16]**

Q9) A truss shown in Fig. is spaced at 4m c/c used for an industrial building situated at pune. The truss is covered with AC sheets of weight 180 N/m^{2}Calculate the panel point dead, live, and wind load. Design members L_0 L_1, U_1 L_1 and L_0 U_1. The design wind pressure is 876 N/m^2. (Cpe - Cpi) = ± 0.8 **[18]**



OR

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

Capacity of Crane = 250 kN

Span between crane rails = 16m

Self weight crane girder = 150kN

Weight of crab, electric motor, Hook, trolley etc. = 50 kN

Minimum hook approach = 1.0 m

Wheel Base = 3.5m

Span of Gantry = 6.5m

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