Total No. of Questions : 10]

SEAT No. :

P1294

[Total No. of Pages : 3

[4858] - 1003

T.E. (Civil) (End Semester) (Semester - I)

STRUCTURAL DESIGN - I

(2012 Pattern)

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

Instructions to the candidates:

1) ***AnswerQ. 1 or Q. 2, Q. 3 or Q. 4, Q. 5orQ. 6, Q. 7orQ. 8and Q. 9or Q.10.***
2) ***Neat sketches must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Take Fe 41 0 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 allowed.***
8) ***Use of cell phone is prohibited in the examination hall.***

Q1) a) State and explain classification of cross section with bending stress distribution. **[4]**

b) Determine the design strength of tension member of roof truss consists single 1SA75 × 75 ×8 mm @ 8.9 kg/m connected to gusset plate by 6 mm fillet weld. **[6]**

OR

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

b) A tension member 3.4 m long between centre to centre of intersection subjected to a factored pull of 200 kN. Design economical section using double equal angle section on either side of gusset plate. **[6]**

Q3) a) A strut consists of a double angle section ISA 70 × 70 × 8 mm @ 8.3 kg/m and 3.2 m long. The member is connected to the gusset plate by 03 numbers of 20 mm diameter bolts. Calculate the design compressive strength of the member if the angles are placed on the opposite of 10 mm thick gusset plate. **[5]**

b) Design a slab base for the column consisting of ISMB 400 @ 61.6 kg/m carrying an axial factored load of 450 kN. Use M20 grade of concrete.**[5]**

P.T.O.

OR

Q4) a) Determine the design strength of a column section ISMB 400 @ 61.6 Kg/m with an effective length of 4 m. **[4]**

b) A column section ISLB 350 @ 82.2 kg/m having effective length of 3.5 m is subjected to factored axial load of 450 kN and factored moment of 50 kNm. Check adequacy for section strength only. **[6]**

Q5) a) State and explain the terms with neat sketch: Laterally supported beam, web buckling and Web crippling **[6]**

b) A simply supported beam in a building has a span of 4 m. It carries a uniformly distributed load 60 kN/m including self weight. Design the beam if the compression flange is laterally restrained throughout the span. Apply usual checks. **[10]**

OR

Q6) A simply supported beam of effective span 5 m carries a uniformly distributed load of w KN/m throughout the span. The compression flange of beam is laterally unsupported throughout the span. Determine the intensity of uniformly distributed load of w, so that the section ISMB 400 @ 61.6 Kg/m provided for beam can carry safely Also check for serviceability. **[16]**

Q7) a) Design a welded seat connection for a factored beam end reaction 100 KN. The beam section is ISMB 250 @ 37.3 kg/m connected to the flange of column section ISHB 200 @ 37.3 kg/m. **[10]**

b) Explain types of beam to beam and beam to column connection with suitable sketches. **[6]**

OR

Q8) A simply supported welded plate girder of span 20 m is subjected to uniformly distributed load 40 kN/m on whole span excluding self weight of plate girder. Design cross section of plate girder and check for shear buckling of web and shear capacity of end panels. Assume compression flange laterally supported throughout the span and yield stress of steel is 250 MPa. **[16]**

Q9) Determine the maximum wheel load, shear force and bending moment for the gantry girder as per following data. Design the section and check for moment capacity of the section.

Weight of crane girder - 180 kN, Crane capacity - 200 kN, Weight of crab and motor - 50 kN Span of crane girder - 16 m, Minimum hook approach - 1.2 m, C/C distance between gantry column - 6 m, Weight of rail - 0.25 kN/m. **[18]**

OR

Q10) Determine the design force in the members L_0U_1, L_0L_1, and U_1L_1 of a truss as shown in Fig. 10. Assume design wind pressure is 1200 N/m^2, use G .1. sheet and the c/c spacing of truss is 4 m. Assume self weight of purlin 120 N/m, **[18]**

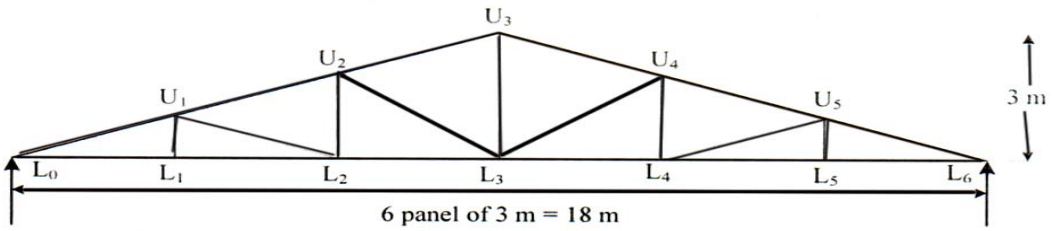

Fig. 10