

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -I EXAMINATION- FEB 2020

B-Tech VIth Semester

COURSE CODE: 10B11CE611

MAX. MARKS: 15

COURSE NAME: Design of Steel Structures

COURSE CREDITS: 4

MAX. TIME: 1 Hr

Note: (i) All questions are compulsory.

(ii) Code is not allowed in T1 examination.

(iii) Carrying of mobile phone during examinations will be treated as case of unfair means.

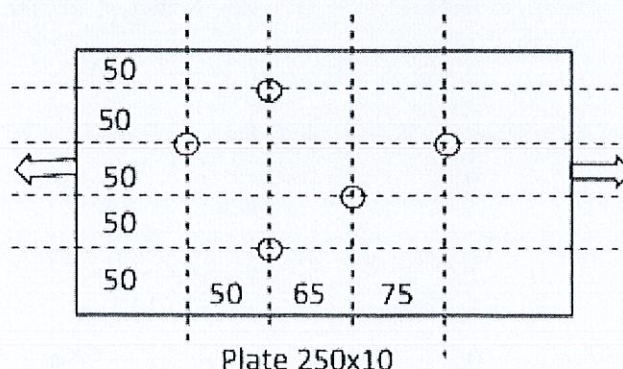
Q1. Short Answer/Fill in the blanks

[12*0.25 = 3 Marks]

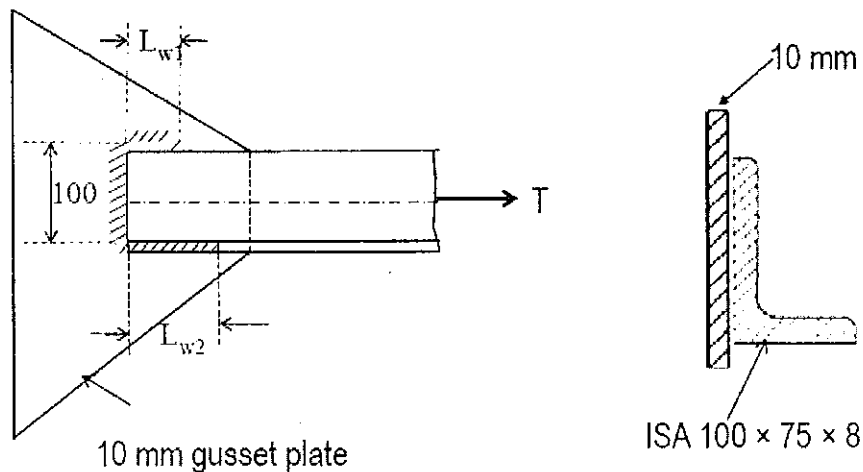
- The mass density of steel is kg/m^3
- The partial safety factor of shop fabricated welds is
- The centre to centre distance of adjacent rivets or bolt holes measured in the direction of stress is called.....
- A row of rivets/bolts which is parallel to the direction of stress is called.....
- Minimum edge distance for rivet/bolt is
- Minimum pitch distance for rivet/bolt is.....
- Two plates of thickness 16 mm and 22 mm are connected with fillet weld. The minimum size of weld will be.....
- Two plates of thickness 16 mm and 22 mm are connected with fillet weld. The maximum size of weld will be.....
- The design shear capacity of bolts carrying shear through a packing plate, should be decreased by a factor, β_{pk} if the thickness of packing plate is.....
- In a connection if the strength of the joint is 200 kN and the strength of solid plate is 400 kN then the efficiency of the joint will be.....
- For a bolt of grade 6.4, Its yield strength will be..... MPa.
- For finding k_b in design bearing strength of bolt, The maximum value of k_b is

Q2. Determine the strength of the plates in tension (M22 bolts of grade 4.6)

[3 Marks]



- Q3. Design a lap joint between the two plates each of width 120mm, if the thickness of one plate is 16 mm and the other is 12 mm. The joint has to transfer a design load of 200 kN. The plates are of Fe410 grade. Use black bolts of grade 4.6. [3 Marks]
- Q4. In a lap joint, two members of thickness 40 mm and 50 mm are connected. If the length of a long bolted joint is 350 mm and the nominal diameter of bolt is 16 mm. Find the designed shear strength of the bolt. [3 Marks]
- Q5. A tie member of a roof truss consists of ISA 100×75×8 of Fe410 grade, is welded to a 10 mm gusset plate. Design the welded connection to transmit a tensile load of full capacity of the angle. Assume connection is made in the workshop. [3 Marks]



Useful Formulas:

1. $V_{dsb} = \frac{f_{yb}}{\sqrt{3} \gamma_{m1}} (n_n A_n + n_s A_{ns}) R_{tg} R_{ej} R_{pk}$
2. $V_{dpb} = \frac{2.5 K_b t d f_y}{\gamma_{m1}} ; K_b = \min \left\{ \frac{e}{3d_o}, \frac{p}{3d_o} - 0.25, \frac{f_{yb}}{f_y}, 1 \right\}$
3. $T_{dg} = \frac{A_g f_y}{\gamma_{m0}}$
4. $T_{dn} = \frac{0.9 A_n f_y}{\gamma_{m1}}$
5. $R_{ej} = 1.075 - \frac{l_j}{200d} , 0.75 \leq R_{ej} \leq 1.0$
6. $R_{eg} = \frac{8d}{3 + l_g} ;$
7. $R_{pk} = 1 - 0.0125 t_{pk}$
8. $T_{dw} = \frac{f_{uw}}{\sqrt{2} \gamma_{m1}} \times t_t \cdot L_w$