بسم الله الرحمن الرحيم

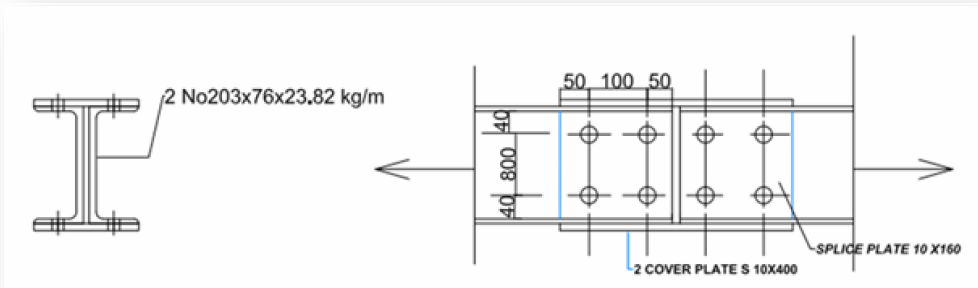
Quiz 1 on connections

Student Name: …….

Student ID Number……

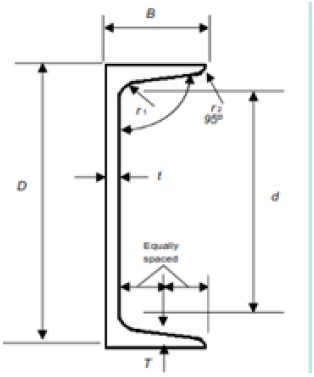
❖ ***Please read and then answer the questions***

In the connection in the figures below calculate the minimum load that can be taken by bolt group



Data

1. ***Black Bolts are 20 mm grade4.6 with a net area in in thread = 245mm2***
2. ***Diametre of bolt at thread 17.66 mm***
3. ***Properties of channel***



D=203.mm, B=76.2mm

t=7.1 mm T=11.2mm d=160mm

<u>use table below</u>

Table 10.1 Non-preloaded bolts in standard clearance holes (shear and bearing strengths of bolts and connected parts in N/mm^2)

Strength of bolts	*Bolt grade*					
	4.6	8.8	10.9	S275[a]	S355[a]	S460[a]
Shear strength p_s	160	375	400	–	–	–
Bearing strength p_{bb}	460	1000	1300	–	–	–
Bearing strength p_{bs}	–	–	–	460[b]	550[b]	670[b]

[a]Steel grade.
[b]Connected parts.

Table 32 — Bearing strength p_{bs} of connected parts

Steel grade	S 275	S 355	S 460	Other grades
Bearing strength p_{bs} (N/mm^2)	460	550	670	$0.67(U_s + Y_s)$
NOTE 1 U_s is the specified minimum tensile strength of the steel.				
NOTE 2 Y_s is the specified minimum yield strength of the steel.				

Q1 What is the Bolts group capacity in shear 8Marks

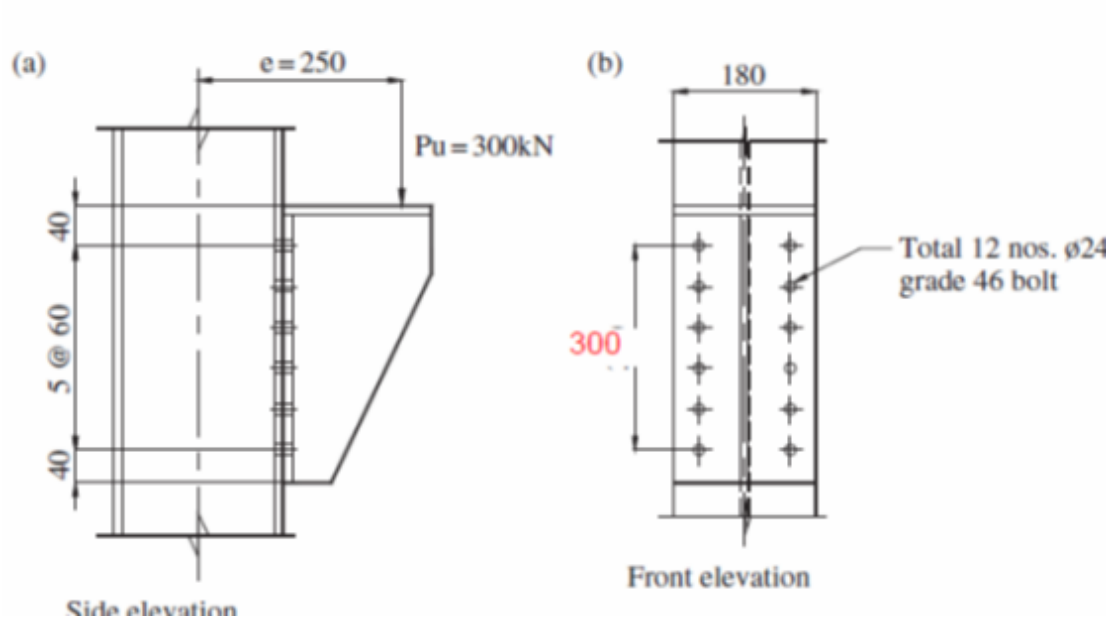
(a) 800 kN
(b) 400kNC
(c) 120 kN
(d) 627 kN

Q2 What is the Bolts group capacity in bearing 8 Marks

(a) 1400 kN
(b) 400 kN
(c) 880 kN
(d) 600 kN

❖ ***Please read and then answer the questions from Q3 to Q10***

The bolted bracket connection shown in Figure carries a vertical ultimate load of 300 kN placed at an eccentricity of 250 mm.
check that the 12 NO .24-mm diameter Grade 4.6 bolts are adequate where the net area of bolt section at thread =353 mm2
Assume all plates to be 20 mm thick



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Bearing strength p_{bs}	–	–	–	460[b]	550[b]	670[b]

[a]Steel grade.
[b]Connected parts.

Table 34 — Tension strength of bolts

Bolt grade	Tension strength p_t (N/mm^2)
4.6	240
8.8	560
10.9	700

Q3 Shear load on bolts from load Fs= ***8 Marks***

(a) 100kN

(b) 43 kN

(c) 25 kN

(d) 20 kN

Q4 Capacity of bolt shear strength Ps= ***8 Marks***

(a) 400.2 kN

(b) 56.48 kN

(c) 150 kN

(d) 36.8 kN

Q5 Ratio - actual shear load /Capacity of bolt in shear= Fs / Ps = ***8 Marks***

(a) 0.44

(b) 0.60

(c) 0.25

(d) 0.33

Q6 Maximum tension in bolt from load Ft= ***8 Marks***

(a) 24.60 kN

(b) 56.81 kN

(c) 100.4 kN

(d) 200 kN

Q7 Bolt Tension capacity Pt = ***8 Marks***

(a) 40.22 kN

(b) 24.8 kN

(c) 118 kN

(d) 67.77 kN

Q8 Ratio of Ft / Pt = ***8 Marks***

(a) 0.83

(b) 0.66

(c) 0.56

(d) 0.48

Q9 Combined ratio Fs/Ps + Ft /Pt = ***8 Marks***

(a) 1.388

(b) 1.122

(c) 1.278

(d) 1.0248

Q10 Is the Bolts group being adequate? ***8 Marks***

(a) Not adequate

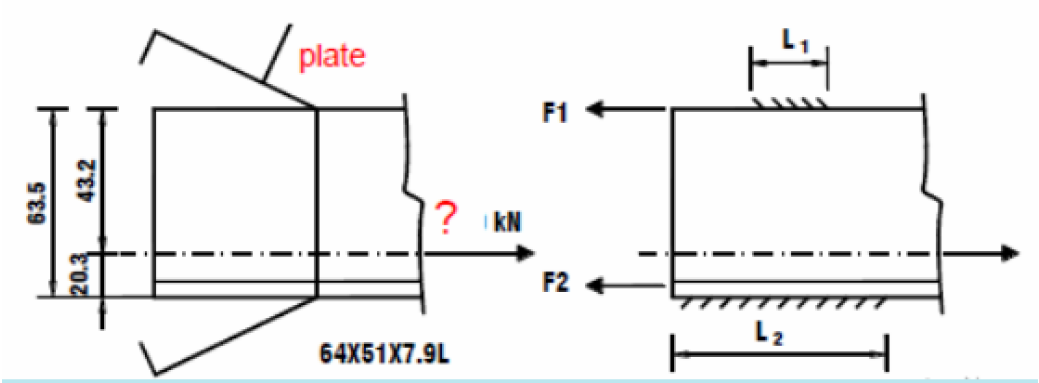
(b) adequate

(c) Partially not adequate

(d) Partially adequate

❖ ***Please read and then answer the questions from Q11 to Q 14***

In the connection below



Data

Leg of weld= 6mm

Using Class 42 electrode on Grade S275 plate

L1 =48 mm L2=88mm

Table 37 — Design strength of fillet welds p_w

Steel grade	Electrode classification (see Table 10)			For other types of electrode and/or other steel grades:
	35 N/mm²	42 N/mm²	50 N/mm²	$p_w = 0.5U_e$ but $p_w \leq 0.55U_s$ where
S 275	220	(220)[a]	(220)[a]	U_e is the minimum tensile strength of the electrode, as specified in the relevant product standard;
S 355	(220)[b]	250	(250)[a]	U_s is the specified minimum tensile strength of the parent metal.
S 460	(220)[b]	(250)[b]	280	

[a] Over-matching electrodes.
[b] Under-matching electrodes. Not to be used for partial penetration butt welds.

Q11 Throat of weld = 5 mark

(a) 5.0 mm

(b) 3.2 mm

(c) 4.2 mm

(d) 6.0 mm

Q12 Force F1 = 5 mark

(a) 33kN

(b) 102 kN

(c) 12 kN

(d) 44 kN

Q13 Force F2 = 5 mark

(a) 120 kN

(b) 81 kN

(c) 40 kN

(d) 24 kN

Q14 Load capacity of the welded connection Sum (F1+F2) = 5 mark

(a) 110 kN

(b) 77 kN

(c) 210 kN

(d) 125. kN