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Family Name					
Given Name/s					
Student Number					
Teaching Period	Semester 1, 2019				

ENG467 – Design of Steel Structures	DURATION	
	Reading Time:	10 minutes
	Writing Time:	120 minutes
INSTRUCTIONS TO CANDIDATES		
Attempt all questions. Wherever necessary, make appropriate assumptions and state your assumptions.		
EXAM CONDITIONS		
<u>You may begin writing from the commencement of the examination session.</u> The reading time indicated above is provided as a guide only.		
This is a RESTRICTED OPEN BOOK examination		
Any non-programmable calculator is permitted		
No handwritten notes are permitted		
No dictionaries are permitted		
ADDITIONAL AUTHORISED MATERIALS	EXAMINATION MATERIALS TO BE SUPPLIED	
Lecture Textbook/s (Annotated Permitted) AS4100	1 x 16 Page Book	

**THIS EXAMINATION IS PRINTED
DOUBLE-SIDED.**

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LEFT BLANK.**

Attempt all questions

Q1

Find the maximum nominal dead loads a 310 UC 118 could support without buckling if (a) both end are pinned (b) if both end are fixed

(12 marks)

Q2

A Pin-ended beam-column 250 UC 72.9 of 300 grade is 5m long. An axial gravity load of 500kN is applied concurrently with a lateral wind load of 62kN at mid-span. The member is bent about its strong axis and laterally restrained to prevent buckling.

Determine whether the design is safe. Refer CI 6.2 and CI 8.4.2

(16 marks)

Q3

State the assumptions made in Plastic design.

Discuss the collapse mechanism in plastic design.

Sketch the stress distribution in a cross section under plastic failure and show how you will calculate the moment of resistance of the section.

(12 marks)

Q4

A structural beam-tie, tension member is loaded with biaxial bending. Details are as follows.

$$M_{sx} = 20 \text{ kNm} \quad M_{sy} = 9 \text{ kNm} \quad M_{bx} = 14 \text{ kNm}$$

$$N_s = N_t = 450 \text{ kN} \quad N^* = 100 \text{ kN}$$

$$M_x^* = 2.6 \text{ kNm} \quad M_y^* = 3.5 \text{ kNm}$$

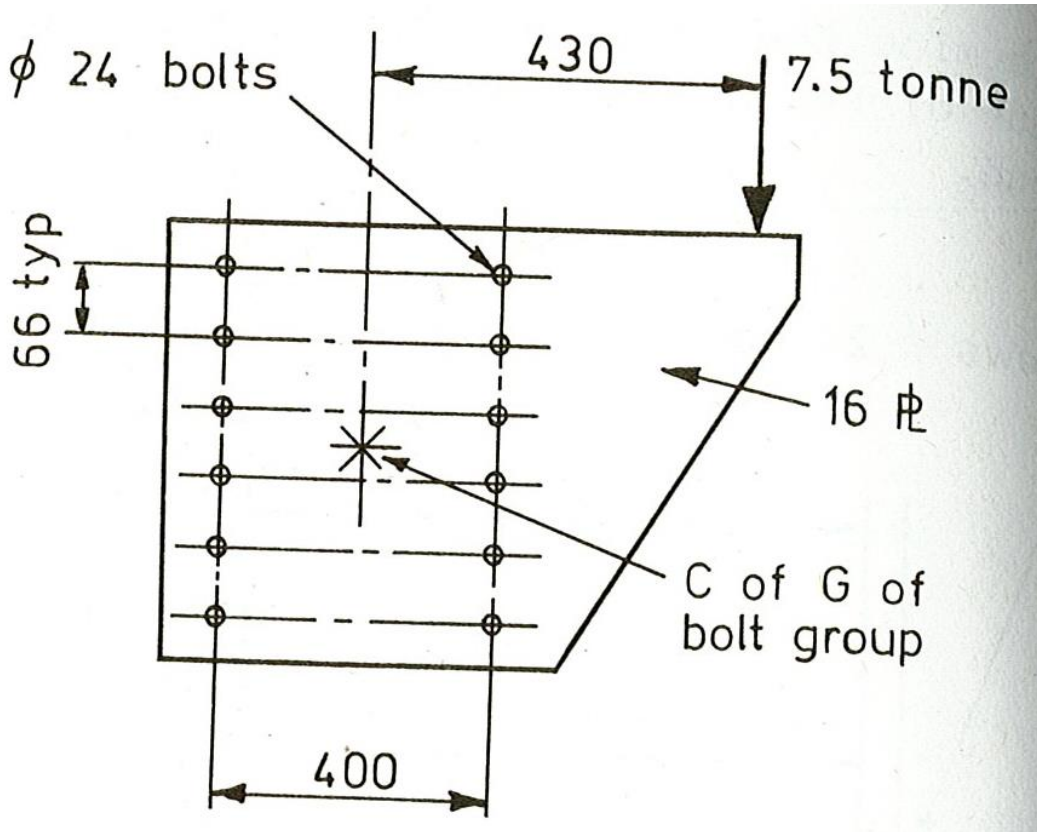
Determine whether the design is safe. Refer CI 8.4.5.2

(12 marks)

Q5

Calculate the maximum shear force in a corner bolt of the bolt group shown in the diagram. Assume the bolt shanks are in the shear plane. Make necessary assumptions and state the assumptions

One tonne = 1000 kg.



(Applied Structural Design Hosking)

(18 marks)

Q6

What are the different kind of failures you will check against in a bolted connection of two plates? Use diagrams wherever possible and discuss how you will go about checking for those failures.

(12 marks)

Q7

Determine the required size of fillet weld for a joint supporting a cantilever beam of 42mm depth and 12mm width. The beam is 2m length. The applied dead load at the end of the beam = 1000 N. Use E48XX electrodes and design for category SP welding.

$$N_Y = b^2 / (2b+d)$$

(18 marks)