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Family Name	
Given Names	
Student Number	
Teaching Period	Semester 1, 2017

FINAL EXAMINATION	DURATION
ENG467 – Design of Steel Structures	Reading Time: 10 minutes
	Writing Time: 120 minutes

INSTRUCTIONS TO CANDIDATES

Make necessary assumptions if required and state the assumptions made.

EXAM CONDITIONS

You may begin writing from the commencement of the examination session. The reading time indicated above is provided as a guide only.

This is an OPEN BOOK examination

Any non-programmable calculator is permitted

Any handwritten material is permitted

Any hard copy, English dictionary is permitted (annotated allowed)

ADDITIONAL AUTHORISED MATERIALS	EXAMINATION MATERIALS TO BE SUPPLIED
Any printed material with the exception of CDU Library books	1 x 16 Page Book 1 x Scrap Paper

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

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Attempt all questions

Q1 (10 Marks)

250UC89.5 Grade 300 UC with connections by its flanges only is used as a tension member. Calculate the capacity of the member in tension. Make any necessary assumption and state the assumptions.

Q2 (6 Marks)

Tensile capacity is reduced in the presence of shear across the section. Explain how you will check the tension member for capacity.

Q3 (10 Marks)

Choose a section for a universal column with a length 5.8m, in Grade 300 steel to resist a design axial force $N^* = 850\text{kN}$. Assume that for X axis both ends are pinned while for Y axis one end is fixed and the other pinned.

Q4 (15 Marks)

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 62.5kN at mid-span. The member is bent about its strong axis and laterally restrained to prevent buckling. Check the column for suitability.

Q5 (8 Marks)

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

$$M_{sx} = 19.4 \text{ kNm} \quad M_{sy} = 9 \text{ kNm} \quad M_{bx} = 14 \text{ kNm}$$

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

$$M_x^* = 2.6\text{kNm} \quad M_y^* = 3.1 \text{ kNm}$$

Q6 (8 Marks)

Describe the method of analysis for a bolt group subject to in plane actions and out of plane actions.

Q7 (8 Marks)

With the aid of sketches discuss the kind of failures possible in a bolted connection of two plates.

Q8 (15 Marks)

Calculate the required size of fillet weld for a connection supporting a cantilever beam made out of plate of size 36 mm (d-depth) x 10 mm (b-width). The length of the beam is 200mm. It carries a load of 200N at the free end. The fixed end is welded around all four sides. Use E41XX electrodes and design for category SP welding.

$$\text{Given } Z_w = bd + d^2 / 3$$