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

ENG215 – Surveying and Construction	DURATION	
	Reading Time:	10 minutes
	Writing Time:	120 minutes
INSTRUCTIONS TO CANDIDATES		
<ol style="list-style-type: none"> 1. Read all questions carefully. 2. Answer all questions. This exam has TWO parts. 3. Questions are not of equal value. Question value indicates length of required response. 4. Show all working and diagrams as necessary. 5. This exam constitutes 50% of the total marks for this unit. 6. Use dark blue or black ink. 		
EXAM CONDITIONS		
<p><u>You may begin writing from the commencement of the examination session.</u> The reading time indicated above is provided as a guide only.</p>		
This is a CLOSED 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	
No additional printed material is permitted	1 x 20 Page Book	

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

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PART A: Short Answer Questions (35 Marks)

(answer all questions, you may use dot points if preferred, use diagrams as necessary)

Explain the following:

- A1.** Effective length, use a sketch (2 Marks)
- A2.** Euler's buckling formula, what are the limitations (4 Marks)
- A3.** The two main factors which determine the maximum carrying capacity in a long strut (2 Marks)
- A4.** Eccentric loading (1 Marks)
- A5.** Proof stress. (1 Mark)
- A6.** Manufactured timber products, and why are they often preferred over timber products "straight from the tree" (3 Marks)
- A7.** Cement (2 Mark)
- A8.** Water:cement ratio (2 Marks)
- A9.** Trial concrete mixes, and why they are necessary (2 Marks)
- A10.** Concrete workability testing, use a sketch. (3 Marks)
- A11.** Aggregate grading, and its importance in concrete (3 Marks)
- A12.** Pre-stressed and Post-stressed Concrete (2 marks)
- A13.** Non-destructive testing methods for steel (3 Marks)
- A14.** Corrosion protection methods for steel (3 Marks)
- A15.** Differential settlement of foundations (2 Marks)

PART B: Extended Questions (68 Marks)

(answer all questions)

Question B1 (7 Marks)

You have been given the task of planning the works on a construction site.

- a) Why is it important to consider drainage before commencing construction? (2 Marks)
- b) List three methods of controlling the surface water before it enters the stormwater drains. (3 Marks)
- c) How would you prevent silt and sand from entering the stormwater drains? (2 Marks)

Question B2 (10 marks)

Explain the two methods of using bitumen as a road surface. Include: (10 Marks)

- I. A description of each method
- II. Examples of situations where each method is used
- III. Reasons why each method is preferred in the above situations
- IV. Any limitations or reasons that the methods might not be used.

Question B3 (17 marks)

- a) Draw a labelled typical stress-strain diagram for a ductile material and explain how it would differ for a brittle material. (5 marks)
- b) How do you calculate the elastic modulus from the stress-strain graph? (2 Marks)
- c) Why is it preferable to use elastic-plastic materials rather than elastic-brittle materials in construction? (2 marks)
- d) List 6 properties that are important when considering a building material for a job. (6 Marks)
- e) Why is it important to have a clear knowledge of a material's mechanical properties before using it for construction? (2 marks)

Question B4 (10 Marks)

- a) What is the preferred cross section for a strut and why is this the case? (3 Marks)
- b) What is the preferred cross section for a beam and why is this the case? (3 Marks)
- c) The most efficient longitudinal section for a beam is one which varies according to the bending moment diagram for the loading for which that beam is designed. Why are "real" beams usually not varied in this manner? (3 marks)
- d) Which structural member does vary in depth according to the bending moment diagram? (1 Mark)

Question B5 (24 Marks)

- a) List 4 features of satisfactory aggregate for use in concrete. (4 Marks)
- b) Water should not be added to concrete when it arrives onsite, explain why. (2 Marks)
- c) What effect do the following have on the design of a concrete mix? (10 Marks)
 - I. High rise construction (2 Marks)
 - II. Closely spaced reinforcement (2 Marks)
 - III. Hot or Cold Weather (4 Marks)
 - IV. Requirement to load before the 28days (e.g. Driveway) (2 Marks)
- d) What are the advantages of having concrete mixed at a batching plant and delivered to site in trucks, compared with mixing concrete on site? (3 Marks)
- e) Can concrete be poured underwater? If so, how is this done? (3 marks)