

**UNIVERSITY OF SOUTH AUSTRALIA
SCHOOL OF NATURAL AND BUILT ENVIRONMENTS**

Bachelor of Construction Management & Economics (Hons)

CONSTRUCTION SCIENCE 1(CIVE 1003)

Internal Examination Semester 1, 2004

10 minutes reading time plus 2 hours and 30 minutes examination time, i.e. a total of 2 hours and 40 minutes.

For ENTEXT students 10 minutes reading time plus 2 hours and 55 minutes examination time, i.e. a total of 3 hours and 5 minutes.

EXAMINER: Rudolf Groeger Tel. 8302 2247

EXAMINATION REVIEWED BY : Stefan Hornlund

INSTRUCTIONS TO CANDIDATES:

- **This exam is worth 40% of the total marks for this course.**
- **NO REFERENCE MATERIAL IS ALLOWED.**
- **Calculators are allowed.**
- **Attempt all questions.**
- **Marks are as indicated.**

	MARKS
QUESTION 1	
(a) Name FOUR conditions under which corrosion of steel is likely even though there is no other dissimilar metal to promote corrosion.	6
(b) Explain the principle of having a sacrificial anode in steel hot water tanks. What is used for making these sacrificial anodes?	4
(c) Name THREE essentially different methods of coating steel with Zinc. Explain how these coatings are applied (if not obvious from the name). State ONE major DISADVANTAGE of each of these methods. Name ONE typical use for each of these systems.	10
TOTAL	20
	MARKS

QUESTION 2

- (a) A solid bar of steel is being tested for tensile strength. The bar is of square section, 12 mm x 12 mm. It is being tested to a load of 30 kN. Young's Modulus for steel is 200 GPa. What is the tensile stress in the bar and what is the strain? 8
- (b) What type of iron product would be used for crane hooks? Why? 2
- (c) Briefly explain how a glass greenhouse traps solar heat. 4
- (d) Name and briefly describe THREE essentially different types of glass or glazing which can reduce solar energy transmission into buildings. 6

TOTAL 20

QUESTION 3

A range of materials is available for filling joints. Some are described as "Elastic" and others as "Plastic". What do these terms mean? Give ONE generic example of each type (i.e. no trade names). 4

A long wall is being constructed for a new warehouse. Tilt up panels are used for the construction, each panel is 6 m in length. What thermal movement will occur in the joint between any two panels, given that the coefficient of thermal expansion of concrete is 12×10^{-6} . Buildings can get very hot in direct sunshine, so you should base your calculations on a range of 0 degrees C to 90 degrees C. 6

What generic type of material would you recommend for filling the joint? 2

State the expected movement range of the material you have selected. 2

Show how this value would affect the design joint width. 3

Draw a simple sketch to show how the joint should be designed. 3

TOTAL 20

QUESTION 4

	MARKS
Write short notes on the following-	
(a) What is sapwood? Why is it must be excluded from timber used for building?	5
(b) Explain with the help of a sketch why wood is anisotropic. How is timber made essentially isotropic in a named type of timber sheeting.	5
(c) Glues used during construction basically set in three ways. Briefly explain these and give a typical use for each of these.	5
(d) Stress grading of timber.	5
TOTAL	20

QUESTION 5

Complete the following sheet by writing your name and ID number in the spaces provided.

Then write your answers in the boxes provided by the tabulated question.

Finally, detach the sheet for question 5, fold it in half and place it in your answer booklet.

**5 FOR EACH
CEMENT**

TOTAL 20

SURNAME
FORENAME(S)
ID NUMBER

Use the following table to compare four special hydraulic cements with General Purpose Portland Cement. Write your answers in the boxes of the table below. You are not expected to give actual values. Where appropriate use terms like 'much faster', 'slower', 'identical', 'lower' etc.

CEMENT TYPE	BASIC DIFFERENCE IN COMPOSITION/ MANUFACTURE	RATE OF STRENGTH DEVELOPMENT	ONE MAJOR ADVANTAGE	ONE MAJOR DISADVANTAGE	ONE TYPICAL USE TO EXPLOIT THE DIFFERENCE
LOW HEAT PORTLAND CEMENT					
BLENDED PORTLAND CEMENT					
SULPHATE RESISTING PORTLAND CEMENT					
HIGH ALUMINA CEMENT					

***HAVE YOU WRITTEN YOUR NAME AND ID NUMBER IN THE BOXES AT THE TOP OF THIS SHEET?
DETACH THIS SHEET AND PLACE IT IN YOUR ANSWER BOOK
 END OF QUESTIONS***