

The University of Melbourne

Semester 2 Assessment, 1998

Department: School of Earth Sciences
Subject Number: 625-023
Subject Title: Geology (Engineering Course)

Exam Duration: **Two (2) Hours**

Reading Time: **15 minutes**

This paper has **3 pages including this one.**

Authorised materials:

The following items are authorised: Electronic calculators

Instructions to Invigilators:

Students will require at least one 14-page script book each. Additional books may be required by some students.

Instructions to Students:

There are 7 questions on the paper. Answer **FOUR** (4) questions. All questions have equal weight.

This Paper may be held by the Baillieu Library

Geology (Engineering Course)

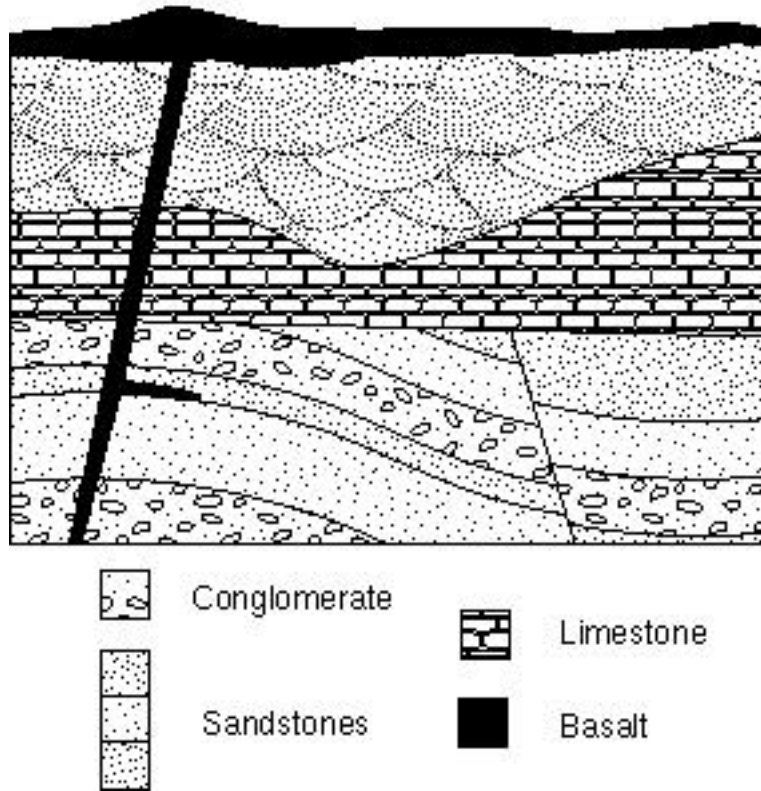
Time Allowed: Two (2) Hours.

Answer four questions only. All questions have equal weight.

Use sketches where appropriate, and label them clearly. The use of calculators is permitted.

- 1 (a) Quartz is a mineral which is relatively hard, Describe some other characteristics of quartz by which it might be identified, and discuss how its hardness is related to the structure of the quartz crystal.
- (b) Augite is a mineral that has two cleavage planes almost at right angles. Describe some other characteristics of augite by which it might be identified, and discuss how its cleavage behaviour is related to the structure of the quartz crystal.
- (c) Calcite is a mineral that dissolves relatively easily in rainwater. Describe some other characteristics of calcite by which it might be identified, and explain why it is susceptible to dissolution.
- 2 Give short definitions or explanations of the following geological terms:
- | | |
|-------------------------|------------------------|
| a. mineral | b. rock |
| c. pyroxene | d. porphyritic texture |
| e. contact metamorphism | f. jointing |
| g. unconformity | h. concentric folds |
| i. matrix and cement | j. hydration |
- 3 Explain why the mineral composition of sedimentary rocks is generally quite different from the mineral composition of igneous rocks.
Do metamorphic rocks fit into your explanation, or must you modify it?
- 4 On the field excursion, we saw that most of the rocks had been fractured at some time since they formed (apart from in the quarrying process), and almost all of those fractures are described as “joints”.
Why are these fractures so called? From an engineering point of view, what was the important difference between the jointing in the sedimentary rocks in the Royal Parade cutting, and the jointing in the granite quarry at Oaklands?

- 5 Describe and explain the processes which, acting over a long period of time, would convert freshly-exposed granite rock to soil and other weathering products.
- 6 A freeway is to be built along a slope near some granite hills. Granite tors (boulders) in the alluvial slopes are obvious obstacles, but it is not obvious whether they are outcrops or whether they rolled down from the higher slopes. Granite is hard, denser than the alluvial sands weathered from the granite, electrically resistive, and usually nonmagnetic. Describe the geophysical method you would use to determine how much, if any, blasting might be required to prepare the freeway, and explain why this method would be useful.
- 7 Describe the order of events which led to the arrangement of rocks in the geological section shown. Explain how you determined this order, and in particular show how the contacts between rock units provide the necessary information.



(Annotate this page and hand it in, if you wish.
Remember to write your student number on it, if you do.)