

National University of Ireland, Galway
OLLSCOIL NA hÉIREANN, GAILLIMH

SUMMER EXAMINATIONS 2003

**3rd SCIENCE
GEOLOGY [GE 322]**

PAPER TWO

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Time allowed: **THREE HOURS**

Answer five questions:

One from each Section and **one other** from Section A or B

Please use separate Answer Books for each Section.

Illustrate your answers with neat sketches and diagrams where appropriate.

SECTION A

1. Describe features that may develop in a strike-slip fault zone. What small-scale structures may help you to determine sense of shear?
- 2. Define Hooke's Law and Newton's Law of Viscous Flow. How may these laws be useful in understanding rock deformation and under what conditions are they likely to apply?
3. **Answer four** out of the following eight questions
 - a What assumptions are made when carrying out a line balancing of a cross section?
 - b Draw and label, with a brief definition, the different parts of a fold.
 - c How may joints form in rocks? Why may they be important?
 - d Define, using diagrams, fold facing, fold vergence and cleavage vergence.
 - e List the forces that drive the plates
 - f Why does increased fluid pressure promote faulting?

- g Distinguish between hydrostatic, lithostatic and deviatoric (sometimes called 'geologic') stress systems.
- h How can folds be formed during dip slip movement on a normal fault during basin formation?

SECTION B

- 4. Shell concentrations can be described as event, composite, hiatal or lag; what are the major distinguishing features of each category?
- 5. Discuss how partitioning of organisms below the sediment-water interface (infaunal tiering) can be studied using the trace fossils left by their activities.
- 6. Distinguish between lithostratigraphy, chronostratigraphy and geochronology; include discussion of the techniques employed with each procedure.

SECTION C

- 7. Explain how skarns are formed paying particular attention to the setting and formation of *exoskarns*, *endoskarns* and *reaction skarns*. Illustrate your answer with examples from Connemara.
- 8. Write short notes on two of the following:
 - a) Granulite facies
 - b) Blueschist facies
 - c) Eclogites
 - d) Snowball garnets

SECTION D

- 9. What is meant by the terms "primary magma" and "secondary magma"? Discuss the above definitions with respect to the formation of andesitic magma.
- 10. Use the diagrams included to illustrate your answers.
 - (i) Diagram A shows the relationship of the oceanic geotherm to the solidus and liquidus curves of mantle peridotite. In order for melting to take place, the solidus and the geotherm must intersect. What geological processes may lead to this taking place?

(ii) Diagram B illustrates the isobaric phase relationships between minerals X and Y. Describe what happens as a melt of composition 40% X is cooled from point M to point S. Sketch on the diagram the effect the addition of water will have on the system.

Diagram A

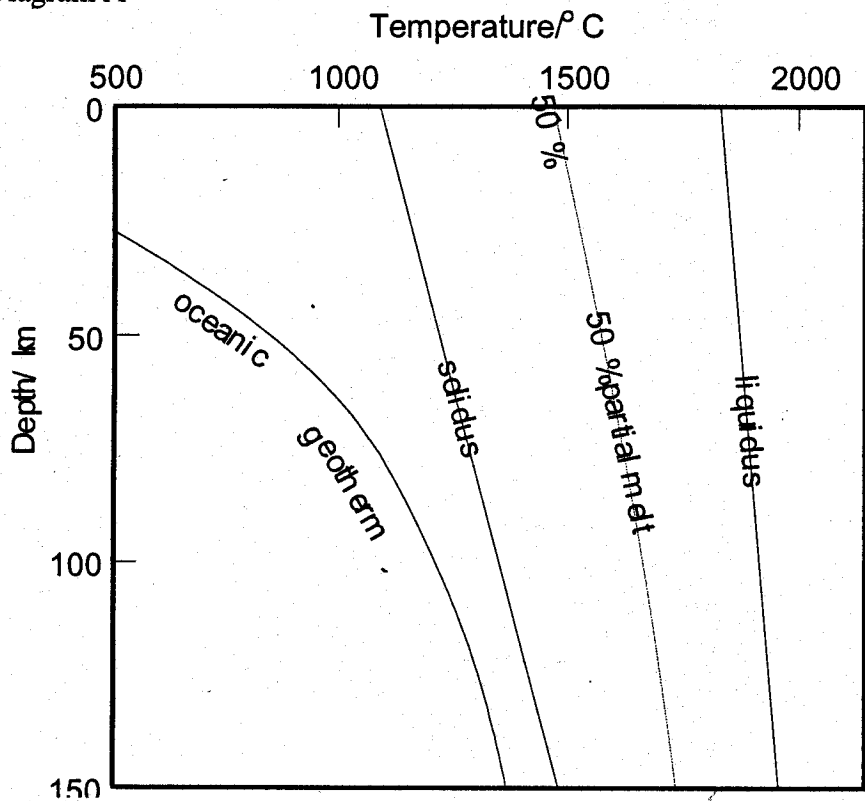


Diagram B