

National University of Ireland, Galway
OLLSCOIL NA hÉIREANN, GAILLIMH

AUTUMN ~~SUMMER~~ EXAMINATIONS 1999

3rd SCIENCE
GEOLOGY [GE 311/GE313]

PAPER TWO

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Prof. P.D. Ryan
Dr. M. Feely

Time allowed: Three hours

Answer four questions: **two** from Section A **two** from Section B.

Please use separate Answer Books for each Section.

Illustrate your answers with neat sketches and diagrams where appropriate.

SECTION A

- (d) Write short notes on the following:
- (a) Blueschist facies
 - (b) Eclogite facies
 - (c) Amphibolite facies
 - (d) Migmatites
- (e) Use P-T space to illustrate how Gibbs phase rule can be used to calculate the number of degrees of freedom and hence define the type of equilibrium present for various phase assemblages derived from the components Al_2O_3 and SiO_2 (with SiO_2 in excess).
- (f) Write an illustrated essay on Skarns.
- (g) Describe in detail the use of S_i and S_e textures in metamorphic petrology.

SECTION B

5. Define "normal" and "shear" stress. Show how a Mohr diagram can be used to explain why faults develop at $\sim 30^\circ$ to the maximum compressive stress, not 45° . How can Mohr diagrams help us understand why high fluid stress promotes faulting?
6. Define, using the Flinn diagram, the constrictional and flattening deformation fields. Discuss the types of structures that develop in each field.
- 7a. How may the concepts of "facing", "fold vergence" and "cleavage vergence" be used to identify the stratigraphy and structure of an area affected by two phases of folding, but where "way up" structures are locally preserved?

OR

- 7b. Discuss Ramsay's classification of folds using dip isogons. By what mechanisms can a class 1B fold form in a sequence of planar-bedded sediments.
8. What structures are associated with major strike-slip faults? Show, using diagrams, how such a fault zone could act as a focus for sedimentation or granite emplacement.