

National University of Ireland, Galway
OLLSCOIL NA hÉIREANN, GAILLIMH

SUMMER EXAMINATIONS 1999

B.Sc. (HONOURS) DEGREE
GEOLOGY (GE417, GE418)
EARTH SCIENCES (GE417, GE418)

PAPER TWO

Prof. B.P.J. Williams
Prof. P.D. Ryan
Prof. A. Brock

Time allowed: Three hours

Answer four questions, at least two from Section A and at least one from Section B.

SECTION A (GE417)

1. Show how a knowledge of the deep geology of Ireland can help constrain tectonic models for the evolution of the Irish lithosphere.
2. Describe and discuss the relative merits of the McKenzie "pure shear" and the Wernicke "simple shear" models for the formation of sedimentary basins.
3. *Either:*

Give an account of the forces that drive the plates

or

Show how velocity triangles can be constructed for a triple junction and how these can be used to demonstrate that the junction has a stable configuration. Cite at least one example where such a velocity triangle has been used in to reconstruct palaeo-plate histories (i.e. those for which the relevant oceanic crust is no longer preserved).

4. Discuss the "Wilson Cycle" closing and re-opening of oceans.
5. Show how the C_z/l_z (crustal to lithospheric thickness ratio) can vary during the formation and collapse of a collisional mountain belt and discuss the topographic effects of these changes in C_z/l_z .

SECTION B (GE 418)

6. Describe, citing examples, how multivariate statistics can be used to make geologically useful decisions.
7. Describe several One Sample and Two Sample tests. State why and on what data you would use these tests and show how they may help you test a hypothesis.
8. Do you think it is a good idea to use computer models to simulate a geological system, or do you think that the assumptions made are so poorly constrained as to render the models useless? Cite models you have used when giving your answer.
9. Distinguish between the refraction method and the reflection method of seismic exploration and discuss their relative strengths and weaknesses.
A refraction survey is to be carried out to determine the depth of bed-rock along the route of a pipeline. What factors need to be considered in deciding the most appropriate geophone spacing, given that a 24 channel system is to be used?