

University of Dublin

Trinity College

Matriculation
Examination

Hilary Term, 2013

Geology

Wednesday 3rd April

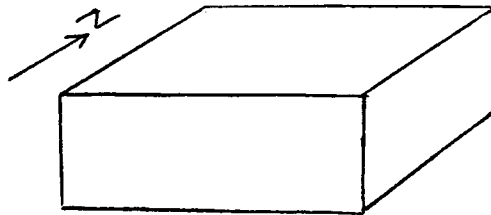
GMB

9.30 - 12.30

Dr I.S. Sanders and Dr P.N. Wyse Jackson

*Answer any **five** questions. Credit will be given for citing examples of geological features you have seen in the field, where appropriate.*

1. Draw a labelled diagram showing the internal structure of the Earth (8 marks). Explain how the seismic recording of distant earthquakes provides evidence for the internal structure (8 marks). Why do geologists infer that the central part of the interior is made of iron? (4 marks)
2. Describe the different forms which basalt can adopt following the extrusion or shallow intrusion of basaltic magma, and state the names and the chemical formulae of three minerals commonly present in basalt (15 marks). How is basalt magma generated, and how does basalt differ from gabbro? (5 marks)
3. Draw four separate block diagrams viewed from the south-east (as shown) to illustrate the following geological structures: (a) strata dipping west at about 20°, (b) strata dipping east at about 70° separated by an angular unconformity from younger, overlying strata that dip SE at about 20°, (c) an upright symmetrical anticline that plunges north at about 20° and (d) strata dipping at about 20° east cut by a reverse fault that trends north-south and dips at 45° to the west. (5 marks for each part)



4. In the context of the geological history of Ireland, write short notes on any **three** of the following five topics: Ireland's oldest rocks; early Devonian granite; Carboniferous limestone; the lapetus Ocean; Cretaceous chalk.
5. Describe the similarities and differences between the rocks in each of the following three pairs, referring to the appearance and the origin of the rocks: coal and limestone; conglomerate and breccia; sandstone and shale.
6. Using clearly labelled drawings describe the appearance of (a) a graptolite and (b) an ammonite (15 marks). Describe the probable mode of life of each kind of organism and say during which geological periods it lived? (5 marks)
7. Describe three erosional features and three depositional features that suggest that Ireland was once glaciated (18 marks). How long ago did the last glaciation come to an end? (2 marks)
8. Write a short essay on the appearance and origin of metamorphic rocks.
9. Discuss the occurrence and origin of oil and natural gas, and describe how exploration for these hydrocarbon resources is carried out.
10. How would you distinguish between the minerals in each of the following pairs: muscovite and gypsum (as cleavage plates); quartz and halite; barite and calcite; pyrite and chalcopyrite (16 marks). Write down the chemical formula of each of the minerals named (4 marks).