

National Exams May 2019

18-Geol-A1, Mineralogy and Petrology

3 hours duration

NOTES:

1. If doubt exists as to the interpretation of any question, the candidate is urged to submit with the answer paper, a clear statement of any assumptions made.
2. This is a CLOSED BOOK EXAM. No calculator is permitted.
3. There are **two parts** to this exam: **PART 1:** Short Answer (~ 1/2 page, each question). Answer all **5** ten-mark questions (50 marks). **PART 2:** Short Answer (~ 1 page, each question): Answer **5 of the 7** ten-mark questions (50 marks). The first ten questions as they appear in the answer book will be marked.

PART 1: Short Answer (~ 1/2 page, each):
Answer all 5 ten-mark questions (50 marks).

1) Olivine and Pyroxene are two silicate mineral groups. Giving a mineral example (i.e., name) of each, please explain how these mineral groups are different. Name one rock where both of these minerals can be found.

2) What is a solid solution in mineralogy? Define and give an example of each with the mineral formula.

3) What kind of evidence would determine if any of the following processes have changed the composition of magmas and resulting igneous rocks (a) crystal fractionation, (b) immiscibility, (c) crustal assimilation.

4) There are 7 crystal systems in mineral crystallography. Name and describe 2 of these crystal systems. Give a mineral example of each.

5) What is thermal metamorphism? What key mineral and textural features would you anticipate seeing in this type of metamorphism?

PART 2: Short Answer (~ 1 page, each):
Answer 5 of the 7 ten-mark questions (50 marks):

- 1) What are ophiolites? Draw a labeled diagram.
- 2) What are LIPS and how are they formed?
- 3) What is the Wilson Cycle? From start to end draw a series of labelled diagrams that demonstrate this complete cycle.
- 4) What causes melting to occur in different tectonic settings? Please use two different tectonic environments to explain.
- 5) Explosive eruptions. Give an example and describe the possible volcaniclastic products? Name a place on Earth where you might find this type of eruption and describe the tectonic setting.
- 6) What is Bowen's Reaction series? Please explain how different igneous rocks are created using Bowen's Reaction series.
- 7) Oxide minerals are common on Earth. List two minerals (i.e., names) in this group. Give the mineral formula for each and a diagnostic property for the identification of each (i.e., how can you tell them apart?).