

## National Exams December 2017

### 04-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 8** 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) Garnet and Feldspar are two silicate mineral groups. Giving a mineral example (i.e., name) of each, please explain how these mineral groups are different.
  
- 2) Zn, Cu, Ni, Fe, and Pb are common in sulfide minerals. List one mineral name and chemical formula for examples of minerals containing these elements.
  
- 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) magma mixing, (c) crustal assimilation.
  
- 4) What are the four basic agents of metamorphism? Give a geological example for each.
  
- 5) What is contact metamorphism? What key mineral and textural features would you anticipate to see in this type of metamorphism?

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

- 1) What is the difference between A'a and Pahoehoe lavas? How do they form? They give insight into temperature, viscosity and proximity to vents. Elaborate.
- 2) What are ophiolites and how are they formed? How are they preserved in the geological record?
- 3) What is the difference between metamorphism and metasomatism? Exoskarn, Endoskarn and hornfels form during these processes, please explain what they are and how they relate.
- 4) What causes melting to occur in different tectonic settings? Please use three different tectonic environments to explain.
- 5) Effusive vs Explosive eruptions. Give an example of each and contrast the products? Name a place on Earth where you might find each of these products.
- 6) Cumulate igneous processes are important in the creation of ultramafic rocks. Using Bowen's Reaction series, please explain these processes.
- 7) Carbonate minerals are common on Earth. List three 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?).