

BSMN 217: MINERALOGY AND CRYSTALLOGRAPHY

STREAM: Y2S1

TIME: 2 HOURS.

DAY:

DATE:

INSTRUCTIONS:

- 1. Do not write anything on this question paper.**
- 2. Answer Question ONE and any other TWO questions.**

QUESTION ONE (30 MARKS)

- Explain the term “specific gravity of a mineral”. (2 Marks)
- Specific gravity of diamond is 3.5 while that of graphite is 2.3 though they have similar chemical composition. Explain (4 Marks)
- Describe the determination of specific gravity of a mineral giving relevant expressions. Why is water not the most suitable liquid to use? (6 Marks)
- Distinguish between isotropic and anisotropic minerals. (4 Marks)
- Explain the main difference between reflecting microscope and transmitted light microscope. (4 Marks)
- What is Luster as used in optical properties of minerals. (2 Marks)
- Explain the following varieties of non-metallic luster. (8 Marks)

- i. Pearly.
- ii. Dull or Earthy.
- iii. Resinous.
- iv. Silky.

QUESTION TWO (20 MARKS)

- a) Explain determination of refractive index of a non-opaque, isotropic mineral.
(5 Marks)
- b) Explain the basic principle of X-ray diffractometry. (3 Marks)
- c) I) State the mathematical expression of Bragg's Law defining all the terms used.
(3 Marks)
ii) Sketch a diagram to show diffraction of X-rays by equally spaced, identical planes of atoms governed by the Bragg' Law. (5 Marks)
- d) Explain two applications of X-ray diffractometry. (4 Marks)

QUESTION THREE (20 MARKS)

- a. Explain four factors that determine the texture of igneous rocks. (12 Marks)
- b. Describe common metamorphic rocks and their textures. (8 Marks)

QUESTION FOUR(20 MARKS)

- a. Distinguish between cleavage, parting and fracture in terms of physical properties of minerals. (6 Marks)
- b. Differentiate between idiochromatic and allochromatic colors as used to diagnose physical properties of minerals. (6 Marks)
- c. Explain the following crystallographic terms. (8 Marks)

- i. Motif
- ii. Unit cell
- iii. Crystal structure
- iv. Morphological crystals
- v. Lattice

QUESTION FIVE (20 MARKS)

a) Describe the use of the following major components of the transmitted light polarizing microscope. (10 Marks)

- i. The light source.
- ii. The polarizer.
- iii. Substage diaphragms.
- iv. The condenser.

b) Explain the following optical properties of minerals observed under plane-polarized light. (10 Marks)

- i. Color.
- ii. Pleochroism.
- iii. Habit.
- iv. Cleavage