

Answer FOUR questions only of the following (50M)

Q1 (12.5 M) Give short notes about the following:

- i- Crystalline substance and amorphous substance.
- ii- Dimorphism and isodimorphous.
- iii- Native metals and native non-metals.

Q2 (12.5 M)

- i- Write short note on the isomorphous minerals and isomorphous series?
- ii- Discuss the chemistry and distinguishing features of hornblende?

Q3 (12.5 M)

- i- Mention some minerals belonging to the cyclosilicates with their chemical formulae?
- ii- Discuss the importance of solid solution and its P-T controls?

Q4 (12.5 M)

- i- Write on the nesosilicates and their common minerals?
- ii- Compare between the optical properties of both orthopyroxene and clinopyroxene subgroups?

Q5 (12.5 M)

- i. Mention the general characteristics of clay minerals and compare between illite and kaolinite?
- ii. Write on the pyroxenoids and spinel group and their important characters?

Answer FOUR questions only of the following (50M)

Q1 (12.5 M)

- i- Give short notes about the three main groups of oxide minerals based on metal cation/oxygen ratios?
- ii- Define the inversion axis of symmetry?

Q2 (12.5 M)

- i- Discuss the general characteristics of nesosilicates with examples?
- ii- Explain the crystal form and crystal habit of crystals?

Q3 (12.5 M)

- i- Mention the general characteristics of halides with examples?
- ii- Compare between luster and streak of minerals?

Q4 (12.5 M)

- i. Write short note on the chemical bonding in minerals?
- ii. Describe both prism and dipyramid forms of crystals?

Q5 (12.5 M)

- i. Compare between both color and density for ferromagnesian and nonferromagnesian silicate minerals?
- ii. Explain the various types of solid solution in minerals?

Answer four questions only of the following (50M)

Q1 (12.5 M) Define the following:

**Crystal Structure, Amorphous Materials, Unit Cell, Polycrystals, HCP,
Atomic Packing Factor (APF)**

Q2 (12.5 M)

- i- Write on the characteristics of both snow crystals and snowflakes?
- ii- Mention the common characteristics of metallic crystal structures?

Q3 (12.5 M)

- i- What is the meaning by MILLER INDICES and identify the face of an octahedron and face of a cube using Miller's indices?
- ii- Explain the relation between energy and packing?

Q4 (12.5M)

- i- Write on the axes of symmetry and center of symmetry of crystals?
- ii- Compare between the tetragonal and hexagonal crystal systems?

Q5 (12.5 M)

- i- Explain the mineral structure of PbS?
- ii- Compare between the isometric and non-isometric forms?