

MASTER OF SCIENCE EXAMINATION, 2018

(1st Year, 1st Semester)

APPLIED GEOLOGY

Mineralogy

Paper - I

Time : Two hours

Full Marks : 50

Use separate answer script for each group.

GROUP - A (25 marks)

(Petroleum Geology)

Answer **q.no. 1** is compulsory and any **two** from the rest.

1. What is Olivine-Spinel transition ? Which factors cause this phase transition ? How does the density of Mg_2SiO_4 change with such phase transition ? What is co-ordination polyhedral ? “Strength of an ionic bond decreases with increasing coordination number of a cation” accept and reject the statement with reason. 13
2. “Al-substitution in amphibole structure is a marker of the ambient geothermal gradient” – Accept or reject the statement with reason. 6
3. What is ‘omphacite’ ? In which rock does ‘omphacite’ occur and why ? What is its tectonic implication ? 6

(Turn over)

(2)

4. 'Single grain of an orthopyroxene can be a good geothermometer' – accept or reject the statement with reason. What is Tschermak's substitution? 6

GROUP - B (25 marks)

5. Answer any **five** questions : 5x5=25
- (a) Why is wustite rarely found on the surface of the earth? How stoichiometry and charge are balanced in wustite structure?
 - (b) Why is maghemite called 'cation deficient' spinel? Discuss about cation distribution in normal and inverse spinel.
 - (c) What is hydrated Mn-oxides? How much barium can be accommodated in hollandite structure? Why natural manganese carbonate deposits usually contain relicts of higher oxides of manganese?
 - (d) How braunite-bixbyite association in metamorphic rocks help identify the grade of metamorphism? What are the limitations of this application?
 - (e) At what temperature pyrite breaks down to pyrrhotite? Discuss briefly the pyrite-pyrrhotite solvus with necessary sketches.

(3)

- (f) Why marcasite is considered as sulfur deficient mineral? How can it be established? Under what condition marcasite is coexistent with its polymorphic form?
- (g) Discuss about intermediate solid solution (ISS) of Cu-Fe-S system. Under what condition do you expect chalcopyrite and mooihoekite to form from ISS?
- (h) Comment on :
 - (i) Hematite-limonite intergrowth in Fe-Ti-O system.
 - (ii) Fe-rich patches in sphalerite.

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