

Ex/SC/GEOL/PG/CORE/TH/01/2025

MASTER OF SCIENCE EXAMINATION, 2025

(1st Year, 1st Semester)

APPLIED GEOLOGY

PAPER : CORE/TH/01

(MINERALOGY)

Time : 2 Hours

Full Marks : 40

Use separate answer scripts for each Part.

PART—I

(20 Marks)

Answer *any four* questions

5×4=20

CO3

1. Describe Spinel Structure. Why is jacobsonite an inverse spinel, but hercynite is a normal spinel? 4+1=5

CO3

2. Describe the Spinel Prism. How do you express the composition of a spinel group of minerals within the spinel prism? 3+2=5

GEOL-1422

[Turn Over]

(2)

CO1

3. “Some variables must be used in geologic systems to indicate the potential for iron to occur in a more oxidized or more reduced state”- Explain. 5

CO1

4. Describe with an appropriate phase diagram the melting experimental results of iron oxides in the presence of graphite and/or C–O vapour. What is the implication of this experimental result? 5

CO1

5. Draw the equilibrium phase relations in the join $\text{FeO-Fe}_2\text{O}_3\text{-TiO}_2$ at 1300°C liquidus temperature. Explain the occurrence of Trellis ilmenomagnetite texture in Fe-Ti oxide minerals. 5

CO1, CO3

6. What are the significant differences in Fe-Ni-S experimental results at 728°C and 400°C? 5

CO3

7. Write a short note on the mineralogy and mineral chemistry of the mantle sulfides. Write their primitive mantle normalised PGE geochemical character. 5

(3)

PART—II

(20 Marks)

Answer Q1 and *any one* from Q2 and Q3

1. Accept or Reject the following statements with reason.

4×3=12

(a) “The configurational entropy of sanidine is lower than the microcline”. (CO1)

(b) “A section of pyroxene grain can never show two sets of exsolution lamellae”. (CO3)

(c) “Penetration depth of an electron beam is higher in SE mode than in the BSE mode”. (CO4)

2. (a) How do you explain the formation of the acicular grain aggregates in komatiite?” (CO2) 5

(b) Do you expect a komatiite in the Phanerozoic volcanic rock association? Justify. (CO1) 3

3. (a) Is it necessary for a mineral to develop a well-defined basal plane? Justify. (CO1) 4

(b) How do you explain the major seismic discontinuities in the mantle transition zone.(CO2) 4

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