

B. Sc. GEOLOGICAL SCIENCE EXAMINATION, 2023

(3rd Year, 1st Semester)

ECONOMIC GEOLOGY

PAPER – CORE/TH/12

Time : Two hours

Full Marks : 40

(Use a separate Answer script for each Part)

PART – I (20 Marks)

Answer Q1 and any 2 from the rest of the questions

- Q1 Write with examples about the types of major ultramafic-mafic bodies in different geological settings that host orthomagmatic ore deposits. What are the major orthomagmatic ore deposits present in the Nuasahi ultramafic-mafic complex (Orissa, India), and how did they form? 3+5 = 8
- Q2 Explain with examples the genetic relationship between magmas and mineral deposits. "Stratiform chromitites are common in both Bushveld type and ophiolitic complexes however podiform chromitites are only found in the ophiolitic complexes" – Explain. 2+4 = 6
- Q3 Explain the occurrence of dunite rim surrounding the podiform chromitites in the upper mantle tectonites. Do you think early segregation of olivine from an ultramafic magma may help in sulfide segregation? Justify your answer. 3+3 = 6
- Q4 What is a Reef-Type PGE deposit? Give examples. Write about the origin of Reef-Type PGE deposits. 2+4 = 6

[Turn over

PART – II (20 Marks)

Answer any four (4) questions (4x5)

1. What are gossan and pseudo-gossan? How does gossan form? Explain why galena and sphalerite-rich ores do not form significant supergene enrichment.

1+2+2

2. Explain the terms “first boiling” and “second boiling”. What happens to a hydrous melt when it is emplaced at shallow crustal level? “2-6 km crustal depth is most suitable for the formation of magmatic-hydrothermal deposit”- accept or reject the statement with reason. Use necessary sketches wherever required.

1+2+2

3. “A felsic protolith is more suitable for the formation of bauxite than a mafic protolith”- accept or reject the statement with reasons. “Neither highly alkaline nor highly acidic solutions are suitable for the formation of bauxite”-accept or reject the statement with reasons. Describe the distribution of Ni, Mg, Fe₂O₃, Al₂O₃ and SiO₂ in a lateritic regolith. Use necessary sketches wherever required.

1+2+2

4. Using necessary sketch discuss the relative solubility of Fe and Al in chlorine-rich solution. What differences would you expect in the mineralogy of a carbonate-hosted skarn deposit formed by Cl-rich and Cl-poor magmatic-hydrothermal fluid and why?

2¹/₂+2¹/₂

5. Define the terms “ore minerals”, “cut-off-grade”, and “enrichment factor”. Briefly discuss the factors that control “cut-off-grade” of a deposit.

3+2

6. Write short notes on a) Alkali alteration in Porphyry Cu and Porphyry Sn deposits, b) Metal zoning in Volcanogenic Massive Sulfide Deposits (VMS).

2¹/₂+2¹/₂