

EX/SC/GEOL/PG/CORE/TH/09/2025

M. Sc. (APPLIED GEOLOGY) EXAMINATION, 2025

(2nd Year, 1st Semester)

ORE GEOLOGY

PAPER : CORE/TH/09

Time : Two Hours

Full Marks : 40

(Use separate answer scripts for each Part.)

PART—I

(Marks : 20)

Answer ***all*** questions :

1. Classify the Platinum Group Elements (PGE) based on their melting temperature and density. Discuss about geochemical behaviour of PGEs during core-segregation of the planet Earth. 4
2. What would be the expected chondrite normalised PGE pattern for any ultramafic-mafic rocks that had experienced prior sulfide liquid miscibility in the parental magma? Explain with an appropriate diagram. 3
3. Discuss about the major types of PGE deposits and their origin. 5

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[Turn Over]

(2)

4. How is the solubility of S in basaltic magma controlled by the independent variables T , fO_2 , FeO activity and SiO_2 activity? Write with appropriate experimental diagrams. 8

(OR)

“Major chromite deposits are genetically related to ultramafic-mafic magmatism that are restricted to specific periods and have specific tectonic settings” — Discuss with examples. Explain the occurrence of dunite rim around the podiform chromitites.

PART—II

(Marks : 20)

Answer *any four* questions : 5×4=20

1. Critically evaluate the potential of bisulfide complexing and chloride complexing in the transportation of ore elements in hydrothermal fluids. CO3 (5)
2. “Pressure can indirectly play very important role in ore mineral precipitation from hydrothermal fluids” — accept or reject the statement with reasons. Use necessary diagrams for your answer. Why are metal ions more efficiently adsorbed on mineral surfaces in alkaline environment than in acidic environment? “While adsorption of most metals on mineral surfaces increases with increasing pH, Au shows a different pattern” — why? CO3 (3+1+1)

(3)

3. “The magma composition, depth of magma emplacement and mechanism of fluid saturation (first boiling vs. second boiling) collectively play an important role in deciding whether the deposit will be a porphyry Cu(Mo) deposit or porphyry W (Mo) deposit” — accept or reject the statement with reasons. CO4 (5)
4. Write short notes on (a) Fe oxide Cu-Au (IOCG)-type deposits and (b) Solubility of uranium as U^{4+} in reduced hydrothermal fluid. CO4 (2½×2)
5. Using suitable diagrams, compare the hydrothermal alteration patterns of a surface derived hydrothermal fluid and a magmatic-hydrothermal fluid in their heating and cooling paths. Briefly discuss the mechanisms that drive large-scale fluid flows in the crust. Use necessary diagrams. CO5 (2+3)
6. “The timing and changing style of major uranium deposit types through geological time can be explained by the evolution of lithosphere, atmosphere and biosphere” — accept or reject the statement with reasons. CO6 (5)

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