B. Sc. GEOLOGICAL SCIENCE EXAMINATION, 2024

(3rd Year, 1st Semester)

ECONOMIC GEOLOGY

PAPER : CORE 12

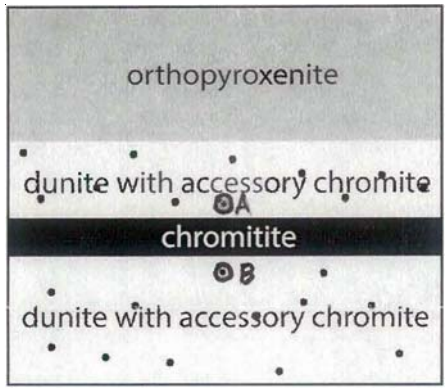
Time : *Two Hours* *Full Marks* : 40

(*Use a separate Answer script for each Part*)

PART—I (20 Marks)

Answer *all* questions : **5×4=20**

1. Explain the most acceptable model for origin of the stratiform chromitite layer and the rock sequences as shown in the figure. How do you validate this model if the compositions of olivine at the locations **A** and **B** in dunite are similar? 5



2. What is liquid immiscibility? Explain with appropriate diagrams the effects of changes in activity of FeO and SiO_2 on sulfur solubility in ultramafic-mafic magmas. 5

3. Explain the occurrences of two types of primary sulfides in the mantle peridotites. What would be the expected platinum-group elements (PGE) budget in a silicate magma generated from such a sulfide-bearing peridotite mantle source due to *(i)* low *(ii)* high degrees of partial melting? 5

4. What are the major geological units in the Singhbhum Craton (Eastern India) that may be explored for the orthomagmatic Ni-Cu-PGE deposits? Give reasons to support your answer. Why are continental flood basalts important for orthomagmatic Ni-Cu-sulfide prospecting? Write the name of the largest continental flood basalt province in India. Give two examples of the world-class Ni-Cu-PGE deposits that are genetically associated with *(i)* continental flood basalt province and *(ii)* komatiitic suite of rocks? 5

PART—II (20 Marks)

Answer *any four* questions from the following : 5×4=20

1. What do you understand by 'volcanogenic massive sulfide deposit'? How does the alkaline, metal- deficient and SO_4^{2-} dominated seawater become acidic, metal- enriched and H_2S-rich (and SO_4^{2-} poor) as it percolates down the oceanic crust in the mid oceanic ridges? What are the main mechanisms of ore mineral precipitations in VMS deposit? 1+3+1=5

2. What is the ultimate source of water for a hydrous melt ''A mafic magma can dissolve more water then felsic magma''- accepts or reject the statement with reason. What are the consequences of emplacement of a hydrous melt at shallow crustal level? Use necessary sketches. 1+2+2=5

3. What are Quartz Pebble Conglomerate type uranium deposits? Why are they restricted in rocks older that ca 2200 Ma? ''Cr and Ni deposits are genetically associated with ultramafic rocks whereas Sn, W mineralizations are genetically associated with felsic igneous rocks'' accept or reject the statement with reason? 1+2+2=5

4. What do you understand by supergene enrichment? ''Porphyry Cu Deposits show pronounced supergene enrichment''- Explain. Describe the mineralogy of different zones found in a well- developed supergene profile of a porphyry copper deposit. 1+2+2=5

5. ''Meteoric water is not suitable for the formation of hydrothermal deposit'' - accept or reject the statement with reason. '' Bi-sulfide complexing is not an efficient mechanism of metal transport in high temperature acidic hydrothermal fluid''-why? Discuss briefly how fluid boiling can efficiently lead to ore mineral precipitation. 1+2+2=5

6. What are greisens and skarn deposits? Write a short note on Ni-rich laterite. 2+3=5

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