GROUP - B (10 marks)

(Non-Metallics)

3. Answer any ***one*** question : 10

   (a) Discuss bauxite mineralogy in the light of mineral stability. Where should we get bauxite deposits in India and how are they formed ?

   (b) What are the principal criteria of delining a mineral as a 'Gemstone' ? Discuss briefly about the diamond, emerald and ruby occurrences in India with their characteristic geological setting.

—— X ——

Ex./M.Sc.-II/G-II/IX/6/2017

MASTER OF SCIENCE EXAMINATION, 2017

(2nd Year, 1st Semester)

APPLIED GEOLOGY

Paper : IX

Ore Deposit

Time : Two hours Full Marks : 50

GROUP - A (40 marks)

(Metallics)

1. Answer question no. **(a)** and any ***three*** from the rest.

   (a) Write the Ni-Fe exchange reactions and the interrelated K_D (equilibrium constant) for the equilibrium partitioning of Ni among three co-existing phases (1) silicate liquid (sil), (2) olivine (ol), (3) immiscible $Fe_{1-x}Ni_{1-x}$ monosulfide liquid (sulf) in a mafic silicate magma saturated with S and crystallizing olivine as a liquidus phase. How do you recognize existence of early magmatic immiscible sulfide liquid in mafic magmas using these equilibrium relations ? 10

OR

How do changes in total pressure, oxygen fugacity, activity of SiO_2 and PH_2O cause the ultramafic-mafic magmas to become supersaturated in chromite, and remove other phases from the liquidus inducing chromite to crystallize ? Write with neat sketches. 10

(b) What is liquid immiscibility ? How do you recognize sufide saturation in parental magmas of any ultramafic-mafic igneous complex using combined chalcophile and lithophile element geochemistry ? Explain with neat sketches and appropriate example. 5

(c) How does 'S' solubility change in a silicate melt depending on change in oxygen fugacity, temperature and activity of FeO ? 5

(d) Show the sulfur solubility profiles for different FeO levels in tholeiitic magma as a function of sulfur fugacity at a constant log O_2 (oxygen fugacity)–11.50 and at a T of 1200°C . Write the implications of these observations. 5

(e) "Sulfide segregation before onset of significant silicate crystallization is more favourable to form the magmatic Ni-sulfide segregation deposits"–Explain with neat sketches. 5

(f) "All chromitites, whether of a residual origin, ophiolite related, or products of crystallization in large layered intrusions or Ural-Alaskan-type complexes, show enrichments in platinum-group element (PGE) than the surrounding dunite or perioditic rocks"–Explain. 5

(g) Write a short note on origin of PGE deposits. 5

2. Answer any three questions. 5x3=15

(a) Discuss, with the help of a diagram, the stability fields of different minerals in $FeO–Fe_2O_3$-TiO_2 triangle for orthomagmatic iron ore.

(b) Discuss the mineralogy, structure, stratigraphy and genesis of the iron ores associated with BIF in the East Indian Shield.

(c) Where do we get Pb-Zn ore deposits in Rajasthan ? Discuss the Pb-Zn mineralization in Zawar area with structure, lithology and ore grade.

(d) What are the principal types of Mn-ore deposits in India and what are their rock associations ?

(e) Discuss gold mineralization in South Indian in the light of stratigraphy, lithology and structure.