

(4)

Ex./UG/Sc/CORE 6/25/2019

INTER BACHELOR OF SCIENCE EXAMINATION, 2019
(2nd Year, 1st Semester)

GEOLOGICAL SCIENCES

Igneous Petrology

Paper - CORE/TH/06

Time : Two hours

Full Marks : 50

Use a separate answer script for each group.

GROUP - A (25 marks)

Answer *q.no. 1* and any *two* from the rest.

1. Consider a solid which is a mixture (by wt%) of forsterite (70 wt%), diopside (20 wt%) and anorthite (10 wt%). Describe the melting behavior of this solid considering the experiment with molten silicate of ternary system $\text{CaMg}(\text{SiO}_3)_2$ - Mg_2SiO_4 - $\text{CaAl}_2\text{Si}_2\text{O}_8$ at 1 bar P. 4

‘Compositionally zoned crystals are common in hypabyssal or extrusive rocks than in the plutonic rocks’-Why? Explain oscillatory zoning of plagioclase in andesite. 2

Explain the presence of reaction rim of orthopyroxene around olivine in basalt. 2

(Turn over)

- (e) How does the intensity of volcanic eruption vary with the gas content and viscosity of the magma composition? Write the IUGS classification of pyroclastic rocks.
- (f) What is Harker’s variation diagram? What is ‘magma series’?
- (g) Write short notes on tabular intrusive igneous bodies. What is lopolith?
- (h) Describe the different contact relations between plutons and its country. What is Laccolith?

— X —

(2)

‘Presence of incongruently melting compounds can be very significant in the formation of magmas whose compositions are greatly different from that of the original source rock’—explain considering the binary system $\text{KAlSi}_2\text{O}_6\text{-SiO}_2$ at 1 bar P. 4

What is perthite texture? How does this form? 2

2. What is the mineralogical composition of primitive mantle? How do we know this? In normal situation geotherm does not intersect solidus for fertile mantle Iherzolite; then how the mantle can be melted? $5\frac{1}{2}$
- 3 ‘Great quantities of magma are generated in regions where cool lithosphere is being subducted into the mantle and isotherms are depressed, not elevated!’ – Explain with necessary diagrams. $5\frac{1}{2}$
4. (a) Write differences between orthocumulate and poikilitic textures. $1\frac{1}{2}$
(b) How do you differentiate between phonolite and basalt in terms of total alkali and SiO_2 contents (in Wt.%)? 1

(3)

- (c) Show the critical plane of silica understuration and critical plane of silica saturation in the basalt tetrahedron. Why are these significant in terms of characterization of basaltic magma series? 2

GROUP - B (25 marks)

5. Answer any *five* questions : $5 \times 5 = 25$
 - (a) Name the rock that contains 8% biotite, 12% hornblende, 20% quartz, 25% plagioclase and 35% alkali feldspar by volume. Name a volcanic ultrabasic rock .
 - (b) How does various degree of partial melting cause change in magma composition? Explain with proper diagram.
 - (c) What are the parameters that inhibit magma mixing? Distinguish between norm and mode of a rock.
 - (d) Name the rocks that are plotted in the P-corner of the QAPF diagram in IUGS classification. Write the IUGS classification of plutonic ultramafic rocks.

(Turn over)