2. Answer ***any two*** :

(a) "Calc-alkaline magma is commonly found in volcanic arcs, but completely absent in oceanic islands" – why? 4

(b) Discuss the petrographic characteristics of *(i)* A basaltic magma crystallizing at shallower depth and *(ii)* Texture developed through crystal melt separation in a basic magma. 4

(c) Write short notes on :

(i) Batch melting

(ii) Layered structure of Oceanic crust below Fast spreading ridges 4

(d) How do you justify high values of Be^{10} and B in rocks of Arc set up compared to that of Mid-oceanic ridge basalt? 4

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BACHELOR OF SCIENCE EXAMINATION, 2024

(2nd Year, 1st Semester)

GEOLOGICAL SCIENCE

PAPER : CORE/TH/06

(Igneous Petrology)

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

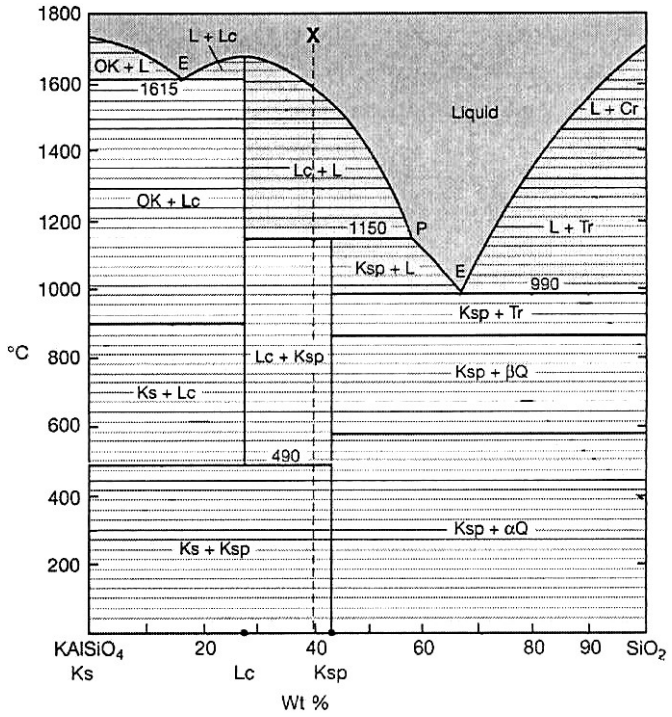
Use separate answer scripts for each Part.

PART—I

(20 Marks)

1. *(a)* Express the Phase Rule. Mark the invariant point, univariant line and bivariant field in any suitable two-component phase diagram and demonstrate the variance for each case with the help of the phase rule. 4

(b) Demonstrate the equilibrium crystallization of a melt having the composition of X, plotted in the following diagram. Which will be the rock and mineral assemblage, crystallized from this melt? Can a granitic rock be formed from melt X under any condition? Justify your answer. 4



(c) How can the magmatic crystallization be influenced by lithostatic pressure in dry and H_2O-saturated systems? Explain with the help of any suitable phase diagram. 4

2. Answer ***any two*** questions from the following : 4×2=8

(a) What are I-type and M-type granites? Write their characteristics. Discuss their genesis. Which tectonic setups are favourable for their origin? Justify your answer with suitable sketches.

(b) Why does albite - anorthite phase diagram have no eutectic point? Explain your answer with the help of the phase rule. Why is zoning in plagioclase mostly concentrated in the rim part?

(c) What are Continuous and Discontinuous reactions? Give examples with the help of an igneous phase diagram using the phase rule. What are the implications of the naming of the Continuous and Discontinuous Crystallization Series in Bowen's Reaction Series?

(d) What is the exsolution texture? Demonstrate the formation of exsolution texture in alkali feldspar. Why does alkali feldspar not show exsolution texture always?

PART—II

(20 Marks)

1. *(a)* "N-MORB compositions always plot in higher $^{143}Nd/^{144}Nd$ and lower $^{87}Sr/^{86}Sr$ sides with respect to that of Bulk Earth" – why? Answer with reasons. 4

(b) Do you consider MORB to be a primary magma? 'Mid-oceanic ridges don't promote any development of Alkali basalt' – why? 4

(c) "E-MORB can easily be differentiated from N-MORB by La/Sm ratio" – justify the statement with reason. 4