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(February)

GEOLOGY

(Honours)

(Igneous and Sedimentary & Metamorphic Petrology)

[GELH–501]

Marks : 56

Time : 3 hours

The figures in the margin indicate full marks for the questions

Answer **four** questions, selecting **one** from each Unit

GROUP—A

(Igneous Petrology)

UNIT—I

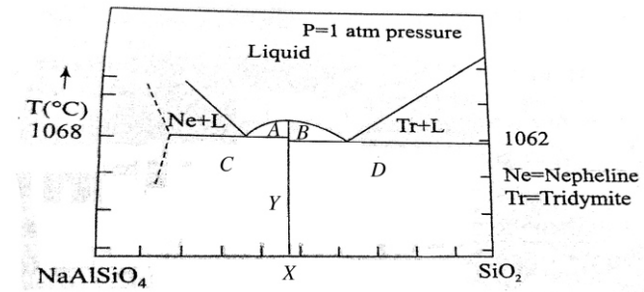
(Introduction)

1. *(a)* What do you understand by primitive magma and primary magma? How do magmas move? 2+2=4

(b) "Magmas originate from the upper mantle and lower crust." Justify your answer. 6

(c) Write on the distribution of igneous rocks in the continental and oceanic crust. 4

2. *(a)* Study the isobaric binary phase diagram of $NaAlSiO_4$-SiO_2 given below and answer the following questions :



(i) Find out the mineral assemblages in *A*, *B*, *C*, *D*, the line *Y* and composition *X*. 3

(ii) Using this diagram, explain why nepheline and quartz do not coexist in nepheline syenite. 1

(b) Describe the crystallization of diopside-anorthite system with reference to phase rule. Give any two petrogenetic significances of the system. 8+2=10

UNIT—II

(Mineralogy and Petrogenesis)

3. *(a)* What is nucleation? Mention the factors that control nucleation. 1+2=3

(b) Explain the relationship between nucleation and crystal growth with suitable diagram. 7

(c) Give the mineralogical and textural feature of any one of the following rocks : 4

(i) Lamprophyre

(ii) Kimberlite

4. Describe the petrogenesis of granite. Add a note on its distribution in India. 12+2=14

GROUP—B

(Sedimentary and Metamorphic Petrology)

UNIT—III

(Sedimentary Petrology)

5. *(a)* What is sedimentary facies? Describe how one facies may be distinguished from another facies. 2+5=7

(b) Give an account on continental environment of deposition. 7

6. Write short notes on any *four* of the following : 3½×4=14

(a) Sediment transportation by running water

(b) Heavy minerals as indicator of provenance

(c) Sorting

(d) Kurtosis

(e) Evaporite and its formation under marine conditions

UNIT—IV

(Metamorphic Petrology)

7. *(a)* Define metasomatism. Describe different types of metasomatic processes. 2+6=8

(b) Explain the following terms : 2×3=6

(i) Tourmalinization

(ii) Greisening

(iii) Kaolinisation

8. Write short notes on any *four* of the following : 3½×4=14

(a) Mylonite

(b) Classification and *P-T* fields of different metamorphic facies

(c) Phase rule and its application in metamorphic studies

(d) Metamorphic zone

(e) Contact metamorphism of impure limestone

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