UNIT-V

9. a. What are stable isotopes? Write an account on applications of oxygen isotopes in geological studies. 2+6=8

   b. Write short notes on the following: 3+3=6

      i. Delta notation

      ii. Isochron

10. Write notes on the following: 6+4+4=14

    a. Alpha, beta and gamma emmissions.

    b. Fractionation of stable isotopes

    c. Derivation of geochronometric equation.

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PG Even Semester Exam, 2024

Earth Science

2nd Semester

COURSE NO. ESCC-551

[Metamorphic Petrology and Geochemistry]

Full Marks : 70
Pass Marks : 28

Time : 3 hours

The figures in the margin indicate full marks for the questions

Answer five questions, taking one from each Unit

UNIT-I

1. a. Define contact metamorphism. Add a note on grade of metamorphism. 1+3=4

   b. Define Gibbs free energy of a system. Discuss the concept of Univariant, divariant and invariant points citing examples of alumino-silicate minerals. 1+5=6

   c. Write a note on AKF Chemographic diagram for metamorphic mineral assemblages with suitable diagram. 4

Turn over

2. a. Discuss in detail the reaction rim textures with neat sketches. 6

b. Discuss in detail the different metamorphic reactions citing suitable examples. 8

UNIT-II

3. a. Define metamorphic facies. Write a descriptive note on medium to high temperature metamorphic facies with diagram. 1+6=7

b. Give a detailed account on Barrovian and Buchan types of metamorphism. 7

4. a. Discuss the metamorphic facies series with suitable diagram. 6

b. Write short notes on the following:: 3+2+3=8

i. Low pressure metamorphic facies

ii. Geothermal gradient in subduction zone

iii. Stable mineral assemblages in Staurolite and Kyanite zones.

UNIT-III

5. a. Distinguish the major, minor and trace elements citing examples of each group. 6

b. Define partition coefficient of elements. What is Bulk partition coefficient? Explain the reasons of partitioning of elements during magmatic processes. 2+2+4=8

6. a. Write an account on the distribution characteristics of trace elements in magmatic rock during partial melting and crystallization. 6

b. Write short notes on the following: 3+2+3=8

i. LILE and HFSE

ii. Ionic potential

iii. Coupled atomic substitution.

UNIT-IV

7. a. What are Rare Earth Elements (REE)? Describe the applications of REE in the petrogenetic studies of magmatic rock. 2+4=6

b. Answer the following: 4+4=8

i. Describe the partition coefficient of rare earth elements in olivine and garnet.

ii. Illustrate the rare earth characteristics of MORB.

8. Write short notes on the following: 5+5+4=14

a. Types of meteorite

b. Geochemical distinction between Tholeiite and calc-alkaline magma.

c. Trace element characteristics of continental crust.