PG Even Semester Exam, May 2025

Earth Science

2^{nd} 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. Explain the concept of progressive metamorphism? Write a detailed account of progressive metamorphism of basic rocks under regional metamorphic conditions. 5+9=14

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

   a. Types of metamorphic equilibrium reactions

   b. Metamorphic grade

   c. Metamorphism in subduction environment

Turn over

UNIT-II

3. Define metamorphic facies and plot the different facies in a p-t diagram. Explain the characteristics of various metamorphic facies of Eskola. 2+4+8=14

4. Write explanatory notes on the following: 4+5+5=14
   a. Eclogite facies
   b. Blue schist facies
   c. Metamorphic facies series

UNIT-III

5. a. Distinguish between partition co-efficient and bulk-partition coefficient? Explain the reasons of partitioning of elements during magmatic processes. 3+5=8
   b. With the help of a neat diagram, explain the behaviour of a compatible trace element and an incompatible trace element during partial melting. 6

6. Write short notes on the following: 5+5+4=14
   a. Major and trace elements
   b. Major element abundances of crust and bulk earth
   c. Goldschmidt's rules of substitution

UNIT-IV

7. Write a short note on the chemistry of Lanthanides. Illustrate the Rare Earth Element (REE) characteristics of Garnet and plagioclase. Add a note on the applications of REE in petrogenetic studies. 4+5+5=14

8. Write short notes on the following: 5+5+4=14
   a. Mineralogy of Stony and Stony-Iron meteorites
   b. Chondrite and Achondrites
   c. Significance of meteorites in geochemical studies

UNIT-V

9. Write briefly on the following: 6+4+4=14
   a. Alpha, Beta and Gamma emissions
   b. Radiogenic and Non-radiogenic daughter isotopes
   c. Del notation and fractionation factor of stable isotopes

10. a. Write explanatory notes on application of stable isotopes of Carbon in understanding Paleoclimates. 7
    b. Isotopic characteristics of seawater during glacial and interglacial period. 7

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