


Name: Enrolment No:			
UPES End Semester Examination, December 2024 Course: ELEMENTS OF GEOCHEMISTRY Semester: III Program: B.Sc. Geology Time : 03 hrs. Course Code: PEGS2048 Max. Marks: 100 Instructions: I. Write correct unit in numerical after calculation. III. Draw neat diagram with proper labeling to explain the answer			
SECTION A (5Qx4M=20Marks)			
S. No.		Marks	CO
Q 1	Mark true or false i. Geochemical classification of elements is based only on atomic weight. ii. An element's atomic environment affects its geochemical behavior.	2*2=4	CO1
Q 2	Correct the Statement i. Radiogenic isotopes measure bonding strength, not age. ii. Nuclides and radioactivity don't help in studying Earth's geological evolution.	2*2=4	CO2
Q 3	Fill in the Blanks i. The -----of a solution measures its acidity. ii. In marine chemistry, the -----marks rapid temperature change with depth.	2*2=4	CO3
Q 4	i. State the primary application of stable isotopes in geochemistry. ii. Identify a common isotopic method for determining rock and mineral ages.	2*2=4	CO4
Q 5	i. Explain Exolution reaction. <p style="text-align: center;">OR</p> ii. Discuss the importance of meteorites in understanding Earth's composition.	1*4=4	CO4

SECTION B (4Qx10M= 40 Marks)			
Q.6	<p>i. Explain the role of radiogenic isotopes in dating Earth's layers.</p> <p>ii. Describe elemental fractionation and its importance in geochemical cycles.</p>	2*5=10	CO1
Q.7	<p>i. Describe the behavior of LREE and HREE in enriched and depleted magmas.</p> <p>ii. Explain the principle of potassium-argon dating in determining the age of volcanic rocks.</p>	5*2=10	CO2
Q.8	<p>i. Calculate the age of a rock sample if the half-life of the parent isotope is 10 million years and the remaining parent isotope is 25% of the original amount.</p> <p>ii. A sample of organic material contains 40% of the original carbon-14. Using a half-life of 5730 years for carbon-14, calculate the age of the sample</p>	5*2=10	CO3
Q.9	<p>Answer any two of the following</p> <p>i. Explain how the oxygen isotope ratio of O¹⁸ increases with temperature and its impact on marine life.</p> <p>ii. Explain the role of the thermocline in ocean geochemistry.</p> <p>iii. Compare geochemical characteristics and behavior different magma.</p>	5*2=10	CO4
SECTION-C (2Qx20M=40 Marks)			
Q.10	<p>Answer any four</p> <p>i. Explain how advection and diffusion influence the transport of elements in the Earth's geochemical systems.</p> <p>ii. Describe the importance of thermohaline circulation in ocean temperatures and nutrients.</p> <p>iii. Discuss the oxygen minimum zone (OMZ) and its impact on marine ecosystems.</p> <p>iv. Explain denitrification in marine environments and its role in the nitrogen cycle.</p> <p>v. Discuss the effect of eutrophication on the nitrogen cycle and marine life.</p> <p>vi. Describe the geochemical variability of magma and its products.</p>	5*4=20	CO3
Q.11	<p>i. Describe different mechanisms of mineral reactions.</p> <p>ii. Examine the processes involved in diagenesis.</p>	10*2=20	CO4