


Name:			
Enrolment No:			
UPES End Semester Examination, May 2023			
Course: Geochemistry Program: B.Tech. APE-UP Course Code: PEGS1009		Semester : II Time : 03 hrs. Max. Marks: 100	
Instructions: Read all the instructions below carefully and follow them strictly.			
1) Mention Roll No. at the top of the question paper. 2) Internal choice is given in Q. no. 10. 3) Attempt all parts of a question at one place only.			
SECTION A (5Qx4M=20Marks)			
S. No.		Marks	CO
Q 1	Differentiate between aromatic and non-aromatic compounds.	4	CO1
Q 2	Discuss the following terms: Phase, Component, Degree of Freedom.	4	CO2
Q 3	Define solid solution and explain how it is different from a liquid solution.	4	CO2
Q 4	Define thermodynamic system and explain how it is different from surrounding.	4	CO1
Q 5	Define polymorphs with a suitable example.	4	CO1
SECTION B (4Qx10M= 40 Marks)			
Q 6	(i) How can you determine the % of C and % of H in our fuel sample. (ii) A sample of coal contains C = 90%, H = 9% and ash = 1%. The following data were obtained when the above coal was tested in a bomb calorimeter: Weight of coal burnt = 0.83 g Weight of water taken = 540 g Water equivalent of bomb and calorimeter= 2,300 g Rise in temperature = 2.62°C Fuse wire correction = 10.0 cal Acid correction = 50.0 cal. Calculate the gross calorific value of coal.	10	CO1
Q 7	(i) Discuss the terms: Standard solution, end point, molarity, and normality of a solution. (ii) How will you prepare 100 ml 0.04 N NaOH solution?	5 5	CO2

Q 8	Discuss three broad types of dissolved constituents found in sea water. Explain the reasons for their variation with depth and latitude.	10	CO3
Q 9	Discuss in detail various theories that explain the origin of oceans on earth.	10	CO3
SECTION-C (2Qx20M=40 Marks)			
Q 10	<p>(i) With the help of a suitable diagram, explain the process of liquation and electrolytic refining of metals.</p> <p style="text-align: center;">OR</p> <p>Discuss any two methods in detail by which an ore can be concentrated before reduction to pure metal.</p> <p>(ii) Draw a neat phase diagram of water system. Discuss the behavior of various equilibrium involved in the system with varying pressure and temperature.</p> <p style="text-align: center;">OR</p> <p>Calculate the phase, components and degree of freedom in the following systems</p> <p>a) $2\text{KClO}_3(\text{s}) \rightarrow 2\text{KCl}(\text{s}) + 3\text{O}_2(\text{g})$</p> <p>b) An aqueous solution of sodium chloride</p> <p>c) Saturated solution of sucrose at 15°C</p>	10	CO2
		10	
Q 11	Define biogeochemical cycle and explain why earth is a super system. Discuss in detail four sub systems that constitute earth super system.	10+10	CO4