


Name:			
Enrolment No:			
UPES End Semester Examination, May 2023			
Course: Analytical Methods in Chemistry Program: BSc (H) Chemistry Course Code: CHEM 3008		Semester: VI Time : 03 hrs. Max. Marks: 100	
Instructions: 1. Read all the instructions carefully and follow them strictly. 2. Mention Roll No. at the top of the question paper. 3. ATTEMPT ALL THE PARTS OF A QUESTION AT ONE PLACE ONLY. 4. Use of scientific calculator is allowed.			
SECTION A			
S. No.		Marks	CO
Q 1	Justify the cause of chemical interference in Flame Atomic Absorption Spectroscopy (FAAS). How can it be removed?	4	CO1
Q 2	The temperatures of two bodies measured by a thermometer are $t_1 = (15 \pm 0.3)^\circ\text{C}$, $t_2 = (45 \pm 0.2)^\circ\text{C}$. Calculate the temperature difference and the error therein.	4	CO2
Q 3	a) Define 'Synergistic extraction' as a separation technique. b) Calculate the weight of Fe (III) left unextracted from 200 mL of a solution having 500 mg of Fe(III) ion in 5 M HCl after three extractions with 25 mL of diethyl ether ($D = 100$)	2 + 2	CO3
Q 4	Describe basic principle of conductometric titrations.	4	CO1
Q 5	Classify Determinate errors.	4	CO2
SECTION B			
Q 6	<p>Explain how will you determine metal ions in solution quantitatively by UV-Vis analysis giving an example of chromium and manganese ions</p> <p style="text-align: center;">OR</p> <p>Discuss the operation of Graphitic Furnace in AAS with labelled diagram.</p>	10	CO1

Q 7	Explain propagation of errors in measurement.	10	CO2
Q 8	<p>a) Elaborate the cation exchange chromatography process giving a suitable example.</p> <p>b) Arrange the following cations in increasing order (strongly held to weakly held) of their separation by cation exchange chromatography:</p> <p style="text-align: center;">$\text{Li}^+, \text{K}^+, \text{Rb}^+$</p> <p>Give reason.</p>	5 + 5	CO3
Q 9	<p>Discuss the mechanism of extraction of metal ions by chelation & deduce the following equation:</p> <p style="text-align: center;">$\mathbf{K = (D_{MRn} K_f K_a^n) / (D_{HR})^n}$</p>	10	CO3
SECTION-C			
Q 10	<p>a) Give an example of thermogravimetric analysis (TGA) of any chemical reaction and explain the TG curve.</p> <p>b) Draw a conductometric titration curve of HCl and NaOH and explain.</p>	10 + 10	CO1
Q 11	<p>a) Discuss the separation of benzoic acid from an aqueous solution by solvent extraction method.</p> <p>b) Deduce the relationship between distribution ratio and partition coefficient. Discuss the effect of pH on the distribution ratio.</p> <p style="text-align: center;">OR</p> <p>a) Define 'separation factor' and comment on its significance in the separation of solutes from solution.</p> <p>b) Discuss the methods of location of compounds on the chromatogram in thin layer chromatography (TLC)</p>	10 + 10	CO3