



SCHOOL OF ADVANCED SCIENCES
Department of Chemistry
Fall Semester 2023-24
Continuous Assessment Test – I

Course Code: CHY1701

Duration: 90 Minutes

Slot: G1+TG1

Course Name: Engineering Chemistry

Max. Marks: 50

Class Numbers: VL2023240106220, VL2023240106222

Faculty Names: Dr. Sovan Roy, Dr. Pundlik Rambhau Bhagat

QN	Answer <u>ALL</u> the questions (5 x 10 = 50 Marks)	Marks	CO	BL
1	List out different types of boiler troubles that occur in the steam boilers. Explain the possible methods adapted for avoiding boiler troubles acquired ONLY due to dissolved gases with appropriate chemical reactions if any. <i>Re-Aeration; De-aeration; De-aeration</i>	10	CO1	L1
2	(a) Illustrate an internal water treatment method that can be applicable for both low- and high-pressure boilers. Support your answer with chemical equations. (b) 100 mL of a sample water consumed 32 mL of 0.01 M EDTA before boiling and 50 mL boiled water sample consumed 6 mL of the same EDTA solution. Calculate the degree of total hardness, permanent hardness, and temperature hardness. (Strength of standard hard water sample = 1 ppm) <i>200, 120, 200</i>	(5 + 5)	CO1	L3
3	(a) What is the principle of coagulation? Which are the common coagulants utilized during the treatment of domestic water. Elaborate on the removal of soluble impurities using any one of the coagulants with necessary chemical reactions. (b) Explain the concept of break point chlorination with a suitable diagram.	(5 + 5)	CO1	L5
4	(a) Write a note on electrodialysis. Support your answer with suitable a diagram. (b) Calculate the quantity of soda [purity = 92%] required for softening 70,000 litres of water containing the following salts in ppm: $\text{Ca}(\text{HCO}_3)_2 = 5$; $\text{Mg}(\text{HCO}_3)_2 = 7$ mg; $\text{CaSO}_4 = 15$; $\text{MgSO}_4 = 10$; $\text{MgCl}_2 = 20$; $\text{HCl} = 7.3$; $\text{NaCl} = 2$, and $\text{Fe}_2\text{O}_3 = 6$. (At. Wt. $\text{Ca}=40$, $\text{H}=1$, $\text{C}=12$, $\text{O}=16$, $\text{Mg}=24$, $\text{S}=32$, $\text{Cl}=35.5$, $\text{Na}=23$, and $\text{Fe}=56$)	(5 + 5)	CO1	L4
5	Identify and describe the water softening process with an appropriate diagram and necessary reactions, that could possibly achieve soft water with less than 2 ppm. Suggest a way to make it reusable.	10	CO1	L2