Name: **Enrolment No:**	

UPES

End Semester Examination, May 2025

Course: Process Chemistry **Semester: II**

Program: B.Tech. Chemical Engineering **Time : 03 hrs.**

Course Code: CHCE1001 **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. 8 and 10.**
3) **ATTEMPT ALL THE PARTS OF A QUESTION AT ONE PLACE ONLY.**

SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
Q 1	Write a short note on biofuels.	**4**	**CO1**
Q 2	What is adsorption? How is it different from absorption. Justify your answer.	**4**	**CO1**
Q 3	Define surface tension. Discuss the factors affecting surface tension of a liquid.	**4**	**CO3**
Q 4	Discuss the use of X-Ray Diffraction technique for the characterization of nanomaterial?	**4**	**CO3**
Q 5	Explain Top-down strategy applied for the synthesis of nanomaterials.	**4**	**CO1**
SECTION B **(4Qx10M= 40 Marks)**			
Q 6	Define specific, molar and equivalent conductance. Discuss the effect of dilution on each one of them.	**10**	**CO3**
Q 7	100 ml of water sample consumed 20 ml of 0.01 N sulphuric acid at phenolphthalein end point. As the titration continued with methyl orange indicator, end point occurred at 30 ml of 0.01 N sulphuric acid. Identify and quantify the different alkalinity present in the water sample in terms of $CaCO_3$ equivalent.	**10**	**CO2**
Q 8	a) Provide a brief overview of the solution polymerization method, including its key advantages and disadvantages. **OR**	**5**	**CO2**

	Discuss condensation polymerization. Write the formation of Phenol-Formaldehyde resin with chemical reaction. b) Classify polymers on the basis of end use with examples. **OR** What are conducting polymers? Discuss the different types of conducting polymers with example.	**5**	
Q 9	a) How will you estimate the ultimate amount of Sulphur in the given fuel sample. b) An organic compound (0.1986 g) containing carbon, hydrogen and oxygen only, was combusted in excess of O_2. After complete combustion, 0.3850 g of CO_2 and 0.1802 g of H_2O were formed. Calculate the % of carbon, hydrogen and oxygen in it.	**5** **5**	**CO1**
SECTION-C **(2Qx20M=40 Marks)**			
Q 10	a) Explain the conductometric titration between a strong acid and a weak base. Write suitable reactions and draw appropriate graph for it. **OR** The standard reduction potentials of Zn^{+2}(0.1M)/Zn and Ni^{2+}(0.05M)/Ni electrodes are -0.76 V and -0.26 V, respectively. Construct a galvanic cell using these electrodes so that its standard EMF is positive. Write the cell representation, half-cell reactions and calculate the EMF of the cell. b) What is galvanic corrosion and how can it be prevented? Explain how corrosion is affected by anodic and cathodic areas. **OR** How does the nature of metal and environment affect the rate of corrosion?	**10** **10**	**CO3**
Q 11	a) Calculate the temporary and permanent hardness of a water sample containing: $Mg(HCO_3)_2$ = 7.3mg/L; $Ca(HCO_3)_2$ = 16.2mg/L; $MgCl_2$ = 9.5mg/L; $CaSO_4$ = 13.6mg/L. (Atomic weights, H=1, C=12, O=16, Mg=24, S=32, Cl=35.5, Ca=40). b) Discuss the lime soda method for the softening of water. Explain with the help of reactions and diagram.	**10** **10**	**CO2**