Name: Enrolment No:		

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2021

Program : M.Sc. Chemistry	**Semester** : I	
Course : Principles of Analytical Chemistry	**Time** : 03 hrs	
Course Code: CHEM 7004	**Max. Marks : 100**	

Section A

Instructions:
1. Each Question will carry 4 Marks

S. No.	Question	CO
Q 1	Write a short note on pH scale. **(4 marks)**	CO2
Q 2	Describe the Lewis theory of Acid and Bases giving suitable examples. **(4 marks)**	CO2
Q 3	Calculate the pH value of a solution obtained by mixing 75 ml of 0.1 N HCl with 50 ml of 0.2 N NaOH. **(4 marks)**	CO2
Q 4	(a) If we begin with 1.6 mL of a glucose solution with a concentration of 4.5 mol L^{-1} and dilute it to a volume of 0.40 L, what is the concentration of the final, diluted solution (in mol L^{-1})? (b) How much water must we add to a 50 mL sample of KCl with a concentration of 0.5 mol L^{-1} to bring about a five-fold dilution? **(4 marks)**	CO3
Q 5	Absolute formation constant (K_{MY}) for MgY^{-2} is 5.0×10^{10} and α_4 at pH 10.5 is 0.35. A 20 mL of 0.01 M Mg^{+2} solution was buffered at pH 10.5, and was titrate with 0.01M EDTA solution. After addition of 20.0 mL of titrant EDTA, the find out the value of pMg **(4 marks)**	CO4

Section B

Instructions:

1. Each question will carry 10 marks
2. Write short/brief notes of 1-2 page answer.
3. Question 4 has internal choices, and hence you have to attempt only one out of two questions.
4. Draw the neat diagram, to justify your answer.

Q 1	Write down about the application of Physiological buffers and how the pH of the same is calculated, citing one example for a basic buffer. **(10 marks)**	CO2
Q 2	A 1.580 gm of a sample contains KCl (52%) and NaCl (48%) have to precipitate as AgCl, using $AgNO_3$. Find out the amount of AgNO3 required for this reaction, alongwith amount of the AgCl formed in grams. (**NaCl=58.5, KCl=74.5, $AgNO_3$= 170.0 and AgCl=143.5 gm/mol**) **(10 marks)**	CO3
Q 3	Discuss the need of different types of EDTA Titrations. Illustrate the (a) Substitution Titrations and (b) Indirect Titrations, giving suitable example. **(2+4+4=10 marks)**	CO4

Q 4	The application of standard solutions has very important role in the field of chemistry. Describe them citing some examples details alongwith their type.	
	OR	CO3
	In an experiment, an average of 74.0 **ml** of 0.48 **mol/L** Zinc hydroxide was required to titrate 120.0 **ml** of the acid in order to reach the endpoint. The neutralization reaction is-	
	$2CH_3COOH_{(aq)} + Zn(OH)_{2\ (aq)} \rightarrow Zn\ (CH_3COO)_{2\ (aq)} + 2H_2O\ (l)$	
	Find out the concentration of acetic acid in **mmol/liter**. **(10 marks)**	

Section C

Instructions:

1. **Each Question is of 20 marks**
2. **Draw the neat diagram, to justify your answer.**
3. **Internal choices is there for question 1. You have to attempt 1a or 1b.**

Q 1	(a) Describe in detail about the role of (i) Choice of adsorbent, (ii) Choice of mobile phase, (iii) Detecting reagent and (iv) Developing chamber, in the field of chromatography.	
	OR	CO1
	(b) Discuss the (i) factors affecting the SPME and (ii) various methods used in LPME.	
	(20 marks)	

Q 2	(a) Describe in detail about the use of masking agent for complexometric titration, giving a suitable example.	
	(b) Find out the electrode potential for a potentiometric titration of 0.05 N Ce (IV) (30 mL) with 0.10 N Fe (III) if both solutions were prepared in one molar H_2SO_4, giving proper chemical reaction.	CO4
	Given that $E^0{}_{Fe^{+2}/Fe^{+3}} = 0.68\ V$ and $E^0{}_{Ce^{+3}/Ce^{+4}} = 1.44\ V$	
	(i) After the addition of 10 mL of Fe solution.	
	(ii) At equivalent point. **(10+10= 20 marks)**	