Name: **Enrolment No:**	UPES UNIVERSITY WITH A PURPOSE

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
Online End Semester Examination, May 2021

Course : Basic Analytical Chemistry **Semester : IV**
Program : B.Sc. (H) Chemistry **Time : 03 hrs**
Course Code: CHEM 2011 **Max. Marks: 100**

Section A

Instructions:
1. Each Question will carry 5 Marks
2. Complete the statement /select the correct answer(s)
3. Answer should be fill in blank, true or false.

S. No.	Question	CO
Q 1	(i) The number of significant digits in 2837 will be. (ii) If $x^2 = 2x$ and 0.2 % error is incurred for y, the % error involved in x will be? (iii) Substance for impurity is known as analyte (True or False) (iv) A liquid solution which is a result of elution is known as eluent (True or False) (v) An electrode plate has the dimension of 1.5 cm of length and 5.7 cm of broadness. Its area up to significant figures will be…….. **(1* 5= 5 Marks)**	**CO1**
Q 2	(i) Organic polymers, with porous structure, are known as ion exchange resins. (True or False) (ii) Cations are released from the anion exchange column. (True or False) (iii) A solvent is uses for separation of absorbed material from the stationary phase, it will be known as…….. (iv) As per Beer-Lambert law, write down is the relationship among absorbance (A), the molar absorption coefficient (ε), concentration(c), path length (l) and transmittance (t). **(1*3 +2= 5 marks)**	**CO2**
Q 3	(i) In planer chromatography, the stationary phase held in a narrow tube, while mobile phase is forced through it by pressure. (True or False) (ii) In ---------- chromatography the stationary phase is more polar than the mobile phase. (iii) HPLC technique is much superior in terms of the speed, efficiency, sensitivity, and ease of operation. (True or False) iv) In ion-exchange process, capital cost is ------and operational expenses are -----. **(1*3+2=5 marks)**	**CO2**

Q 4	(i) In Flame emission photometers, colour & wavelength of the flame is measured. (True or False) (ii) Phosphorus uptake in alkali soil in the form of $H_2PO_4^-$. (True or False) (iii) A Column was packed with 1.5 gm of a strongly acidic ion-exchange resin in H^+ form. NaCl solution of 3.0 mole/liter was passed through the column until the eluent coming out becomes neutral. The collected eluent was completely neutralized by 17 mL of 2.0 M NaOH. The ion exchange capacity (in meq/gm) of resin will be… **(1*2+ 3= 5 marks)**	**CO2**
Q 5	(i) The colour of dye metal complex and dye are same. (True or False) (ii) At $[OH^-] = 10^{-4}$, the metal-EDTA dye complex has the colour blue colour. (True/False) (iii) Ion-free water coming out from the exchanger is known as potable water. (True or False) (iv) Heterotrophic organism utilize carbon from CO_2 for their cellular synthesis. (True or False) (v) Low dissolved oxygen in samples means lesser pollution of the same. (True or False) **(1*5= 5 marks)**	**CO3**
Q 6	(i) The buffer used in the EDTA solution must have the pH of …… (ii) The hardness of water is due to the occurrence of salts of Chlorine. (True/False) (ii) Mordant Black II indicator used in Complexometric titration. (True/False) (iii) How many milli grams of MgCO3 dissolved per liter gives 84 ppm of equivalent hardness? (iv) The chemical formula of thiourea is… and N content in the same is…… **(1*3 +2= 5 marks)**	**CO3**

Section B

Instructions:

1. Each question will carry 10 marks
2. Write short/brief notes of 1-2 page answer.
3. Question 5 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	Discuss in short citing suitable examples on the (i) sampling, (ii) precision, (iii) accuracy, (iv) sources and (v) types, of errors, in analytical chemistry. **(2*5= 10 marks)**	**CO1**
Q 2	(i) Estimation of macronutrients is the key components for fertilizer industries to make soil efficient materials for the benefit to the farmers. Discuss a method to estimate the Magnesium content of the soil by flame photometer giving all points in detail alongwith a neat diagram. (ii) Discuss the spectrophotometric identification and determination of Benzoic Acid in a cold drink sample. **(5*2= 10 marks)**	**CO2**

Q 3	Determination of ion exchange capacity of anion/cation exchange resins is key procedure in the industry. Discuss in details the above process for an anion exchange resin, giving suitable examples, diagram and concept. **(10 marks)**	**CO2**
Q 4	Discuss in details about the (i) procedure and (ii) application of the paper chromatography giving suitable diagram. **(5*2= 10 marks)**	**CO2**
Q 5	Discuss the titration method used to determine the amount of Ca^{+2} present in the soil samples, by using all necessary requisites in details. **OR** Discuss the structure and uses of any five indicators for soil analysis. **(10 marks)**	**CO3**

Section C

Instructions:

1. Question is of 20 marks
2. Write long answer of 2-3 page.
3. Draw the neat diagram to justify your answer.
4. Internal choices is there and hence you have to attempt only one question.

Q 1	**(i)** Write down the details for determination of the alkalinity of given carbonated sample giving all possible combination of alkaline species. **(ii)** The UPES waste water (pH=7) has Ca^{+2} (50 mg/L), Mg^{+2} (10 mg/L) ions, bicarbonate ions (130 mg/L), 20 mg/L sulfate ions, and 100 mg/L carbonate ions. Calculate total alkalinity in terms of $CaCO_3$. **OR** **(i)** Discuss in details the soda and lime method for purification of water sample giving suitable equation and example. **(ii)** Calculate the quantity of lime and soda required for softening one million litre of the following sample of water. If the purities of lime and soda are 80% and 85% respectively. The impurities are Silica = 75 mg/litre $MgCl_2$ = 19 mg/lit. $MgSO_4$ = 30 mg/lit. $CaSO_4$ = 68 mg/lit. $MgCO_3$ = 884 mg/lit. $CaCO_3$ = 120 mg/lit **(12+8= 20 marks)**	**CO3**