

Seat No. : \_\_\_\_\_

# AE-133

April-2019

M.Sc., Sem.-II

## 410 : Chemistry (Analytical Chemistry)

Time : 2:30 Hours]

[Max. Marks : 70

1. (A) (I) Discuss Craig's counter current extraction. 7  
(II) Describe the equilibrium processes involved in solvent extraction of metal chelates. 7

OR

- (I) Describe the process for accelerated and microwave-assisted extraction.  
(II) 90% of a metal chelate is extracted when equal volume of aqueous and organic phases are used. What will be the percent extracted if the volume of the organic phase is doubled ?
- (B) Give short answers of any **four** in following : 4  
(1) What is partition coefficient ?  
(2) What is Solid-Phase Extraction ?  
(3) What is the use of solvent extraction ?  
(4) State the relation between the fractions which remains in the aqueous phase after 'n' extraction.  
(5) Give two limitations of liquid-liquid extraction.  
(6) Give the relation between % extraction and distribution ratio.

2. (A) (I) Explain Van-Deemter equation and explain each term involved in the equation. 7  
(II) State the principles of TLC & HPTLC and give their comparative assessment. 7

OR

- (I) Discuss counter-current chromatography with principle.  
(II) Discuss the principle of chromatography. Explain its classification based on mechanism of retention/interaction.
- (B) Give short answers of any **four** in following : 4  
(1) Define the terms eluent and eluate in chromatography.  
(2) What is  $R_f$  value ?  
(3) Define : Retention time  
(4) How height equivalent of theoretical plates is related to the length of the column ?  
(5) Give an example for a strong and weak cation, exchange resins.  
(6) Define : Linear flow rate.

3. (A) (I) Explain modern definition of pH & discuss validity of the equation. 7  
(II) Discuss different applications of conductometric titration with suitable example. 7

**OR**

- (I) Give the mechanism of pH measurement using glass electrode.  
(II) Write a note on Conductance of electrolytic solutions.
- (B) Give short answers of any **three** in following : 3
- (1) Give the unit of conductance and resistance.  
(2) What is pH ?  
(3) Give the composition of Glass used for pH measurement.  
(4) Write name the factors that affect the conductivity of an electrolyte solution.  
(5) Give one advantage of glass electrode.
4. (A) (I) Describe the European, American and IUPAC concepts of sign convention for expressing the electrode potential. 7  
(II) State the principle, working mechanism and application of calcium ion selective electrode. 7

**OR**

- (I) Write a note on applications of Potentiometric titrations.  
(II) Discuss the working mechanism of CO<sub>2</sub> and O<sub>2</sub> gas sensing probes for expressing the electrode potential.
- (B) Give short answers of any **three** in following : 3
- (1) Define : Pre-concentration.  
(2) What are enzyme electrodes ?  
(3) Give two characteristics of reference electrode.  
(4) Give one example each for the electrode of the second and third kind.  
(5) Define : Electrochemical cell.
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