



SEAT No. _____

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[7]

SARDAR PATEL UNIVERSITY
B. Sc. (Fourth Semester Examination)
Tuesday, 2022, 4 October
12:30p.m. to 2:30p.m.

US04EICH02 – INSTRUMENTAL METHODS OF ANALYSIS

Total Marks : 70

- Q.1 Choose the correct option for the following : [10]
- (i) PH is expressed as _____
a. $-\log_{10}[\text{H}^+]$ b. $\log [\text{OH}^-]$
c. $-\ln [\text{H}^+]$ d. $-\log_{10}[\text{OH}^-]$
- (ii) Potentiometric titration deals with change in----- with respect to volume.
a. pressure b volume c. Temperature d. potential
- (iii) In a potentiometer acid-base titration the graph is plotted _____
a. $\Delta E/\Delta V \rightarrow P$ b. $\Delta E/\Delta V \rightarrow V$
c. $\Delta E/\Delta V \rightarrow \text{weight}$ d. $\Delta E/\Delta V \rightarrow \text{temperature}$
- (iv) If stationary phase is solid & moving phase is liquid then the chromatography possible is _____
a. column chromatography b. Thin layer chromatography
c. High performance liquid chromatography d. All of the above
- (v) R_M, R_F, R_X are called _____
a. Migration parameters b. Travelling agent
c. Both 1 & 2 d. None of these
- (vi) Write the full name of FID _____
a. Flame ionization detector b. Flame in detector
c. False intake detector d. Flame Infusible detector
- (vii) High polarity solvent is _____
(a) Acetone (b) Water (c) Benzene (d) n- butane
- (viii) In gas chromatography the mobile phase used is gas but stationary phase may be _____
(a) Solid & Liquid (b) Liquid & Gas
(c) Solid, Liquid, Gas (d) None
- (ix) Due to hydrogen bonding in UVabsorption wave length is _____
(a) Higher (b) Shorter (c) no effect (d) None of these
- (x) A photomultiplier tube is generally used as a detector in _____
a) IR Spectroscopy b) UV Spectrophotometers
c) NMR d) ESR

- Q.2 State whether the following statements are true or false [08]
- Usually a buffer consists of a mixture of an acid and its conjugate base.
 - Conductance of solution varies strongly with the viscosity of the solvent.
 - Paper chromatography is a variety of partition chromatography.
 - Ordinary cellulose paper shows high affinity towards water.
 - Gas chromatography is generally applied to separation of gas phase mixture by interaction with a high boiling liquid on a solid.

6. HPLC is particularly suitable to the analysis of those compounds which are not readily handled by GLC.
7. Molecular group that absorbs visible or UV light is called chromophores.
8. Photo multiplier is used as a detector in NMR.

Q.3 Answer in very short (Any Ten):

[20]

- (i) Define: Conductance and cell constant.
- (ii) Name different types of conductometric titrations.
- (iii) Give advantages and disadvantages of quinhydrone electrode.
- (iv) Explain ascending paper chromatography.
- (v) Discuss detecting reagents used in Thin Layer chromatography.
- (vi) Name the factors affecting column efficiency.
- (vii) Write the principle of gas chromatography.
- (viii) Explain basic principle of HPLC instrument.
- (ix) Draw a properly labeled block diagram of Thermal conductivity detector.
- (x) Explain the basic principle of UV spectroscopy in brief.
- (xi) Give the types of transitions in UV spectroscopy.
- (xii) Discuss types of transitions in UV spectroscopy.

Q4 Attempt any FOUR from the following

[32]

1. Give the advantages of pH measurements and write down advantages of potentiometric titrations.
2. Write note on hydrogen electrode and on potentiometric complexometric titration.
3. Discuss the types of paper chromatography with the diagrams and detecting reagents used in Thin Layer chromatography.
4. Explain superiority of TLC over any other method of chromatography. Write the highlights of types of chromatography.
5. Draw the schematic diagram of GC and explain the main parts of it.
6. Discuss the applications of GC and HPLC techniques and sketch properly labeled block diagram.
7. Write a note on photomultiplier tube and derive Lambert – Beer's law and also write down deviations from Beer's law.
8. Write a note on double beam UV spectrophotometer and discuss main applications of UV spectroscopy.

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