

SEAT No. \_\_\_\_\_

No. of Printed Pages : 2

[12/A-14]

SARDAR PATEL UNIVERSITY  
B. Sc. (Fourth Semester Examination)  
Monday, 16<sup>th</sup> April, 2018  
10.00. a.m. to 12.00 p.m.

US04EICH02 – INSTRUMENTAL METHODS OF ANALYSIS

Total Marks : 70

Instruction: (i) All questions are to be attempted in your answer book.  
(ii) Figures to the right indicate marks.

- Q.1** Choose the correct option for the following : [10]
- (i) pOH is expressed as \_\_\_\_\_  
a.  $\log_{10}[\text{H}^+]$                       b.  $\log[\text{OH}^-]$   
c.  $-\ln[\text{H}^+]$                         d. none
- (ii) Potentiometric titration is used for \_\_\_\_\_  
a. Acid – Base            b. Replacement    c. Precipitation    d. Redox  
e. All of the above
- (iii) In a potentiometer acid-base titration the graph is plotted \_\_\_\_\_  
a.  $\Delta E/\Delta V \rightarrow P$                       b. none  
c.  $\Delta E/\Delta V \rightarrow \text{weight}$                 d.  $\Delta E/\Delta V \rightarrow \text{temperature}$
- (iv) If stationary phase is liquid & moving phase is liquid then the chromatography possible is \_\_\_\_\_  
a. Gel chromatography                      b. solid – Liquid chromatography  
c. Gel permeation chromatography    d. None of these
- (v)  $R_M, R_F, R_X$  are called \_\_\_\_\_  
a. Refraction parameter                      b. Travelling agent  
c. Both 1 & 2                                      d. None of these
- (vi) Write the full name of FID \_\_\_\_\_  
a. None of this                                      b. Foot in detector  
c. False intake detector                      d. Flame Infusible detector
- (vii) High polarity solvent is \_\_\_\_\_  
(a) Acetone    (b) none                      (c) Benzene                      (d) n- butane
- (viii) In gas chromatography the mobile phase used is gas but stationary phase may be \_\_\_\_\_  
(a) Solid & plasma                                      (b) Liquid & plasma  
(c) Solid, Liquid, plasma                                      (d) None
- (ix) Which type of bond shifts the UV absorption to shorter wave length  
(a) none            (b)  $\pi$ - bond            (c)  $\sigma$ - bond            (d) All of the above
- (x) A photomultiplier tube is generally used as a detector in \_\_\_\_\_  
a) IR Spectroscopy                                      b) none  
c) NMR    d) ESR

**Q.2** Answer the following (Any Ten): [20]

- (i) Define: Cell constant and pH scale.
- (ii) State the law which helps to determine the limiting molar conductivity of weak electrolyte. Calculate limiting molar conductivity of calcium sulphate (limiting molar conductivity of calcium and sulphate ions are 119.0 and 160.0  $\text{mole}^{-1} \text{Scm}^2$ )
- (iii) Give advantages and disadvantages of quinhydrone electrode.
- (iv) What is the basic principle of chromatography? Name the types of paper chromatography.

①

[P.T.O.]

- (v) Name the factors affecting column efficiency in column chromatography and give its main applications.
- (vi) Write a note on migration parameters.
- (vii) Name three types of analytical columns and discuss one of them in gas chromatography.
- (viii) Write the applications of HPLC in short.
- (ix) Write a short note on: Thermionic detector
- (x) Explain the basic principle of UV spectroscopy in brief.
- (xi) Give the types of electron in UV spectroscopy.
- (xii) Discuss types of transitions in UV spectroscopy.
- Q3**
- (a) Give the advantages of pH measurements. [3]
- (b) Write down advantages of potentiometric titrations. [3]
- (c) Write down the advantages and disadvantages of conductometric titrations. [4]
- OR**
- Q3**
- (a) Explain effect of dilution on conductance and specific conductance. [3]
- (b) Write note on hydrogen electrode. [3]
- (c) Write note on potentiometric complexometric titration. [4]
- Q4**
- (a) Discuss the types of paper chromatography with the diagrams. [3]
- (b) Write a note on Thin layer chromatography. [3]
- (c) Write a note on Adsorbent requirement in Column chromatography. [4]
- OR**
- Q4**
- (a) Name the detectors used in column chromatography and explain one of them with proper diagram. [3]
- (b) Explain superiority of TLC over any other method of chromatography. [3]
- (c) What is chromatography? Write the highlights of types of chromatography. [4]
- Q5** **Attempt the following:** [10]
- Explain main parts of GC by drawing its schematic diagram.
- OR**
- Q5** **Attempt the following:** [10]
- Discuss the applications of GC and HPLC techniques and sketch properly labeled block diagram of electron capture detector and HPLC instrument.
- Q6**
- (a) Explain detector photomultiplier tube drawing properly labeled diagram.. [3]
- (b) Derive Lambert – Beer's law and write down deviations from beers law. [3]
- (c) Discuss different monochromators used in spectrophotometer. [4]
- OR**
- Q6**
- (a) Write a note on double beam UV spectrophotometer. [3]
- (b) How UV spectroscopy is useful in detecting conjugation, geometrical isomerism and functional groups in an organic compounds. [3]
- (c) Discuss different radiation sources used in UV spectrometer. [4]