

**SARDAR PATEL UNIVERSITY**  
**Programme & Subject: M.Sc (Physical Chemistry)**  
**Semester: IV**  
**Syllabus with Effect from: June - 2013**

<b>Paper Code: PS04CPHC03</b>	<b>Total Credit: 4</b>
<b>Title Of Paper: Electro Analytical Methods</b>	

Unit	Description in detail	Weightage (%)
I	<p><b>pH and Ion-Selective Electrodes:</b>            Introduction, Construction and working of electrodes, Ion selective electrodes- Glass-membrane electrodes, Solid-state sensors, Liquid-membrane electrodes, Gas-sensing and Enzyme electrodes Interferences, Application of pH measurements, Ion-activity Evaluation Methods, Electrometric Measurement of pH and pI</p>	25%
II	<p><b>Potentiometry:</b>            Introduction, types of electrodes and its classification, Location of the Equivalence point, EMF and thermodynamic of the cell reactions, Determination of activity co-efficient from EMF measurements, Potentiometric Titrations and Its applications</p> <p><b>Coulometry &amp; Electrogravimetry:</b>            Introduction, First and Second law of faraday of electricity, Methods of Coulometry, Applications of Coulometry, Coulometric titrations, Advantages of Coulometric titrations, Electrogravimetry : Constant Current &amp; potential electrolysis, metal deposits, Electrode, Applications</p>	25%
III	<p><b>Conductometry:</b>            Introduction, Principle, Basic terms and their inter-relationships, Measurement of conductance, Conductometric titrations, Applications such as Determination of degree of dissociation &amp; dissociation constant of acids-bases, Determination of ionic product of water, Determination of Basicity of Organic compounds, Determination of solubility and solubility product of sparingly soluble salts, Determination of degree of hydrolysis and hydrolysis constant, advantages.</p> <p>High Frequency Conductance Measurements: Introduction, Types of Cells used, Instrumentation, Applications</p>	25%
IV	<p><b>Polarography &amp; Voltametric Methods:</b>            Introduction, Principle, Apparatus and electrode systems, Component of limiting current, Plarographic maxima, Half-wave potential, Derivation of a relation between halfwave potential &amp; diffusion co-efficient, The ILKOVIC equation, Factors governing diffusion current, Evaluation Methods, Applications of Polarography; Modified voltametric techniques such as A. C. Polarography, Rapid Scan Polarography, Pulse Polarography, Cyclic voltametry etc. Amperometric Titrations : Principle, Apparatus, Amperometric titrations. Biampereometric titrations – Titration with the Rotating platinum microelectrode, advantages and disadvantages, applications</p>	25%



### Basic Text & Reference Books:-

- Principles of Instrumental Analysis, 6<sup>th</sup> Edition 2006, by Douglas A. Skoog, F. James Hooer, Timothy A. Nieman.
- Instrumental Methods of Analysis, 6<sup>th</sup> Edition, by Willard, Merritt, Dean, Settle, CBS Publishers and Distributors.
- Contemporary Chemical Analysis, by J. F. Rubinson and K. A. Rubinson, Princtice-Hall International Inc. 1998.
- Analytical Chemistry, 6<sup>th</sup> Edition 2004, by Gary D. Christian, John Wiley & Sons Inc.
- Introduction to Instrumental Analysis, by Robert D. Braun, McGraw-Hill Book company, New Delhi.
- The Principles of Electrochemistry, by Duncan A. MacInnes, Dover Publications Inc., N.Y.
- Instrumental Methods of Chemical Analysis, 24<sup>th</sup> Edition 2005, by B. K. Sarma, Goel Publishing House, Meerut.

