

Semester II

Physical and Analytical Chemistry

Objectives:

1. To acquaint the students to fundamental principles of physical and analytical chemistry
2. To understand the diverse analytical processes and the various steps involved in the same
3. To develop analytical skills
4. To understand the various instrumentation techniques applied

	Subject	Total credits	Th	Pr	Int	Ext	Total
	Physical and Analytical Chemistry	4	2	2	25	75	100

Physical and Analytical Chemistry Theory

Module no	Objective	Content	Evaluation
1	This module will enable students to: <ol style="list-style-type: none"> 1. Acquire knowledge of fundamentals of physical chemistry 2. Understand and analyze the scientific information 	Physical Chemistry Instrumental methods of chemical analysis <ol style="list-style-type: none"> a) Potentiometry: Brief mention of electrode potential, Hydrogen electrode, glass electrode and applications b) Conductometry: Definition of specific conductance, equivalent conductance and applications c) Refractometry: Simple theory, instrumentation, Application, Abbe's refractometer d) Colorimetry and spectrophotometry: Definition, absorbance, absorptivity, Beer and Lambert law, instrumentation of colorimeter and spectrophotometer, factors affecting absorptivity like temperature, solvent, wavelength, difference between colorimeter and spectrophotometer and applications 	Question-Answer- 10 Marks + Assignment -5 Marks or Presentation- 5 Marks
2	This module will enable students to : <ol style="list-style-type: none"> 3. Acquire knowledge about different analytical methods 4. Understand the 	Analytical Chemistry <ol style="list-style-type: none"> a) Gravimetric Analysis -Common ion effect, solubility product, completeness of precipitation, complexions effect of acids, effect of acid, temperature and solvent upon solubility of precipitate, super saturation,	Question-Answer- 10 Marks or Assignment -5 Marks + Presentation- 5

	various steps involved in analytical processes	<p>and precipitate formation, re-precipitation</p> <p>b)Solvent extraction and Chromatography</p> <p>-Principle, Distribution co-efficient, distribution ratio, relation between distribution ratio and distribution co-efficient, solvent extraction methods i.e. ion association, salivation, chelate formation and its applications</p> <p>-Principle of chromatography, types (absorption, partition, column) , principle, diameter of column, packing, loading of sample, elution</p> <p>-Ion exchange chromatography, principle, cation and anion exchange resins, anion acids, deionization of water</p> <p>-Paper chromatography, Thin layer chromatography and Gas-Liquid chromatography - principle, techniques involved and applications. Detection of water</p>	Marks
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Physical and Analytical Chemistry Practical

Module no	Objective	Content	Evaluation
1	<p>This module will enable students to :</p> <ol style="list-style-type: none"> 1. Understand the principles of physical chemistry 2. Learn the various instrumentation techniques 	<p>Physical Chemistry</p> <ol style="list-style-type: none"> 1.To determine the heat of neutralization of strong acid or strong base 2.To determine the relative fuel value of kerosene to ethyl alcohol 3.To determine the λ max and concentration of CuSO_4 colourimetrically 4.To determine the λ max and concentration of ascorbic acid colourimetrically 5.To determine the molar absorptivity coefficient of $\text{K}_2\text{Cr}_2\text{O}_7$ colourimetrically 6.To study the adsorption of acetic acid on charcoal from its solution 7.To study the hydrolysis of ester and find out the order of reaction 8.To determine the total soluble solids content of various food samples 	<p>Experiment- 10 Marks</p> <p>+ Assignment - 5 Marks</p> <p>or Presentation- 5 Marks</p>

2	<p>This module will enable students to:</p> <ol style="list-style-type: none"> 1. Learn the various analytical techniques 2. Develop analytical skills 	<p>Analytical Chemistry</p> <ol style="list-style-type: none"> 1. To prepare 1N KMnO₄ solution 2. To prepare KMnO₄ solutions of different normalities using dilution method 3. To separate and identify a binary mixture of inorganications by paper chromatography 4. To separate and identify a binary mixture of amino acids by paper chromatography 5. To separate the mixture of ortho and para nitro aniline by thin layer chromatography 6. To separate the cations from the given mixture by coloumn chromatography using cellulose 7. To determine the amount of Nickel gravimetrically as Ni-DMG 	<p>Experiment-10 Marks or Quiz -5 Marks + Assignment-5 Marks</p>
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References:

1. Chatwell and Anand Instrumental methods of chemical analysis
2. Willard, Dean, Merit 1994, Instrumental methods of chemical analysis, 6th ed.
3. Bassette, Denney, Tuffery, Mendham (1968) Vogel's text book of Quantitative inorganic analysis, 3rd edition, London, Longman
4. S. Ranganna, (1987) Handbook of Analysis and Quality Control for Fruit and Vegetable Products, 2nd edition, Tata McGraw Hill Publishing Company Limited, New Delhi.
5. Yeshajahu Pomeranz, Clifton E. Melo, (2000), Food Analysis: Theory and Practice, 3rd edition, Aspen Publishers, United States of America,
6. S M Khopkar, (2004), Basic Concepts Of Analytical Chemistry, 2nd edition, New Age International publishers, New Delhi.