

B.Sc. I Year Chemistry Syllabus

CBCS Annual Pattern
From Academic Year 2021-2022

Paper II

Part A Introduction		
Class- B.Sc.	Year- First	
Session: 2021-2022	Subject - Chemistry	
SI-CHEM2T	Analytical Chemistry (Paper II)	
Core Course		
To study this course students must have had the subject <u>Chemistry</u> in class +2 or equivalent.		
By the end of this course students will learn the following aspects of Chemistry:		
	<ol style="list-style-type: none"> 1. Basic concepts of Mathematics for Chemists. 2. Fundamentals of analytical chemistry and steps involved in analysis. 3. Basic knowledge of Computer for chemists. 4. Basic Concepts of Chemical equilibrium. 5. Principles of Chromatography and chromatographic techniques. 6. Various techniques of Spectroscopic Analysis. 	
Credit Value	4	
Total Marks	Maximum Marks: CCE-25. University Exam (UE)- 75	Minimum Passing Marks: 33

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Topic	No. of lectures
<p>Mathematics for Chemists Straight line equation, Logarithmic relations, curve sketching, linear graphs & calculation of slopes. Differentiation, differentiation of functions like $k_x, e^x, x^n, \sin x, \log x$, maxima & minima, partial differentiation. Integration of some useful relevant functions. <i>Keywords/Tags: Linear graphs, Logarithmic Relation, Differentiation, Integration</i></p>	10
<p>Basic Analytical Chemistry: Introduction to Analytical Chemistry and its interdisciplinary nature. Concept of sampling. Importance of accuracy, precision and sources of error in analytical measurements. Presentation of experimental data and results, from the point of view of significant figures, statistical terms: mean, mean deviation, median, standard deviation, Numerical Problems.</p> <p>Calculations used in Analytical Chemistry Some Important units of measurements- SI Units, distinction between mass and weight, mole, milli mole and Numerical Problems.</p> <p>Solution and their concentrations-Concept of Molarity, molality and normality. Expressing the concentration in parts per million (ppm), parts per billion (ppb), Numerical Problems.</p> <p>Chemical Stoichiometry- Empirical and Molecular Formulas, Stoichiometric Calculations, Numerical Problems. <i>Keywords/Tags: Accuracy, Precision, SI units, Units of Concentration, Chemical stoichiometry.</i></p>	10
<p>Computer for Chemists Introduction to computer, Introduction to operating systems like -DOS, Windows, Linux and Ubuntu.</p> <p>Use of computer programs Running of standard programs & packages such as MS-word, MS-excel, PowerPoint, Execution of linear regression x-y Plot. Use of softwares for drawing structures and molecular formulae. <i>Keywords/Tags: Operating Systems, MS-word, MS-excel, PowerPoint.</i></p>	10
<p>Chemical Equilibrium: Equilibrium constant and free energy, concept of chemical potential, Thermodynamic derivation of law of chemical equilibrium. Temperature dependence of equilibrium constant; Van't Hoff reaction isochore, Van't Hoff reaction isotherm. Le-Chatelier's principle and its applications. <i>Keywords/Tags: Chemical Equilibrium, Equilibrium constant, Free Energy, Chemical Potential</i></p>	10
<p>Chromatography Introduction, Principle and Classification. Mechanism of separation: adsorption, partition & ion-exchange. Development of chromatograms: frontal, elution and displacement methods.</p>	10

	<p>Paper Chromatography (ascending, descending and circular), Thin Layer Chromatography (TLC) and Column Chromatography (CC), Gas Chromatography (GC) and High Pressure Liquid Chromatography (HPLC), types of column and column selection, applications, limitations.</p> <p>Principle and Applications of :</p> <ul style="list-style-type: none"> • Flash chromatography, • Ion-exchange chromatography and • Chiral chromatography. <p>Keywords/Tags Chromatogram, Ion Exchange, Column Selection, Adsorption</p>	
6	<p>Spectral techniques of analysis</p> <p>Basics of absorption spectroscopy: Electromagnetic radiation, Spectral range, Absorbance, Absorptivity, Molar Absorptivity, Fundamental Laws of Absorption, Lambert-Beer Law and its limitations.</p> <p>Constitution & working of photometer, spectrometer, colorimeter.</p> <p>Ultraviolet (UV) absorption spectroscopy- Presentation and analysis of UV spectra, Types of electronic transitions, Effect of conjugation. Concept of chromophore and auxochrome. Bathochromic, hypsochromic, Hyperchromic and hypochromic shifts. UV spectra of conjugated polyenes and enones.</p> <p>Infra-red (IR) absorption spectroscopy- Molecular vibrations, Hooke's law, selection rules, intensity and position of IR bands, Measurement of IR spectrum, finger print region, characteristic absorption of various functional groups and interpretation of IR spectra of simple organic compounds.</p> <p>Keywords/Tags : Hypsochromic, Hypochromic, Absorption, Spectrum</p>	10

Part C - Learning resources

Text Books, Reference Books, Other Resources

Text Books

1. Gaur, S., Computer for Chemists, Neel Kamal Prakashan, 2017
2. Khopkar, S.M. Basic Concepts of Analytical Chemistry. New Age, International Publisher, 2009
3. Kaur H, Analytical Chemistry, PragatiPrakashan (2008)
4. Gupta, Alka L., Analytical Chemistry, PragatiPrakashan (2020)
5. Bahl, A. & Bahl, B.S. Advanced Organic Chemistry, S. Chand, 2010.
6. Kaur H, Instrumental Methods of Chemical Analysis, PragatiPrakashan, 2018
7. Sharma B.K., Chromatography. Krishna Prakashan, 2019.
8. Sharma Y.R., Elementary Organic Spectroscopy. S Chand. 2013
9. Singh, DR, Saxena, G., Singh, B., Inorganic Chemicals. Shival Aggarwal & Company, Agra
10. Srivastava, S. S., Gehlot, A. S., Chemistry, Ratan Prakashan Temple, Indore
11. Soni, PL, Organic Chemistry, Sultan Chand and Sons, Delhi

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