

**Integral University, Lucknow**  
**Department of Chemistry**  
**B.Sc. (Hons.) Industrial Chemistry, 1<sup>st</sup> Year/ 1<sup>st</sup> Semester**  
**Subject Name: Essential Professional Communication, Subject Code: LN-104**  
**SYLLABUS REVISED-2015**  
**w.e.f. July-2015**

**L T P 3 1 0**

**Unit-I** **04**

**Introduction to Communication:** Definition, Types of Communication, Channels of Communication, Language.

**Unit-II** **06**

**Interpersonal Communication:** Culture- Definition and Types, Communication and Culture including Cross Cultural Communication.

**Unit-III** **08**

**Written Communication:** Letter Writing- Informal and Formal - Letters of Enquiry, Letters of complaint, Response to complaints and enquiries, Self Exploration through description.

**Unit-IV** **12**

**Grammar through Worksheets:** Situational activities and modules- Parts of Speech, Tenses, Articles, Modals, Active and Passive, Subject-Verb Agreement, Direct and Indirect Speech, Degrees of comparison.

**Unit-V** **10**

**Grammar through Worksheets Continued:** Sentences: Simple, Compound, Complex, Declarative, Assertive, Negative, Interrogative, Exclamatory, Imperative

**Books Recommended:**

1. Wren PC and Martin H, "High School Grammar and Composition", S. Chand and Co.
2. K. Floyd , "Interpersonal Communication: The Whole Story" (2009), McGraw Hill,
3. Greenbaum Sidney and Nelson Gerald, "An Introduction To English Grammar", Pearson Swan Michael, "Practical English Usage" OUP, 2005
4. Raymond Murphy, " Intermediate English Grammar", (2007) Cambridge University Press

**Integral University, Lucknow**  
**Department of Chemistry**  
**B.Sc. (Hons.) Industrial Chemistry, 1<sup>st</sup> Year/ 1<sup>st</sup> Semester**  
**Subject Name: Elementary Mathematics Professional, Subject Code: MT-108**  
**SYLLABUS REVISED-2015**  
**w.e.f. July-2015**

**L T P 3 1 0**

**Unit-I** **08**

**Calculus:** Limits and functions, definition of differential coefficient, differentiation of functions including function of a function, differentiation of parametric form, simple and successive differentiation.

**Unit-II** **08**

**Integration:** Integration as inverse of differentiation, Indefinite integrals of standard form, Integration by parts, substitution method and partial fraction method, Evaluation of definite integrals.

**Unit-III** **08**

**Statistics:** Basic concepts of Simple random sampling and stratified random sampling, measures of central tendency (mean, median and mode), measures of variation (mean deviation and standard deviation), Covariance, Karl Pearson's Coefficient of Correlation, Regression, method of least squares.

**Unit-IV** **08**

**Permutation, Combination and Binomial Theorem:** Fundamental principle of counting, Permutations, permutations under certain conditions, Combinations, combinatorial identities, Binomial theorem (without proof), some applications of Binomial theorem.

**Unit-V** **08**

**Probability:** Random experiment and associated sample space, events, definition of probability, algebra of events, addition and multiplication theorems on probability (without proof), Binomial, Poisson and Normal distributions analysis.

**Books recommended:**

1. Murray R. Spiegel, 1980, Probability and Statistics, Schaum's (Outline Series) McGraw-Hill Book Co.
2. Q.S Ahmad, V. Ismail and S.A Khan: Biostatistics, Ixmi Publications Pvt.Ltd.
3. E. Kreyszig, "Advanced Engineering Mathematics", 5<sup>th</sup> Edition, Wiley Eastern, 1985.
4. Mathematics, NCERT

**Integral University, Lucknow**  
**Department of Chemistry**  
**B.Sc. (Hons.) Industrial Chemistry, 1<sup>st</sup> Year/ 1<sup>st</sup> Semester**  
**Subject Name: Physical Chemistry-I, Subject Code: CH-103**  
**SYLLABUS REVISED-2015**  
**w.e.f. July-2015**

**L T P 3 1 0**

**Unit-I** **08**

**Gaseous States:** Postulates of kinetic theory of gases and derivation of equation for kinetic molecular theory of gases, deviation from ideal behavior, vander Waals equation of State. PV isotherms of ideal gases, continuity of states, the isotherms of vander Waals equations, relationship between critical constants and van der Waals constants, the law of corresponding states, reduced equation of states. Root mean square, average and most probable velocities. Liquification of gases (based on Joule Thompson effect).

**Unit-II** **08**

**Colloidal State:** Dispersion systems, Types and classification of colloidal systems, Preparation and purification of colloidal solutions, Properties of colloidal solutions, Applications of colloids, Emulsions.

**Unit –III** **08**

**Thermodynamics- I:** Definition of thermodynamic terms : system, surrounding etc. Types of systems, intensive and extensive properties. State and path functions and their differentials. Thermodynamic process. Concept of heat and work. First Law of Thermodynamics: Statement, definition of internal energy and enthalpy. Heat capacity, heat capacities at constant volume and pressure and their relationship, Joule-Thomson effect and inversion temperature. Calculation of W, q, dU and dH for the expansion of ideal gases under isothermal and adiabatic conditions for reversible process.

**Unit-IV** **08**

**Thermochemistry:** Standard state, standard enthalpy of formation - Hess's Law of heat summation and its applications. Heat of reaction at constant pressure and at constant volume. Enthalpy of neutralization. Bond dissociation energy and its calculation from thermo-chemical data, temperature dependence of enthalpy.

**Unit-V** **08**

**Phase Equilibrium:** Gibbs phase rule, Statement and meaning of the terms - phase, component and degree of freedom, phase equilibria of one component system - water, and sulphur system.

**Books Recommended:**

1. Physical Chemistry, P.WE. Atkins, ELBS
2. Thermodynamics – J. Rajaram and J.C. Kuriacose – Educational Publishers.
3. Chemical Thermodynamics by R.P.Rastogi et al
4. Principles of physical chemistry by Puri Sharma and Pathan
5. Essentials of Physical Chemistry, Bahl & Tuli, S. Chand & Co. Ltd.
6. Principles of Physical Chemistry, Puri, Sharma & Pathania, Vishal Publishing Co.

**Integral University, Lucknow**  
**Department of Chemistry**  
**B.Sc. (Hons.) Industrial Chemistry, 1<sup>st</sup> Year/ 1<sup>st</sup> Semester**  
**Subject Name: Inorganic Chemistry-I, Subject Code: CH-104**  
**SYLLABUS REVISED-2015**  
**w.e.f. July-2015**

**L T P 3 1 0**

**Unit-I** **08**  
**Atomic Structure:** Idea of de Broglie matter waves, Heisenberg uncertainty principle, atomic orbitals, quantum numbers, shapes of s, p, and d orbitals. Aufbau and Pauli exclusion principles, Hund's multiplicity rules. Electronic configurations of the elements.

**Unit-II** **08**  
**Periodic Properties:** An introduction to modern periodic table, periodicity in properties of elements: Atomic and ionic radii, ionization energy, electron Affinity, electronegativity, effective nuclear charge, shielding effect.

**Unit-III** **08**  
**Chemical Bonding-I:** Introduction, causes of chemical combination, electronic theory of valency, general characteristics of: electrovalent bond, covalent bond, coordinate bond, metallic bonding and hydrogen bonding.

**Unit-IV** **08**  
**Chemical Bonding-II:** Hybridization and shapes of simple molecules and ions. Valence Shell Electron Pair Repulsion (VSEPR) theory to NH<sub>3</sub>, SF<sub>4</sub>, ClF<sub>3</sub>, ICl<sub>4</sub><sup>-</sup> and H<sub>2</sub>O. Molecular Orbital theory for homonuclear and heteronuclear diatomic molecules, bond length, bond angle and bond energy, resonance.

**Unit-V** **08**  
**Nuclear Chemistry:** Natural and artificial radioactivity, binding energy, rate equation for nuclear decay, nuclear fission and nuclear fusion and their applications, group displacement law, isotopes and isobars, applications of radioactivity: radiocarbon dating and radio tracer techniques.

**Books recommended:**

1. Advanced Inorganic Chemistry Vol-I & II, Satya Prakash, G.D. Tuli, S.K. Basu, R.D. Madan, S. Chand & Co. Ltd.
2. Test book of Inorganic Chemistry, P.L. Soni, Sultan Chand & Sons
3. Simplified Course in Inorganic Chemistry, Madan & Tuli, S. Chand & Co. Ltd.
4. Concise Inorganic Chemistry, J.D. Lee, Black Well Sciences
5. Selected Topics in Inorganic Chemistry, Wahid U Malik, GD Tuli, RD Madan, S Chand Publication.

**Integral University, Lucknow**  
**Department of Chemistry**  
**B.Sc. (Hons.) Industrial Chemistry, 1<sup>st</sup> Year/ 1<sup>st</sup> Semester**  
**Subject Name: Organic Chemistry-I, Subject Code: CH-105**  
**SYLLABUS REVISED-2015**  
**w.e.f. July-2015**

**L T P 3 1 0**

**Unit-I** **08**

**Structure and Bonding of Organic Molecules:** Hybridizations:  $sp^3$ ,  $sp^2$  and  $sp$  hybridization of carbon; Bond lengths, bond angles, bond energy, resonance, hyperconjugation, inductive, electromeric and mesomeric effects, hydrogen bonding.

**Unit-II** **08**

**Organic reaction, mechanism and their intermediates:** Types of organic reactions and mechanism: Addition, Substitution and Elimination reaction. Electrophiles and nucleophiles, Reactive intermediates- carbocations, carbanions, free radicals, carbenes, nitrenes and benzyne.

**Unit-III** **08**

**IUPAC nomenclature:** Classification of organic compounds, Functional group, Homologous series, IUPAC nomenclature of organic compounds (alkanes, alkenes, alkynes, cycloalkanes, alkyl halides, alcohols, aldehydes, ketones, acids, amides, amines, esters, anhydrides), bifunctional and polyfunctional organic compounds.

**Unit-IV** **08**

**Stereochemistry:** Concept of isomerism, types of isomerism: structural and stereoisomerism, E and Z nomenclature. Geometrical isomerism in alicyclic compounds. Conformational isomerism of n-butane and cyclohexanes, axial and equatorial bonds, Newman, Saw horse and Fischer projections.

**Unit-V** **08**

**Alkanes and Alkenes:** Preparation of alkanes by hydrogenation of alkenes/alkynes, Reduction of alkyl halides, Grignard reagent, Wurtz reaction. Chemical properties of alkanes. Mechanisms of dehydration of alcohols and dehydrohalogenation of alkyl halides, Saytzeff rule, Hoffmann elimination, Markownikoff's rule, hydroboration-oxidation, oxymercuration-demercuration, Epoxidation, ozonolysis, hydration, hydroxylation and oxidation with  $KMnO_4$ .

**Books recommended:**

1. Advanced Organic Chemistry, Bahl & Bahl, S. Chand & Co. Ltd.
2. Organic Chemistry Vol.I & II, I.L. Finar
3. Fundamentals of Organic Chemistry, Nafis Haider, S. Chand & Co. Ltd.
4. A text book of Organic Chemistry, Bahl & Bahl, S. Chand & Co. Ltd.
5. Organic Chemistry Vol.I, II & III, Dr. Jagdamba Singh, L.D.S. Yadav, Pragati Prakashan.

**Integral University, Lucknow**  
**Department of Chemistry**  
**B.Sc. (Hons.) Industrial Chemistry, 1<sup>st</sup> Year/ 1<sup>st</sup> Semester**  
**Subject Name: Industrial Chemistry Lab-1, Subject Code: CH-106**  
**SYLLABUS REVISED-2015**

w.e.f. July-2015

**L T P 0 0 8**

**List of Experiments**

1. Preparation of standard solution related to normality & molarity.
2. Preparation of buffer solution, pH measurement.
3. Acid - base titration.
4. Oxidation-reduction (redox) titrations.
  - a) To determine the strength of oxalic acid.
  - b) To determine the strength of ferrous ammonium sulphate (Mohr's salt) solution by using external indicator.
5. To determine the strength of potassium permanganate solution by using sodium thiosulphate solution. Iodometrically.
6. To determine the strength of given copper sulphate solution by using sodium thiosulphate solution. Iodometrically.
7. Complexometric titrations.
  - a) To estimate the concentration of calcium ions with EDTA.
  - b) To estimate the concentration of magnesium ions with EDTA.
8. Detection of element present in the given organic compounds.
9. Detection of functional group present in the given organic compounds.
  - a) Carboxylic
  - b) Phenolic
  - c) Alcoholic
  - d) Aldehydic
  - e) Ketonic
  - f) Ester
  - g) Amine
  - h) Amide