

Course Title	Chemistry	
Course Code	BSC201	
Course Credit	Lecture	: 4
	Practical	: 3
	Total	: 7
Course Objectives		
<p>On the completion of the course, students will be able to:</p> <ul style="list-style-type: none"> ▪ Understand the fundamental of chemistry. 		
Detailed Syllabus		
Sr. No.	Name of Chapter & Details	Hours Allotted
	SECTION-I	
Unit-1	<p style="text-align: center;">Inorganic Chemistry</p> <p>1. Wave Mechanics.</p> <ul style="list-style-type: none"> ➤ Introduction of wave Mechanics. ➤ Postulates of wave Mechanics. ➤ Interpretation of ψ, ψ^2, $\psi\psi^*$. ➤ Derivation of Schrodinger's equation in three dimensions (Cartesian Coordination). ➤ Eigen function & Eigen value. ➤ Orthogonal & Normalised wave function and problems on it. 	20

	<p>2. Chemistry of Lanthanide Elements.</p> <ul style="list-style-type: none"> ➤ Introduction. ➤ Occurrence & Important ores. ➤ Isolation of Lanthanide Elements from ore. ➤ Individual Isolation by (I) Ion Exchange Method (II) Solvent Extraction Method. ➤ Electronics Configuration with necessary Explanation. ➤ Oxidation State & their Stability. ➤ Magnetic properties. ➤ Colour (spectral) properties. ➤ Lanthanide Contraction. ➤ Misch Metal. ➤ Uses of Lanthanides & their Compounds. 	
<p>Unit-2</p>	<p style="text-align: center;">Organic Chemistry</p> <p>1. Carbonyl Compounds (Aldehydes and Ketones)</p> <ul style="list-style-type: none"> ➤ Introduction and Nomenclature ➤ Preparation of Carbonyl Compounds <ul style="list-style-type: none"> ○ Synthesis of Aldehydes ○ Synthesis of Ketones ➤ Structure and Physical Properties ➤ Reactivity and applications of carbonyl compounds ➤ Understanding of reaction mechanism ➤ Study of important name reactions involving carbonyl compounds 	<p style="text-align: center;">20</p>

	<ul style="list-style-type: none"> ➤ Active methylene compounds: Keto-enol tautomerism ➤ Identification Tests for aldehydes and ketones <p>2. Carboxylic Acid Compounds</p> <ul style="list-style-type: none"> ➤ Introduction and Nomenclature <ul style="list-style-type: none"> ○ Nomenclature of mono and dicarboxylic acids ➤ Preparation of monocarboxylic acid compounds ➤ Physical Properties of mono carboxylic acid compounds ➤ Acidity of Carboxylic acids <ul style="list-style-type: none"> ○ Effect of other functional groups on Acidity ➤ Reactivity and applications of carboxylic acids ➤ Esterification of Carboxylic Acids <ul style="list-style-type: none"> ○ Mechanism of Esterification ○ Trans-Esterification ➤ Introduction of Amino acids <p style="text-align: center;">SECTION-II</p>	
Unit-3	<p style="text-align: center;">Physical Chemistry</p> <p>1. Basic of some physical properties</p> <ul style="list-style-type: none"> ➤ Introduction ➤ Surface tension and parachor (Drop method) & its method for determination ➤ Viscosity and its method for determination ➤ Refractive index and its method for determination 	20

	<ul style="list-style-type: none"> ➤ Theory of Optical activity ➤ Dipole moment and its method for determination ➤ Application and numericals ➤ Examples <p>2. Phase Rule and related theory of solutions</p> <ul style="list-style-type: none"> ➤ Statement and meaning of the term – Phase, Components, Degree of freedom ➤ Explanation of phase equilibrium of one component system – Water & Sulphur system ➤ Phase equilibria of two component system : Solid-liquid mixture – desilverization of lead (Pb-Ag) ➤ Solid solution – compound formation with congruent melting point (Mg-Zn) ➤ System of $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ ➤ Theory of liquid-liquid mixture ➤ Ideal liquid mixture ➤ Azeotropes ➤ Lower and upper consolute temperature ➤ Steam distillation ➤ Short explanation of Raoult's law, Henry's law & Nernst's distribution law ➤ Examples 	
Unit-4	<p>Industrial Chemistry</p> <p>1. Fuels</p> <ul style="list-style-type: none"> ➤ Introduction 	15

- Calorific value
- Determination of calorific value- bomb calorimeter
- Characteristic of an ideal fuel
- Classification of fuels
- Natural solid fuels-wood, peat, lignite and coal
- Types of coal
- Artificial solid Fuels Charcoal, coke, and briquettes
- High and low Carbonisation of Coal
- natural gaseous fuels – natural gas and biogas
- Artificial gaseous fuels – coal gas, water gas, oil gas, Producer gas
- Advantages and disadvantages of solid liquid and gaseous fuels

2. Synthetic drugs and dyes

❖ Drugs

- Introduction
- Classification
- Synthesis and uses of sulphathiazole (cibazole) , phenacetin, paludrine, chloramphenicol, veronal

❖ Dyes

- Introduction
- Classification
- Synthesis and uses of methylorange, Diamonblack -f malachite green, Indigotin
- Congo red, Crystal violet, Anthraquinone

Laboratory course CHEMISTRY PRACTICALS [C-102] SYLLABUS		

1. Organic Qualitative Analysis [10 marks]

[Minimum six bifunctional Organic Compounds should be given]

Identification of an organic compound through the functional group analysis and determination of melting point or boiling point
(Bifunctional organic compounds)

2. Organic Volumetric Estimation: [10 marks]

[Standard solution to be given]

1. To determine the amount of $-\text{CONH}_2$ in the given Acetamide solution
2. To determine the amount of Phenol / m-cresol in the given solution
3. To determine the amount of Aniline / p-toluidine in the given solution
4. To determine the amount of Ester in the given solution
5. To determine the amount of Glucose in the given solution
6. To determine the amount of $-\text{COOH}$ in the given carboxylic acid

3. Gravimetric Estimation (Any Three) [15 marks]

1. Estimation of Ba as BaSO_4
2. Estimation of Fe as Fe_2O_3
3. Estimation of Ni as $\text{Ni}(\text{DMG})_2$
4. Estimation of Al as Al_2O_3

Instructional Method and Pedagogy:

- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval.
- Surprise tests/Quizzes/Tutorials will be conducted.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.
- Minimum ten experiments shall be there in the laboratory related to course contents.

Students Learning Outcomes:

At the end of the course the students will be able to:

- Distinguish different types of ionic compounds.
- Understand MOT of various compounds.
- Explain properties and preparations of Alcohol, Phenol, Ethers, Amines.
- Distinguish type of cell.
- Understand basic principles of Photochemistry and Catalysis.
- Basic principles of Qualitative analysis.
- Different parameters of water analysis.

Reference Books:

List of Reference Books Inorganic Chemistry

- Valency & Molecular Structure by Cartmell-Fowles.
- Atomic Structure & Chemical Bonding – Manas Chanda.
- Advance Inorganic Chemistry by : Cotton Wilkinson.
- Inorganic Chemistry by : P. L. Soni.
- Progressive Inorganic Chemistry by : Suratker thatte.
- Consise Inorganic Chemistry by : J. D. Lee.

List of Reference books for Organic Chemistry

- Advanced Organic Chemistry by Arun Bahl and B.S.Bahl
- Text Book of Organic Chemistry for BSc students by B.S. Bahl
- Organic Chemistry by Morrison and Boyd
- Fundamentals of Organic Chemistry by Solomon, John Wiley.
- Textbook of Organic Chemistry by P.L. Soni and H.M. Chawla
- March's Advanced Organic Chemistry Reactions, Mechanism and Structure by Michael B Smith and Jerry March
- Reaction Mechanisms and Reagents in Organic Chemistry by Gurudeep R. Chatwal
- Advanced Organic Reaction Mechanism by N. Tewari
- Organic Chemistry by I.L.Finar

List of Reference books for Physical Chemistry

- Textbook of physical chemistry K.K. Sharma, L.K. Sharma
- Physical Chemistry by Dr.D.R. Pandit, A.R. Rao and Padke
- A Textbook of physical chemistry by Samuel Glasstone
- A Textbook of physical chemistry by B.K. Sharma

List of Reference Books for Industrial Chemistry

- Industrial instrumentation by Eckman . Donald P.
- Shreeve's Chemical Process by Austin George

- Fuel and combustion by Sarkar & Samir
- Industrial Chemistry *by B. K. Sharma.*