DEPARTMENT PROFILE

Started as a supportive subject to P.U.C from 1967 and allied one to UG Mathematics course from 1972, the Department is elevated to offer B.Sc., (Chemistry) major programme during 1979 with Mathematics / Botany and Physics as Ancillary subjects. The Department has been producing exemplary results right from its inception. The Department is constantly concentrating on the overall development of students. So far 39 batches of students have successfully finished their graduation. Many of them have pursued their higher education in various prestigious institutions like M.I.T, I.I.Sc, I.I.T and the others have been well placed as production executives and marketing executives in chemical and pharma industries.

VISION

To train our students as scientifically literate professionals with a sense of social responsibility

MISSION

- To encourage the advancement of Chemistry in all of its branches through education, research and service opportunities.
- To provide students with community need based research and out reach opportunities.
- To strive for an ideal balance between creation and knowledge dissemination in the chemical sciences.
- To train our students to succeed in competitive examinations.

Signature of the Chairman/HOD

DISTRIBUTION OF CREDITS (UG PROGRAMME)

PART	SEM	COURSES	NO.OF COURSES	HOURS	CREDITS	TOTAL CREDITS
I	I-IV	LANGUAGE	4	6	3	12
II	I-IV	ENGLISH	4	6	3	12
III	I-VI	CORE	15-20	4-6	4-5	60
III	I-IV	ALLIED	4	5	5	20
III	V,VI	ELECTIVE	3	5	5	15
IV	I-IV	SKILL BASED SUBJECT(SBS)	4	3	3	12
IV	I	VALUE EDUCATION	1	2	2	2
IV	II	ENVIRONMENTAL STUDIES	1	2	2	2
IV	III,IV	NON-MAJOR ELECTIVE(NME)	2	2	2	4
V	IV	EXT.ACTIVITY	1	0	1	1
TOTAL CREDITS						**140**

Undergraduate (UG) Programme Outcomes (POs)

Undergraduate (B.A., B.Sc., B.Com., B.C.A., B.B.A., etc.,) is a 3-year degree programme with 6 semesters consisting the following Programme Outcomes (POs) under various criteria including critical thinking, problem solving, effective communication, societal/ citizenship/ ethical credibility, sustainable growth and employable abilities.

PO 1	**Critical Thinking**: Intellectual exploration of knowledge towards actions in clear and rational manner by understanding the logical connections between ideas and decisions.
PO 2	**Problem Solving**: Understanding the task/ problem followed by planning and narrow execution strategy that effectively provides the solution.
PO 3	**Effective Communication**: Knowledge dissemination by oral and verbal mechanisms to the various components of our society.
PO 4	**Societal/ Citizenship/ Ethical Credibility**: Realization of various value systems/ moral dimensions and demonstrate the empathetic social concern as well as equity in all the decisions, executions and actions.
PO 5	**Environmental Concern and Sustainable Growth**: Understanding the emerging environmental challenges and provide the possible contribution in sustainable development that integrates environment, economy and employment.
PO 6	**Skill Development and Employable Abilities**: Adequate training in relevant skill sector and creating employable abilities among the under graduates.

Passed in the BOS Meeting held on 18-03-2020

PROGRAMME SPECIFIC OUTCOMES (PSOs)

On completion of B.Sc. Chemistry Programme, the students are expected to

PSO 1	get a firm foundation in the fundamentals and applications of chemical and scientific theories including environmental and biological aspects in Chemistry.
PSO 2	make use of experiments by demonstration with the help of analytical instruments and analyze the outcomes.
PSO 3	develop skills in problem solving, critical thinking and analytical reasoning as applied to chemistry related problems.
PSO 4	find the solution for the ethical, historic, philosophical, economical and environmental dimensions of problems and issues facing chemists.
PSO 5	pursue post graduate program in higher educational institutions and also to get suitable employment opportunities in industries and academic institutions.

B.SC CHEMISTRY COURSE STRUCTURE

I - SEMESTER

S. No.	Sub. Code	Subject Title	Hrs./ Week	Exam (Hrs.)	Total Marks	Credits
1	21UACT11/ H11/S11	I: Tamil/Hindi/ Sanskrit	6	3	100	3
2	21UACE11	II: English	6	3	100	3
3	21UCYC11	III : Core – 1 T: General Chemistry – I	4	3	100	4
4	21UCYC12	III :Core – 2 T: General Chemistry – II	4	3	100	4
5	21UCYCP1	III: Core – 3 P: Volumetric Analysis *	2	-	-	-
6	21UMSA11/ 21UBYA11	III: Anc.1 – 1 T: Mathematics / Botany *	6 / 4	3	100	5/4
7	21UBYAP1	III: Anc.1: Botany Practical *	2	-	-	-
8	21UACVE1	IV: VE – 1 T: Value Education	2	3	100	2
		TOTAL	30		600	21

***Practical examination conducted at the end of the even semester**

II - SEMESTER

S. No.	Sub. Code	Subject Title	Hrs./ Week	Exam (Hrs.)	Total Marks	Credits
1	21UACT21/ H21/S21	I : Tamil/Hindi/ Sanskrit	6	3	100	3
2	21UACE21	II : English	6	3	100	3
3	21UCYC21	III : Core – 4 T: Inorganic Chemistry – I	4	3	100	4
4	21UCYC22	III : Core – 5 T: Physical Chemistry – I	4	3	100	4
5	21UCYCP1	III : Core – 3 P: Volumetric Analysis	2	3	100	2
6	21UMSA21/ 21UBYA21	III :Anc.1 – 2 T: Mathematics / Botany	6 / 4	3	100	5/ 4
7	21UBYAP1	III :Anc. 1 : Botany Practical	2	3	100	2
8	21UACES1	IV :ES – 1 T: Environmental Studies	2	3	100	2
		TOTAL	30		800	25

III - SEMESTER

S. No.	Sub. Code	Subject Title	Hrs./ Week	Exam (Hrs.)	Total Marks	Credits
1		I : Tamil/Hindi/ Sanskrit	6	3	100	3
2		II : English	6	3	100	3
3		III : Core – 6 T: Organic Chemistry – I	5	3	100	5
4		III : Core – 7 P: Inorganic Qualitative Analysis*	3	-	-	-
5		III: Anc.2 – 1 T: Physics	4	3	100	4
6		III : Anc. 2 – 2 P: Physics Practical*	2	-	-	-
7		IV : SBS – 1 T: Laboratory Techniques	2	3	100	2
8		IV : NME	2	3	100	2
		TOTAL	30		600	19

***Practical examination conducted at the end of the even semester**

IV - SEMESTER

S. No.	Sub. Code	Subject Title	Hrs./ Week	Exam (Hrs.)	Total Marks	Credits
1		I : Tamil/Hindi/ Sanskrit	6	3	100	3
2		II : English	6	3	100	3
3		III : Core – 8 T: Inorganic Chemistry – II	5	3	100	5
4		III : Core – 7 P: Inorganic Qualitative Analysis	3	3	100	2
5		III : Anc. 2 – 3 T: Physics	4	3	100	4
6		III : Anc.2 – 2 P: Physics Practical	2	3	100	2
7		IV : SBS – 2 T: Nuclear Chemistry & Radioactivity	2	3	100	2
8		IV : NME	2	3	100	2
9		V :EA: Extension Activities	0	3	100	1
		TOTAL	30		900	24

V - SEMESTER

S. No.	Sub. Code	Subject Title	Hrs./ Week	Exam (Hrs.)	Total Marks	Credits
1		III : Core – 9 T: Inorganic Chemistry – III	4	3	100	4
2		III : Core – 10 T: Organic Chemistry – II	5	3	100	5
3		III : Core – 11 T: Physical Chemistry – II	5	3	100	5
4		III : Core – 12 P: Physical Chemistry Expts.	5	3	100	5
5		III: Core – 13 P: Organic Analysis & Organic Estimation*	2	-	-	-
6		III : Elective – 1 T: Analytical Chemistry	5	3	100	5
7		IV : SBS – 3 T: Green Chemistry & Nanomaterials	2	3	100	2
8		IV : SBS – 4 T: Applied Organic Spectroscopy	2	3	100	2
		TOTAL	30			28

***Practical examination conducted at the end of the even semester**

VI - SEMESTER

S. No.	Sub. Code	Subject Title	Hrs./ Week	Exam (Hrs.)	Total Marks	Credits
1		III :Core – 14 T: Organic Chemistry – III	5	3	100	5
2		III : Core – 15 T: Physical Chemistry – III	5	3	100	5
3		III : Core – 16 P: Grav.Estmn. & Org.Ppn.	4	3	100	4
4		III : Core – 13 P: Organic Analysis & Organic Estimation	2	3	100	2
5		III : Elective – 2 T: Chemistry of Biomolecules	5	3	100	5
6		III : Elective – 3 T: Applied Chemistry	5	3	100	5
7		IV : SBS – 5 T: Pharmaceutical & Clinical Chemistry	2	3	100	2
8		IV : SBS – 6 T: Polymer Chemistry	2	3	100	2
		TOTAL	30		800	30

Passed in the BOS Meeting held on 18-03-2020

I - SEMESTER

S. No.	Sub. Code	Subject Title	Hrs./ Week	Exam (Hrs.)	Total Marks	Credits
1	21UACT11/ H11/S11	I: Tamil/Hindi/ Sanskrit	6	3	100	3
2	21UACE11	II: English	6	3	100	3
3	21UCYC11	III : Core – 1 T: General Chemistry – I	4	3	100	4
4	21UCYC12	III :Core – 2 T: General Chemistry – II	4	3	100	4
5	21UCYCP1	III: Core – 3 P: Volumetric Analysis *	2	-	-	-
6	21UMSA11/ 21UBYA11	III: Anc.1 – 1 T: Mathematics / Botany *	6 / 4	3	100	5/4
7	21UBYAP1	III: Anc.1: Botany Practical *	2	-	-	-
8	21UACVE1	IV: VE – 1 T: Value Education	2	3	100	2
		TOTAL	30		600	21

***Practical examination conducted at the end of the even semester**

Course code	Course Title	Category	L	T	P	Credits
21UCYC11	GENERAL CHEMISTRY- I	Core	4	-	-	4

L – Lecture T – Tutorial P – Practical

Year	Semester	Internal	External	Total
I	I	25	75	100

COURSE DESCRIPTION:

This course imparts basic idea about atomic structure and helps to understand the theories pertaining to how atoms are linked with one another with usage of periodic table. It also helps to acquire a thorough knowledge about the types of bonds and to understand the concept of hybridization & acids – bases & redox reactions

COURSE OBJECTIVES:

- To learn the origin and structure of atom.
- To refresh the sequence of elements and essential properties to understand the formation of molecules.
- To study the concept of various types of bonds.
- To understand the basic concepts about bonding (VBT & MOT)
- To study the concepts of acids – bases & redox reactions

COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

CO	Course Outcome	Knowledge level (on the basis of Blooms Taxonomy)
CO 1	understand atom on the basis of classical mechanics	K2
CO 2	understand the atomic properties	K2,K3
CO 3	gain knowledge of bonding in molecules	K1, K2
CO 4	remember the various chemical interactions in molecules through bonding concepts.	K1
CO 5	gain knowledge about the acids- bases, the oxidation states and balance redox reactions	K1,K4

K1- KNOWLEDGE (REMEMBERING), K2-UNDERSTANDING, K3-APPLYING
K4- ANALYZING, K5-EVALUATING, K6 - CREATING

GENERAL CHEMISTRY - I

UNIT - I

ATOMIC STRUCTURE (12 hours **) :** Constituents of atom - Planck's Quantum theory: Black body radiation – Photoelectric effect – Compton effect - Bohr model of atom: postulates only (no derivation) and hydrogen spectrum – de Broglie's equation – Heisenberg's uncertainty principle - Quantum numbers – Pauli's exclusion principle – Aufbau principle- Hund's rule.

UNIT - II

PERIODIC PROPERTIES (12 hours**) :** Modern Periodic table and its salient features - Periodicity and magic number - Periodic properties: atomic volume , size of atoms and ions, ionization energy and electron affinity - factors influencing these (including screening effect and effective nuclear charge) and their periodic trends – electronegativity : definition, Pauling and Mulliken scales – factors affecting the magnitude of EN and their periodic trends – applications.

UNIT – III

CHEMICAL BONDING – I (12 hours**) :** Cause of chemical bonding - Octet rule – Types of bonds - Ionic bond : definition - ionic compounds - factors favoring the formation of ionic compounds including Lattice energy and properties - Metallic bond : definition and conditions for the formation of metallic bond –significance – Hydrogen bond : definition and types – consequence and significance – van der Waals forces : definition and types – applications

UNIT - IV

CHEMICAL BONDING – II (12 hours**):** Covalent bond : definition - covalent compounds : factors favouring the formation and properties - Valence Bond theory - Postulates -applications to H_2 and HF molecules - Molecular Orbital approaches - explanation and applications to various molecules including homonuclear (H_2, He_2, F_2, O_2) and heteronuclear (HF, CO)molecules.

Hybridization : definition and types : *sp*, sp^2, sp^3, sp^3d and sp^3d^2 (BeF_2, BCl_3, CH_4, PCl_5, SF_6)-VSEPR theory : Postulates -applications to H_2O, NH_3, ClF_3 and ClO_4^- molecules - Ionic character in covalency : Fajan's rule - Coordinate Bond : definition and conditions for formation of a coordinate bond.

UNIT - V

CONCEPTS OF ACIDS & BASES & OXIDATION AND REDUCTION (12 hours): Acids and bases : Arrhenius, Bronsted -Lowry, Lewis, Lux-Flood and Usanovich concepts – relative strength of acids and bases – pH and pOH scales – buffer- calculation of pH of buffer solution – Henderson's equation.

Oxidation and reduction: Explanation in terms of oxidation number - oxidant and reductant - their equivalent weight calculation – redox reactions – balancing of redox reactions by ion-electron and oxidation number methods.

REFERENCE BOOKS :

1. Principles of Inorganic Chemistry by Puri, Sharma & Kalia, Milestone publisher & distributor (2009).
2. Modern Inorganic Chemistry by R.D. Madan S. Chand and Co. Ltd. (2012).
3. Essentials of Physical Chemistry by B. S. Bahl, Arun Bahl and G. D. Tuli, S. Chand and Co. Ltd. (2012).
4. Essentials of Physical Chemistry by B. S. Bahl, Arun Bahl and G. D. Tuli, S. Chand and Co. Ltd. (2012).
5. Inorganic Chemistry by R.L.Madan & G.D.Tuli , S. Chand and Co. Ltd (2018)

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	--	L	L	--
CO2	S	--	M	L	--
CO3	S	L	M	--	--
CO4	S	--	S	L	M
CO5	S	M	M	L	M

S – STRONG M – MEDIUM L - LOW

PERCENTAGE OF REVISION: 30%

Course code	Course Title	Category	L	T	P	Credits
21UCYC12	GENERAL CHEMISTRY- II	Core	4	-	-	4

L – Lecture T – Tutorial P – Practical

Year	Semester	Internal	External	Total
I	I	25	75	100

COURSE DESCRIPTION:

This course gives a thorough knowledge of basics of organic chemistry & organic reactions, metallurgical studies of elements and helps to know the characteristics of hydrogen and its compound and helps to acquire a thorough knowledge about the concepts of non- aqueous solvents.

COURSE OBJECTIVES:

- To study about the basic concepts of organic chemistry
- To gain information about the concepts of organic reactions
- To understand the metallurgical process of elements
- To give an introductory account of hydrogen and its compounds.
- To study the concepts of non –aqueous solvents.

COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

CO	Course Outcome	Knowledge level (on the basis of Blooms Taxonomy)
CO 1	know the basics of organic chemistry	K2
CO 2	understand the concepts of organic reactions	K2,K3
CO 3	understand the extraction of metals and its ores	K2, K6
CO 4	remember the properties of hydrogen and hydrides	K1
CO 5	analyze the nature of non-aqueous solvents	K1,K4

K1- KNOWLEDGE (REMEMBERING), K2-UNDERSTANDING, K3-APPLYING
K4- ANALYZING, K5-EVALUATING, K6 - CREATING

GENERAL CHEMISTRY- II

UNIT - I

BASICS OF ORGANIC CHEMISTRY (12 hours) **:** Characteristics of organic compounds – catenation – classification of organic compounds – homologous series – functional groups – nomenclature – IUPAC system – detection and estimation of elements: Lassaigne's test- Beilstein test – estimation of nitrogen by Kjeldhal method, halogens and sulphur by Carius method- molecular weight of acids and bases : silver salt method for acids, platinichloride method for bases- empirical formula – molecular formula – problems.

UNIT - II

UNDERSTANDING ORGANIC REACTIONS (12 hours)**:** Tetrahedral valency of carbon – homolytic and heterolytic fissions of C-C bond – formation and stability of carbonium ions, carbanions and free radicals –electrophilic and nucleophilic reagents. Electronic effects: Inductive effect, mesmeric effect, resonance effect & hyper conjugation effect Types of organic reactions: substitution – addition – elimination – rearrangement – illustrated examples only (mechanism not required).

UNIT – III

METALLURGY (12 hours)**:** Occurrence of metals – minerals – ores - types of ores – various steps involved in metallurgy- concentration of ore - physical and chemical methods - calcination - roasting -reduction methods : smelting, alumino-thermic, air and electrolytic methods - refining methods : cupellation, electrolytic, zone refining and vapour phase method.

Illustrations : Extraction of Vanadium, Molybdenum and Tungsten from their ores

UNIT - IV

HYDROGEN & ITS COMPOUNDS (12 hours) **: Reactive forms of hydrogen:** A brief study about Nascent, Occluded, Active, Atomic, Ortho & para hydrogen molecules – Isotopes of hydrogen

Hydrides: Definition &Classification – Preparation & Properties of hydrides

Oxides: Definition &Classification - Preparation, Properties, uses and structure of Hydrogen peroxide & Ozone.

UNIT – V

NON AQUEOUS SOLVENTS (12 hours)**:** Classification of solvents – General properties of ionizing solvents- solvation, solvolysis - auto ionization theory – study of reactions in liquid ammonia, liquid sulphur dioxide & liquid hydrogen fluoride – comparison of reactions of these solvents with water as solvent.

REFERENCES :

1. Advanced Organic Chemistry by B. S. Bahl and Arun Bahl S. Chand and Co. Ltd. (2012).
2. Organic Chemistry by B. Mehta and M. Mehta E.E. Edition (2010).
3. Modern Inorganic Chemistry by R.D. Madan S. Chand and Co. Ltd. (2012).
4. Principles of Inorganic Chemistry by Puri, Sharma & Kalia, Milestone publisher & distributor (2009).
5. Inorganic Chemistry by R.L.Madan & G.D.Tuli , S. Chand and Co. Ltd (2018)

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	M	--	M
CO2	S	M	M	--	--
CO3	M	--	L	--	--
CO4	M	--	L	M	--
CO5	M	L	--	--	L

S – STRONG M – MEDIUM L – LOW

PERCENTAGE OF REVISION: 40%

Passed in the BOS Meeting held on 18-03-2020

II - SEMESTER

S. No.	Sub. Code	Subject Title	Hrs./ Week	Exam (Hrs.)	Total Marks	Credits
1	21UACT21/ H21/S21	I : Tamil/Hindi/ Sanskrit	6	3	100	3
2	21UACE21	II : English	6	3	100	3
3	21UCYC21	III : Core – 4 T: Inorganic Chemistry – I	4	3	100	4
4	21UCYC22	III : Core – 5 T: Physical Chemistry – I	4	3	100	4
5	21UCYCP1	III : Core – 3 P: Volumetric Analysis	2	3	100	2
6	21UMSA21/ 21UBYA21	III :Anc.1 – 2 T: Mathematics / Botany	6 / 4	3	100	5/ 4
7	21UBYAP1	III :Anc. 1 : Botany Practical	2	3	100	2
8	21UACES1	IV :ES – 1 T: Environmental Studies	2	3	100	2
		TOTAL	30		800	25

Course code	Course Title	Category	L	T	P	Credits
21UCYC21	**INORGANIC CHEMISTRY - I**	Core	4	-	-	4

L – Lecture T – Tutorial P – Practical

Year	Semester	Internal	External	Total
I	II	25	75	100

COURSE DESCRIPTION:

This course offers an basic idea about nucleus. Know the characteristics of *s*-block and *p*-block elements.

COURSE OBJECTIVES:

- To understand the basic knowledge of alkali metals.
- To study the characteristics of alkaline earth metals.
- To give an introductory account of Group 13 elements
- To gain information about the Group 14 elements
- To study the characteristics of Group 15 elements

COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

CO	Course Outcome	Knowledge level (on the basis of Blooms Taxonomy)
CO 1	understand the basic knowledge of alkali metals	K2
CO 2	study the characteristics of alkaline earth metals	K2,K3
CO 3	analyze the Group 13 elements & its compounds	K2, K6
CO 4	summarize the characteristics of Group 14 elements	K1 ,K4
CO 5	understand the basic ideas of Group 15 elements	K1,K4

K1- KNOWLEDGE (REMEMBERING), K2-UNDERSTANDING, K3-APPLYING
K4- ANALYZING, K5-EVALUATING, K6 - CREATING

INORGANIC CHEMISTRY - I

UNIT – I

S-BLOCK ELEMENTS –I (ALKALI METALS) (12 Hrs): General characteristics : Electronic configuration, metallic character, flame colouration, oxidation state and reducing property – Anomalous behaviour of Li –Diagonal relationship and resemblance of Li & Mg – causes – preparation, properties and uses of lithium carbonate, sodium peroxide, sodium hydroxide, potassium bromate and potassium iodide

UNIT – II

S -BLOCK ELEMENTS -II (ALKALINE EARTH METALS) (12 Hrs):

General characteristics : Electronic configuration, metallic character, flame colouration, oxidation state and reducing property – Anomalous behaviour of Be – Diagonal relationship of Be & Al - Preparation and properties and uses of Beryllium chloride, Magnesium sulphate, Calcium carbide, Calcium sulphate and Barium sulphate – Uses of Radium salts.

UNIT – III

p - BLOCK ELEMENTS –I (GROUP 13 ELEMENTS) (12 Hrs):

General characteristics : Electronic_configuration, metallic character, oxidation states, formation of trihalides and hydrides - Diagonal relationship of B & Si - Preparation, properties and uses of Diborane, Borax, Borazine and $AlCl_3$ – Structure of Diborane , BF_3 and $AlCl_3$

UNIT – IV

p - BLOCK ELEMENTS –II (GROUP 14 ELEMENTS) (12 Hrs) :

General characteristics : Electronic configuration, allotrophy, metallic and non-metallic character, oxidation states and catenation – allotropes of carbon – detailed study of Carbides and Silicates – Preparation, properties and uses of Silicones, Carborundum, Stannous chloride, Red Lead and White Lead.

UNIT – V

p - BLOCK ELEMENTS – II (GROUP 15 ELEMENTS) (12 Hrs) :

General characteristics : Electronic configuration, metallic and non-metallic character, allotropy, oxidation states and catenation - Nitrides: classification - Allotropic modifications of phosphorus – Difference between red and white phosphorus – metalloid character of Arsenic – alloys of bismuth – preparation, properties and uses of microcosmic salt, Graham's salt and tartar emetic.

REFERENCE BOOKS:

1. Principles of Inorganic Chemistry by Puri, Sharma and Kalia, Milestone Publisher 2013.
2. Modern Inorganic Chemistry by R. D. Madan and Satya Prakash, S. Chand and Co, 3rd edn. 2014.
3. Inorganic Chemistry by J. E. Huheey et. al, Pearson Education Pvt. Ltd., 4th edn. 2004.
4. Advanced Inorganic Chemistry by F. A. Cotton and G. Wilkinson, John Wiley and sons Inc., 6th edn. 2006.
5. Inorganic Chemistry by H.C.Heera, Pragati prakasham vol.1, 4th edn.2015

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	L	--	--	L
CO2	M	--	L	--	L
CO3	M	L	--	--	L
CO4	S	--	M	L	M
CO5	M	--	L	--	--

S – STRONG, M– MEDIUM, L – LOW

PERCENTAGE OF REVISION: 25%

Passed in the BOS Meeting held on 18-03-2020

Course code	Course Title	Category	L	T	P	Credits
21UCYC22	**PHYSICAL CHEMISTRY - I**	Core	4	-	-	4

L – Lecture T – Tutorial P – Practical

Year	Semester	Internal	External	Total
I	II	25	75	100

COURSE DESCRIPTION:

This course gives an idea about **three states of matter, catalysis , adsorption and colloids.**

COURSE OBJECTIVES:

- To give an introductory account of gaseous state
- To gain information about the Intermolecular forces in liquids
- To study the arrangement of atom in solid state and its application elaborately.
- To discuss the fundamental aspects of catalysis and adsorption.
- To deal with the preparation, properties and applications of colloids

COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

CO	Course Outcome	Knowledge level (on the basis of Blooms Taxonomy)
CO 1	understand the gases law and its applications	K2
CO 2	interpret the knowledge interaction of liquids	K2,K3
CO 3	understand the various types of crystals.	K2, K6
CO 4	gain the knowledge of catalysis and adsorption	K1
CO 5	acquire the basic knowledge of colloids.	K1,K4

K1- KNOWLEDGE (REMEMBERING), K2-UNDERSTANDING, K3-APPLYING
K4- ANALYZING, K5-EVALUATING, K6 - CREATING

PHYSICAL CHEMISTRY - I

UNIT – I

GASEOUS STATE (12hrs): Gas Laws – Ideal gas equation - kinetic theory of gases : Postulates – derivation of ideal gas laws – deviations - Vander Waals' equation - Maxwell distribution of molecular velocities (no derivation) - graphical representation – effect of temperature on various velocities – Law of corresponding states – Boyle and inversion temperatures of gases - Mean free path– collision number – Brownian movement.

UNIT – II

LIQUID STATE (12 hrs): Intermolecular forces in liquids – dipole-dipole attractions, London forces and hydrogen bonding - Heat of vapourisation - Trouton's rule and its significance – surface tension - effect of temperature on surface tension – parachor – atomic and structural parachors - their applications- viscosity – effect of temperature on viscosity –Reynold's number. Liquid Crystals **–** classification – smectic – nematic - cholesteric liquid crystals –applications.

UNIT – III

SOLID STATE (12 hrs): Introduction – types of solids: amorphous and crystalline solids - size and shape of crystals – symmetry of crystals – space lattice and unit cells – types of unit cells – Miller indices- Bragg's equation –derivation- measurement of diffraction angle : rotating crystal method– Ionic crystals : sodium chloride, cesium chloride – crystal defects : vacancy defect, interstitial defect and impurity defect.

UNIT – IV

SURFACE CHEMISTRY (12 hrs): **Catalysis** : Definition – characteristics of catalytic reactions – Homogeneous catalysis : Acid-base catalysis-enzyme catalysis-Michaelis-Menten equation-autocatalysis-Heterogeneous catalysis – surface catalytic reactions – promoters- catalytic poison – theories of catalysis .

Adsorption : Definition – various terms involved in adsorption – types of adsorption : physical and chemical adsorption – difference between them - factors influencing adsorption–Adsorption Isotherms: Freundlich adsorption isotherm and Langmuir adsorption isotherm (no derivation) - applications of adsorption.

UNIT – V

COLLOIDS (12 hrs): Definition – classification- lyophilic and lyophobic sols – comparison between them – preparation of sols – dispersion methods: Bredig's Arc , peptization methods – aggregation methods – Purification of sols: dialysis – Optical properties of sols: Tyndall effect – Kinetic properties of sols: Brownian movement – Electrical properties of sols : Electrophoresis – Gold number –Emulsions: definition – types – Gels: definition - types – applications of colloids .

REFERENCES :

1. Principles of Physical Chemistry by B. R. Puri, L. R. Sharma & S. Pathania, Vishal Publishing Co. (2011).
2. Essentials of Physical Chemistry by B. S. Bahl, Arun Bahl and G. D. Tuli, S. Chand and Co. Ltd. (2012).
3. Advanced Physical Chemistry by D. A. Bajpai, S. Chand and Co. Ltd. 3rd Edition.
4. Text book Physical Chemistry by P.L.Soni, O.P.Dharmarha & U.N.Dash,S.Chand,(2011)
5. Advanced Physical Chemistry by Gurdeep Raj - Krishna Prakashan Media (P) Ltd 39th Edn. (2014).

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	--	M	L	--
CO2	S	M	--	--	L
CO3	M	S	L	--	--
CO4	M	--	M	M	L
CO5	M	L	--	L	L

S-STRONG, M-MEDIUM, L-LOW

PERCENTAGE OF REVISION: 15%

Passed in the BOS Meeting held on 18-03-2020

Course code	Course Title	Category	L	T	P	Credits
21UCYCP1	**Volumetric Analysis**	Core	-	-	2	2

L – Lecture T – Tutorial P – Practical

Year	Semester	Internal	External	Total
I	I & II	40	60	100

COURSE DESCRIPTION:

To practice the quantitative estimation of substances by titration methods.

COURSE OBJECTIVES:

A double titration involving the making up of the solution to be estimated and the preparation of a primary standard solution

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COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

CO	Course Outcome	Knowledge level (on the basis of Blooms Taxonomy)
CO	illustrate the estimation of substance by various types of titration method	K2,K3,K4, K5

K1- KNOWLEDGE (REMEMBERING), K2-UNDERSTANDING,K3-APPLYING
K4- ANALYZING, K5-EVALUATING, K6 - CREATING

LIST OF EXPERIMENTS:

I.**ACIDMETRY AND ALKALIMETRY**

1. Estimation of Na_2CO_3
2. Estimation of NaOH
3. Estimation of Oxalic acid.

II. **REDOX TITRATIONS**

1. **Permanganimetry**
   (i). Estimation of Ferrous ion
   (ii).Estimation of Oxalic acid
   (iii).Estimation of Calcium(direct method)
2. **Dichrometry**
   (i).Estimation of Ferrous ion
   (ii).Estimation of Ferric ion using external indicator

III. **IODOMETRY AND IODIMETRY**

1. Estimation of Potassium dichromate
2. Estimation of Potassium permanganate
3. Estimation of Copper

IV.**EDTA Titration**

1. Estimation of Hardness of water using EDTA.
2. Estimation of Calcium.
3. Estimation of Magnesium

Distribution of Marks: Internal - 40 Marks External - 60 Marks

Internal		**External examination**	
Class Experiments: 30 marks		Record Notebook	: 10 marks
Viva-voce	: 10 marks	Procedure writing	: 10 marks
Total	: 40 marks	Experiment	: 40 marks
		Total	: 60 marks

For Estimation, if the student has

< 1% error - 40 marks
1.1-2% error - 30 marks
2.1-3% error - 20 marks
3.1-5%error - 10 marks
> 5% error - 8 marks