GRADUATE ATTRIBUTES

1. **(PA) Problem analysis**: An ability to use appropriate knowledge and skills to identify, formulate, analyze, and solve complex problems in order to reach substantiated conclusions

2. **(Inv.) Investigation**: An ability to conduct investigations of complex problems by methods that include appropriate experiments, analysis and interpretation of data and synthesis of information in order to reach valid conclusions.

3. **(Des.) Design:** An ability to design solutions for complex, open – ended problems and to design systems, components or processes that meet specified needs with appropriate attention to health and safety risks, applicable standards, and economic, environmental, cultural and societal considerations.

4. **(Tools) Use of Scientific tools**: An ability to create, select, apply, adapt, and extend appropriate techniques, resources, and modern scientific tools to a range of engineering activities, from simple to complex, with an understanding of the associated limitations.

5. **(Team) Individual and teamwork**: An ability to work effectively as a member and leader in teams, preferably in a multi – disciplinary setting.

6. **(Prof.) Professionalism**: An understanding of the roles and responsibilities of the Science Graduates in society, especially the primary role of protection of the public and the public interest.

7. **(Ethics) Ethics and equity**: An ability to apply professional ethics, accountability, and equity.

8. **(LL) Life – long learning**: An ability to identify and to address their own educational needs in a changing world in ways sufficient to maintain their competence and to allow them to contribute to the advancement of knowledge

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO1	Possess fundamental knowledge of physics and able to transfer and apply the acquired phenomena and principles to learn different branches of physics
PEO2	Realize and develop an understanding of the impact of physics and science on society
PEO3	Report the solutions to physics problems and experimental studies either orally or in written format
PEO4	Motivate to pursue PG courses in reputed institutions and to kindle the interest for research in students
PEO5	Equip with creative and analytical skills that will enrich them to participate in co – curricular and extra – curricular activities, to cultivate and grow leadership skills, can act sensitively to recent issues and play a positive role for the benefit of the society.

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.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

On completion of **B.Sc. Physics programme,** the students are expected to

PSO 1	acquire core knowledge in Physics, including major areas of Classical Mechanics, Quantum Mechanics, Electromagnetism, Optics, Electronics, Modern physics, Thermal physics and Mathematical methods.
PSO 2	develop the proficiency in the acquisition of data using a variety of laboratory instruments and in the analysis and interpretation of such data.
PSO 3	have learned laboratory skills enabling them to take measurements in physics laboratory and analyse the measurements to draw valid conclusion.
PSO 4	be capable of oral and written scientific communication and will prove that they can think critically and work independently.
PSO 5	realize and develop an understanding of the impact of physics and science on society.
PSO 6	discover physics concepts in other disciplines such as Mathematics, Computer Science, Chemistry etc.,

B.Sc. PHYSICS – II YEAR
COURSE STRUCTURE – III SEMESTER

S. No.	Subject Code	Subject Title	Hrs./ Week	Exam (Hrs.)	CA	SE	Total Marks	Credits
1.	21UACT31	**Part – I:Tamil** – காப்பியமும் நாடகமும்	6	3	25	75	100	3
	21UACH31	**Hindi** – Hindi – III						
	21UACS31	**Sanskrit** – Sanskrit – III						
2.	21UACE31	**Part – II: English** – English For Enrichment – III	6	3	25	75	100	3
3.	21UPSC31	**Part – III: Core – 3:** Electricity & Electromagnetism	4	3	25	75	100	4
4.	21UPSC32	**Part – III: Core – 4:** Heat & Thermodynamics	4	3	25	75	100	4
5.	21UCYA31	**Part – III: Allied 2: T** Allied Chemistry – I	4	3	25	75	100	4
6.	21UPSN31	**Part – IV: NME:** Fundamentals of Physics – I	2	3	25	75	100	2
7.	21UPSCP2	**Part – III: Core:** Major Practical – 2*	2	–	40	60	100	–
8.	21UCYAP2	**Part – III: Allied 2: P*** Volumetric Analysis	2	–	40	60	100	–
		Total Hours	**30**		**Total Credits**			**20**

*** Practical exam will be conducted only in the even semester.**

COURSE STRUCTURE – IV SEMESTER

S. No.	Subject Code	Subject Title	Hrs./ Week	Exam (Hrs.)	CA	SE	Total Marks	Credits
1.	21UACT41	**Part – I: Tamil** – சங்க இலக்கியமும் அற இலக்கியமும்	6	3	25	75	100	3
	21UACH41	**Hindi** – Hindi – IV						
	21UACS41	**Sanskrit** – Sanskrit – IV						
2.	21UACE41	**Part – II: English** – English For Enrichment – IV	6	3	25	75	100	3
3.	21UPSC41	**Part – III: Core – 5:** Optics & Spectroscopy	4	3	25	75	100	4
4.	21UPSC42	**Part – III: Core – 6:** Mathematical Methods	4	3	25	75	100	4
5.	21UCYA41	**Part – III: Allied 2: T** Allied Chemistry – II	4	3	25	75	100	4
6.	21UPSN41	**Part – IV: NME:** Fundamentals of Physics – II	2	3	25	75	100	2
7.	21UPSCP2	**Part – III: Core:** Major Practical – 2	2	3	40	60	100	2
8.	21UCYAP2	**Part – III: Allied 2: P** Volumetric Analysis	2	3	40	60	100	2
9.		**PART –V:** Extension Activities	–	–	–	–	100	1
		Total Hours	**30**		**Total Credits**			**25**

COURSE STRUCTURE – III SEMESTER

S. No.	Subject Code	Subject Title	Hrs./ Week	Exam (Hrs.)	CA	SE	Total Marks	Credits
1.	21UACT31	**Part – I:Tamil** – காப்பியமும் நாடகமும்	6	3	25	75	100	3
	21UACH31	**Hindi** – Hindi – III						
	21UACS31	**Sanskrit** – Sanskrit – III						
2.	21UACE31	**Part – II: English** – English For Enrichment – III	6	3	25	75	100	3
3.	21UPSC31	**Part – III: Core – 3:** Electricity & Electromagnetism	4	3	25	75	100	4
4.	21UPSC32	**Part – III: Core – 4:** Heat & Thermodynamics	4	3	25	75	100	4
5.	21UCYA31	**Part – III: Allied 2: T** Allied Chemistry – I	4	3	25	75	100	4
6.	21UPSN31	**Part – IV: NME:** Fundamentals of Physics – I	2	3	25	75	100	2
7.	21UPSCP2	**Part – III: Core:** Major Practical – 2*	2	–	40	60	100	–
8.	21UCYAP2	**Part – III: Allied 2: P*** Volumetric Analysis	2	–	40	60	100	–
		Total Hours	**30**		**Total Credits**			**20**

*** Practical exam will be conducted only in the even semester.**

CA – Class Assessment (Internal)
SE – Summative Examination
SBS – Skill Based Subject
NME – Non –Major Elective
T – Theory
P – Practical

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
21UPSC31	ELECTRICITY AND ELECTROMAGNETISM	CORE – 3	4	–	4

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
II	III	25	75	100

NATURE OF COURSE	Employability	Skill Oriented	Entrepreneurship
	☐	✓	☐

COURSE DESCRIPTION:

This course helps to acquire knowledge and the basic concepts in electricity and electromagnetism, to understand the functions of capacitors, resistors, and inductors, to expose the students to the applications of electricity and magnetism.

COURSE OBJECTIVE:

This course helps to understand the fundamental laws of electricity and magnetism, to gain knowledge about capacitors, resistors, and inductors, to learn about electromagnetic induction, to apply the knowledge of electricity and magnetism to technological advances.

COURSE OUTCOMES (COs):

On successful completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	gain the knowledge of different laws of electrostatics which helps to solve problems	Upto K3
CO 2	understand the concepts and laws of current electricity and demonstrate the experiment to determine the resistivity of the material of wire and calibrate voltmeter and ammeter.	Upto K3
CO 3	explain the magnetic induction due to various types of current – carrying conductors	Upto K3
CO 4	recall the laws of electromagnetic induction	Upto K3
CO 5	explain various circuits consisting of capacitors, resistors, and inductors and demonstrate various bridges	Upto K3

K1 – KNOWLEDGE (REMEMBERING), K2 – UNDERSTANDING, K3 – APPLY

ELECTRICITY AND ELECTROMAGNETISM

UNIT – I: ELECTROSTATICS

Coulomb's law – Electric field and flux – Gauss law – applications of gauss law – Field due to charged sphere – Coulomb's theorem – Mechanical force on the surface of a charged conductor – electric potential – Equipotential surface – Relation between electric field and electric potential – Electric potential energy.

Capacitors – Principle of capacitor – Capacitance of a spherical capacitor – Energy stored in a capacitor – Loss of energy when two charged conductors share the charges.

UNIT – II: CURRENT ELECTRICITY

Current – Current density – Expression for current density – Kirchoff's laws – Wheatstone's network (no derivation) – Carey Foster's bridge – Determination of resistivity and temperature coefficient of resistance – Potentiometer – Principle – Calibration of ammeter – Calibration of voltmeter (low range and high range).

UNIT – III: MAGNETIC FIELDS OF ELECTRIC CURRENT

Magnetic field – flux – Biot-Savart's law – Magnetic induction due to a straight conductor – Magnetic induction due to a circular coil – Magnetic induction at any point on the axis of a solenoid – Force on a current carrying conductor in a magnetic field – Torque on a current loop in a uniform magnetic field – Ampere's law – Magnetic field inside a long solenoid – Moving coil galvanometer – Dead beat and Ballistic galvanometer – Comparison between them.

UNIT – IV: ELECTROMAGNETIC INDUCTION

Faraday's laws of electromagnetic induction – Lenz's law – Self-inductance – Determination of L by Rayleigh's method – Energy stored in an inductor – Mutual inductance – Determination of mutual inductance using Ballistic galvanometer (with theory) – Coefficient of coupling – Eddy currents.

UNIT – V: TRANSIENT CURRENTS AND ALTERNATING CURRENTS

Growth and decay of current in LR circuit – Growth and decay of current in CR circuit – Growth and decay of charge in CR circuit – Determination of high resistance by leakage.

Mean value of alternating emf – RMS value of the alternating current/voltage – Alternating current applied to LR, CR and LCR circuits – Series resonance circuit– Parallel resonance circuit – Power in an ac circuit – Wattless current.

AC bridges – Maxwell's bridge – Owen's bridge – Anderson's bridge.

TEXT BOOKS:

1. R. Murugeshan, *Electricity and Magnetism* (2008) S Chand & Co, New Delhi
2. BrijLal & Subramanyam, *Electricity and Magnetism*, (2005)

REFERENCE BOOKS:

1. David J. Griffith, *Introduction to Electrodynamics*, (2012) PHI, New Delhi
2. *Electricity and Magnetism* – D.N.Vasudeva (Twelfth revised edition)
3. *Electricity and Magnetism* – K.K.Tiwari (S.Chand&Co.)
4. *Electricity and Magnetism* – Tayal (Himalaya Publishing Co.)
5. D.Halliday, R.Resnick and J.Walker, *Fundamentals of Physics – Electricity and Magnetism* (2011), Wiley India, Pvt Ltd
6. M.Narayanamurthy & N. Nagarathnam, *Electricity & Magnetism*, NPC pub., Revised edition.

DIGITAL TOOLS:

http://engineering.nyu.edu/gk12/amps – cbri/pdf/Intro%20to%20Electricity.pdf
https://www.montana.edu/aolson/eele354/presentation–files/Lecture_8_Magnets%20and%20Magnetism%20print.pdf

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	1	1	1
CO2	3	3	3	2		
CO3	3	2	2		1	
CO4	3	2	3	1		
CO5	3	3	3	2	1	2

3. Advanced Application 2. Intermediate Development 1. Introductory Level

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
21UPSC32	HEAT AND THERMODYNAMICS	CORE – 4	4	–	4

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
II	III	25	75	100

NATURE OF COURSE	Employability		Skill Oriented	✓	Entrepreneurship	

COURSE DESCRIPTION:

This course helps to provide basic knowledge in thermal physics, to understand the phenomena connected with various units of measurement of temperature and to acquire knowledge about the process of converting heat to do mechanical work.

COURSE OBJECTIVE:

This course helps to know various units of measurement of temperature, to understand the basic concepts in calorimetry, to learn experimental methods to determine the transmission of heat, and to acquire knowledge about Maxwell's thermo dynamical relations.

COURSE OUTCOMES (COs):

On successful completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	acquire knowledge of different scales of temperature which helps to solve problems.	Upto K3
CO 2	classify the types of specific heat capacities a gas.	Upto K3
CO 3	understand the process of heat transmission and demonstrate the experiments to determine the thermal conductivity of the bad conductor, the specific heat of the liquid.	Upto K3
CO 4	explain the degrees of freedom, equipartition of energy and mean free path	Upto K3
CO 5	understand the laws of thermodynamics and gain knowledge about Maxwell's relations.	Upto K3

K1 – KNOWLEDGE (REMEMBERING), K2 – UNDERSTANDING, K3 – APPLY

HEAT AND THERMODYNAMICS

UNIT – I: **Thermometry**

Heat and temperature – different scales of temperature – Platinum resistance thermometer – Callender's constant pressure air thermometer – Joly's constant volume air thermometer.

UNIT – II: **Calorimetry and Low – temperature Physics**

Specific heat capacity of gases – C_p and C_v – Meyer's relation – Experimental determination of C_v by Joly's differential steam calorimeter method – Determination of $C_p$by Regnault's methodJoule – Kelvin effect – Liquefaction of Air – Production of low temperatures – Adiabatic demagnetization – Practical applications of low temperature

UNIT – III: **Transmission of Heat**

Conduction – Coefficient of thermal conductivity – the cylindrical flow of heat – Lee's disc method to determine the thermal conductivity of a bad conductor

Convection currents in the atmosphere – Lapse rate – Stability of the atmosphere – Greenhouse effect – Newton's law of cooling – Determination of specific heat capacity of liquid

Thermal Radiation – Stefan's law – Experimental determination of Stefan's constant – Solar constant –Temperature of the sun.

UNIT – IV: **Kinetic Theory of Gases**

Derivation of the ideal gas equation – Degrees of freedom – Maxwell's law of equipartition of energy – Ratio of specific heat capacities – Maxwell's law of distribution molecular velocities – Experimental verification – Mean free path – Expression for mean free path – Transport phenomenon – Expression for viscosity, diffusion and thermal conductivity of gases.

UNIT – V: **Thermodynamics**

Zeroth law of thermodynamics – Reversible and irreversible processes – First law of thermodynamics – Gas equation during the adiabatic process –Clement and Desorme's method to find γ – Second law of thermodynamics – Entropy – Change of entropy in reversible and irreversible processes – Change of entropy in converting ice into steam – Maxwell's thermodynamic relations.

TEXT BOOKS:

1. *Thermal Physics and sound* – R. Murughesan, S. Chand& Co, I Edition, New Delhi, 2007
2. *Thermal Physics* – R. Murughesan and KiruthigaSivaprasath, S. Chand & Co, II Edition, New Delhi, 2008

REFERENCE BOOKS:

1. *Heat and Thermodynamics* – Brijlal and Subramanyam, S.Chand& Co, 16th Edition New Delhi, 2005.
2. *Heat and Thermodynamics* – D.S. Mathur, Sultan Chand & Sons, 5th Edition, New Delhi, 2014.

DIGITAL TOOLS:

http://galileo.phys.virginia.edu/classes/152.mf1i.spring02/HeatLectures.pdf
https://www.phys.ens.fr/~ebrunet/Thermo – en.pdf

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	1	1	1
CO2	3	2	2	2		
CO3	3	3	3		1	
CO4	3	1	1	1		
CO5	3			2	1	2

3. Advanced Application 2. Intermediate Development 1. Introductory Level

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
21UCYA31	ALLIED CHEMISTRY– I (for Physics students)	ALLIED	4	–	4

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
II	III	25	75	100

NATURE OF COURSE	Employability	Skill Oriented	Entrepreneurship
	✓	✓	

COURSE DESCRIPTION:

This course informs basic knowledge in chemical bonding, behavior of gaseous molecules and kinetic theory. It also helps to know the basic concept of organic chemistry and coordination chemistry.

COURSE OBJECTIVES:

- To give a preliminary idea of chemical bonding between atoms.
- To gain information about the gaseous molecules
- To study the rate of reactions in various situations.
- To discuss the fundamental aspects of organic chemistry.
- To deal with the coordination chemistry in various aspects.

COURSE OUTCOMES (COs):

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

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	recognize the chemical bonding between atoms	Upto K3
CO 2	understand the gases law and its applications	Upto K3
CO 3	realise the rate of reactions in chemical kinetics.	Upto K3
CO 4	understand the various types of organic reactions.	Upto K3
CO 5	gain the basic idea about coordination chemistry	Upto K3

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLY

ALLIED CHEMISTRY – I

UNIT– I: Chemical Bonding **(12 hrs.)**

VB Theory: Postulates of VB theory – Application to the formation of simple molecules like H_2 and O_2 – overlap of atomic orbitals and its types – s–s, s–p and p–p overlap – principle of hybridization – sp, sp^2 and sp^3hybridisation (acetylene, ethylene, methane) – VSEPR theory and its applications (H_2O, NH_3, ClF_3).

M. O. Theory: Formation of M. O's by LCAO method – bonding, anti-bonding and non–bonding M.O's – M.O. diagram for H_2, He_2, O_2 and F_2 – electronic configuration and bond order.

UNIT – II: Gaseous state **(12 hrs.)**

Postulates of kinetic theory of gases – derivation of expression for pressure of an ideal gas on the basis of kinetic theory – deducing the basis gas laws. Deviation of real gases from ideal behavior – derivation of van der Waals gas equation – explanation of behavior of real gases on the basis of van der Waals equation. Average, Root Mean Square and Most Probable velocities (no derivation) : definition, equations and their relationship.

UNIT – III: Chemical kinetics **(12 hrs.)**

Introduction – rate of reaction – rate law and rate constant – order and molecularity – first order reactions – examples – rate equation – derivation – half life period – second order reactions – examples – rate equation – derivation – half life period – zero order and third order reactions – examples – rate equations (no derivation required) – determination of order of a reaction.

UNIT – IV: Organic Chemistry **(12 hrs.)**

a) Nature of valency of carbon in organic compounds – tetrahedral arrangement of valency of carbon – bond breaking and bond forming in organic reactions – homolytic cleavage – heterolytic cleavage – reaction intermediates – formation, reactions and stability of carbocations, carbanions and free radicals.

b) Reagents: Nucleophilic and electrophilic – types and examples.

c) Type of reactions: addition – substitution – elimination – rearrangement and polymerization – illustration with examples.

UNIT – V: Coordination Chemistry **(12 hrs.)**

Double salts and coordination compounds – terminology: coordination sphere, coordination number, central metal ion, ligand and its types – Werner's coordination theory: postulates – EAN rule – applications and limitations. Valence Bond Theory: postulates and applications to $[Ni(CN)_4]^2$, $[CuCl_4]^{2-}$, $[Fe(CN)_6]^{3-}$, and $[Fe(H_2O)_6]^{2+}$ complexes – C**helates**: definition and its applications.

TEXT BOOKS:

1. *A Text book of Organic Chemistry* by B. S. Bahl and Arun Bahl. S. Chand & Co. Ltd. (2019).
2. *Principles of Inorganic Chemistry* by Puri, Sharma & K.C. Kalia, Milestone Publisher and distributer, 48th Edn. (2019).
3. *Principles of Physical Chemistry* by Puri, Sharma and Pathania, Vishal Publishing Co., (2020).

REFERENCE BOOKS:

1. *Elements of Physical Chemistry* by Puri, Sharma and Pathania, Vishal Publishing co. (2013).
2. *Modern Organic Chemistry* by M. K. Jain and S. C. Sharma, Vishal Publishing co. Golden Jubilee, Edn. (2020).

DIGITAL TOOLS:

1. **https://byjus.com/jee/chemical–bonding/**
2. **https://www.toppr.com/guides/chemistry/states–of–matter/the–gaseous–state/**
3. **https://www.youtube.com/watch?v=4YLbhZtia1Q**
4. **https://www.youtube.com/watch?v=B_ketdzJtY8**
5. **https://byjus.com/jee/coordination–compounds/**

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	2	2	2	3
CO2	1	2	1	1	3
CO3	2	2	1	2	3
CO4	1	2	2	1	3
CO5	2	2	1	1	3

3. Advanced Application 2. Intermediate Development 1. Introductory Level

COURSE DESIGNER: Dr. M. RAJASEKARAN

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
21UPSN31	FUNDAMENTALS OF PHYSICS – I	NME	2	–	2

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
II	III	25	75	100

NATURE OF COURSE	Employability		Skill Oriented	✓	Entrepreneurship	

COURSE DESCRIPTION:

This course helps to provide basic knowledge of Units and Dimensions and to provide basic ideas regarding states of matter and conservation of energy.

COURSE OBJECTIVE:

To motivate the students the importance of measurements, clear understanding of sources of energy and its application in day to day life.

COURSE OUTCOMES (COs):

On successful completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	write the dimensional formula for the physical quantities.	Upto K3
CO 2	understand the concepts of three states of matter and applying the concept of heat capacities in the real life	Upto K3
CO 3	recall kinds of energies and its application and uses.	Upto K3
CO 4	outline the importance of renewable and non – renewable energy resources	Upto K3
CO 5	understand the formation of images using convex and concave lenses and to illustrate the defects of eye and rectification	Upto K3

K1 – KNOWLEDGE (REMEMBERING), K2 – UNDERSTANDING, K3 – APPLY

FUNDAMENTALS OF PHYSICS – I

UNIT – I:

S.I. Units – measurements of length, mass, time and other physical quantities – Dimensional formula for area, volume, density and force – Uses of dimension.

UNIT – II:

Matter – Solid, Liquid, Gas and Plasma – Application of Plasma – change of state – specific heat capacity – specific latent heat of ice and steam.

UNIT – III:

Kinds of energy – Mechanical energy, Thermal energy, Optical energy, Sound energy, Electrical energy, Atomic and Nuclear energy, (Examples) – Conservation of energy.

UNIT – IV:

Renewable and non – renewable energy – Fossil fuel – coal oil – Solar – Wind – Biomass – OTEC.

UNIT – V:

Mirror – Laws of reflection – Image formation (Concave and Convex mirror) Lens – Laws of refraction – Image formation (Concave and Convex lens) – Defects of eye and rectification.

TEXT BOOK:

First Year B. Sc. Physics – B.V. Narayan Rao, New Age International (P) Lt, 1998.

REFERENCE BOOKS:

1. *Mechanics* – D.S. Mathur – S.Chand & Co., 2002.
2. *Properties of matter* – D.S. Mathur – S. Chand & Co., 2002.
3. *Properties of matter* – Brijlal Subramanian – S. Chand & Co., 2006.

DIGITAL TOOLS:

https://www.vssut.ac.in/lecture_notes/lecture1428910296.pdf
https://byjus.com/physics/concave – convex – lenses/

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3		1			
CO2	3				1	
CO3	3	1		1		
CO4	3				1	
CO5	3		1		1	2

3. Advanced Application 2. Intermediate Development 1. Introductory Level

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
21UPSCP2	MAJOR PRACTICAL – 2	CORE PRACTICAL	–	2	–

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
II	III	–	–	–

MAJOR PRACTICAL – 2

LIST OF EXPERIMENTS

Any Fourteen experiments:

1. Calibration of Low range Voltmeter by Potentiometer
2. Calibration of Ammeter by Potentiometer
3. Potentiometer – Comparison of EMFs
4. Figure of Merit – Spot Galvanometer
5. LCR – Series Resonance circuit
6. LCR – Parallel Resonance circuit
7. Determination of M and B_H – Tan C Method
8. Comparison of capacities of the given two capacitors.
9. Determination of Thermal Conductivity of bad conductor by Lee's disc method
10. Self Inductance – Anderson's Bridge
11. Self Inductance – Owen's Bridge
12. Grating N and λ by Normal incidence method
13. Refractive index of the Prism using spectrometer.
14. Air – Wedge – Determination of thickness of the given material.
15. Newton's Rings – Radius of Curvature
16. Carey – Foster's Bridge – Resistance and Resistivity

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
21UCYAP2	VOLUMETRIC ANALYSIS	ALLIED CHEMISTRY LAB	–	2	-

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
II	III	-	-	-

NATURE OF COURSE	Employability	Skill Oriented	Entrepreneurship
	✓	✓	

COURSE DESCRIPTION:

This course gives the practical knowledge in volumetric analysis.

COURSE OBJECTIVES:

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

COURSE OUTCOMES (COs):

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

No.	Course Outcome	Knowledge Level (According to Bloom's Taxonomy)
CO	Illustrate the estimation of substance by various types of titration method	Upto K3

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLY

VOLUMETRIC ANALYSIS

LIST OF EXPERIEMENTS:

I. **ACIDMETRY AND ALKALIMETRY**

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

II. **REDOX TITRATIONS**

Permanganometry

1. Estimation of Ferrous ion
2. Estimation of Oxalic acid

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

Internal examination		**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

< 2% error	– 40 marks
2.1–3% error	– 30 marks
3.1–4% error	– 20 marks
4.1–5%error	– 10 marks
> 5% error	– 8 marks

TEXT BOOK:

Vogel's *Textbook of Quantitative Inorganic Analysis*, Pearson Education, 6th Edn. (2009).

REFERENCE BOOK:

Basic Principles of Practical Chemistry by V. Venkateswaran, R. Veeraswamy and A. R. Kulandaivelu, S. Chand and Co. Ltd. (2017).

DIGITAL TOOLS:

1. **https://www.youtube.com/watch?v=V9tAQl2XcHw**
2. **https://www.youtube.com/watch?v=cEOvj6jkdDw**

COURSE DESIGNER: Dr. M. RAJASEKARAN

COURSE STRUCTURE – IV SEMESTER

S. No.	Subject Code	Subject Title	Hrs./ Week	Exam (Hrs.)	CA	SE	Total Marks	Credits
1.	21UACT41	**Part – I: Tamil** – சங்க இலக்கியமும் அற இலக்கியமும்	6	3	25	75	100	3
	21UACH41	**Hindi** – Hindi – IV						
	21UACS41	**Sanskrit** – Sanskrit – IV						
2.	21UACE41	**Part – II: English** – English For Enrichment – IV	6	3	25	75	100	3
3.	21UPSC41	**Part – III: Core – 5:** Optics & Spectroscopy	4	3	25	75	100	4
4.	21UPSC42	**Part – III: Core – 6:** Mathematical Methods	4	3	25	75	100	4
5.	21UCYA41	**Part – III: Allied 2: T** Allied Chemistry – II	4	3	25	75	100	4
6.	21UPSN41	**Part – IV: NME:** Fundamentals of Physics – II	2	3	25	75	100	2
7.	21UPSCP2	**Part – III: Core:** Major Practical – 2	2	3	40	60	100	2
8.	21UCYAP2	**Part – III: Allied 2: P** Volumetric Analysis	2	3	40	60	100	2
9.		**PART –V:** Extension Activities	–	–	–	–	100	1
		Total Hours	**30**		**Total Credits**			**25**

CA – Class Assessment (Internal) **NME – Non –Major Elective**

SE – Summative Examination **T – Theory**

SBS – Skill Based Subject **P – Practical**

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
21UPSC41	OPTICS AND SPECTROSCOPY	CORE – 5	4	–	4

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
II	IV	25	75	100

NATURE OF COURSE	Employability		Skill Oriented	✓	Entrepreneurship	

COURSE DESCRIPTION:

This course helps to understand the basic concepts in Geometrical and Physical Optics and lays the foundation for understanding the concepts like holograms and interferometers, also to acquire knowledge in spectroscopy

COURSE OBJECTIVE:

The main objective of this course is to give an idea about the basic concepts in Geometrical and Physical Optics and Spectroscopy in Physics. It also intends to provide knowledge on phenomenon like interference, diffraction, polarization through wave nature of light.

COURSE OUTCOMES (COs):

On successful completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	gain knowledge of geometrical optics helps in the practical model of many optical systems and instruments including aberrations in lens system.	Upto K3
CO 2	explain the phenomenon of interference and demonstrate various experiments in interference.	Upto K3
CO 3	classify the two types of diffraction and demonstrate the experiment to determine the wavelength of light.	Upto K3
CO 4	explain the theory, production, detection of various types of polarized light.	Upto K3
CO 5	get knowledge of Spectroscopy helps to extract the dynamic information about the molecule.	Upto K3

K1 – KNOWLEDGE (REMEMBERING), K2 – UNDERSTANDING, K3 – APPLY

OPTICS AND SPECTROSCOPY

UNIT – I: Geometrical optics

Lens – Spherical aberration in lenses – Methods of minimizing spherical aberration – chromatic aberration in lenses – condition for achromatism of two thin lenses (in and out of contact) – Dispersion –combination of prisms to produce i) dispersion without deviation ii) deviation without dispersion – Direct vision spectroscope Eyepieces – Ramsden's and Huygens's eyepieces.

UNIT – II: Interference

Conditions for interference – Theory of interference fringes – interference due to reflected light (thin films) – colours of thin films – wedge shaped thin film –theory – determination of diameter of a thin wire by Air wedge –Newton's rings by reflected light – Determination of wavelength of light – Michelson's Interferometer – theory and its Application (Measurement of wavelength).

UNIT – III: Diffraction

Fresnel and Fraunhofer classes of diffraction –Rectilinear propagation of light – zone plate –action of zone plate – Comparison of a zone plate with a convex lens – Plane diffraction grating – theory of plane transmission grating – experiment to determine wavelength (Normal incidence method) – resolving power– Rayleigh's criterion for resolution – resolving power of a plane transmission grating – comparison of Prism and Grating spectra.

UNIT – IV: Polarization

Double refraction –Nicol Prism – Nicol Prism as polarizer and analyzer – Huygens's explanation of double refraction in uniaxial crystals– Plane, elliptically and circularly polarized light– Quarter wave plates and Half wave plates – Production and detection of plane, circularly and elliptically polarized light – Optical activity– Fresnel's explanation of optical activity – Specific rotatory power –Laurent's half shade polarimeter.

UNIT –V: Spectroscopy

Infrared spectroscopy – sources and detector – uses –Raman Spectroscopy – Quantum theory of Raman effect – applications – Nuclear magnetic resonance –Nuclear quadrupole resonance – Electron spin resonance spectroscopy(Qualitative study).

TEXT BOOK:

Optics and Spectroscopy – R.Murugeshan, S. Chand and Co., 1st Edition, New Delhi, 2003.

REFERENCE BOOKS:

1. *A text book of Optics* – Subramanyam and Brijlal, S. Chand and co., 25th Edition, New Delhi 2004.
2. *Optics* – Sathyaprakash, RatanPrakashan Mandhir, VIIth Edition, New Delhi, 1990.
3. *Elements of Spectroscopy* – S.L. Gupta, V.Kumar and R.C. SharmaPragati Prakashan, 13th Edition, Meerut, 1997.
4. *Molecular structure and spectroscopy* – G.Aruldhass, PHI Pvt Ltd, II Edition, New Delhi, 2007.
5. *Introduction to Molecular Spectroscopy* –C.N.Banewell,TMH publishing co. IV Edition, New Delhi, 2006.

DIGITAL TOOLS:

https://www.freebookcentre.net/physics – books – download/Lecture – Notes – Optics – (PDF – 57P).html

https://www.lehigh.edu/~kjs0/carey – 13.PDF

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2		1	1
CO2	3	3	3	2		
CO3	3	3	3	1		2
CO4	3	2	3	1	1	
CO5	3			2	1	2

3. Advanced Application 2. Intermediate Development 1. Introductory Level

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
21UPSC42	MATHEMATICAL METHODS	CORE – 6	4	–	4

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
II	IV	25	75	100

NATURE OF COURSE	Employability		Skill Oriented	✓	Entrepreneurship	

COURSE DESCRIPTION:

This course is an introduction to mathematical methods and numerical analysis. It helps to develop mathematical skills to solve problems in quantum physics, electromagnetic theory and other fields of theoretical physics through the numerical method. It covers matrices, beta and gamma functions, iterative method, numerical integration and differentiation, and solution to linear equations.

COURSE OBJECTIVE:

The main objective of this course is to understand various approximation methods to find the solution to problems which do not have exact solutions and impart knowledge of various mathematical methods to solve physical problems. It helps to develop the basic understanding of numerical techniques for solving linear equations and roots of the equation and the fundamentals of matrices, and special functions.

COURSE OUTCOMES (COs):

On successful completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	explain the fundamental aspects of numerical analysis and find out the solution of non – linear equations by numerical methods.	Upto K3
CO 2	solve the simultaneous linear algebraic equations through various methods in numerical techniques.	Upto K3
CO 3	solve eigenvalue problems using matrices that are relevant in physics and explain theorems on matrix.	Upto K3
CO 4	define and explain the properties of special functions like gamma and beta functions, their relation and solve problems.	Upto K3
CO 5	solve differentiation and integration using appropriate numerical methods	Upto K3

K1 – KNOWLEDGE (REMEMBERING), K2 – UNDERSTANDING, K3 – APPLY

MATHEMATICAL METHODS

UNIT – I: Errors and Root of Equations

Numerical analysis – numbers and their accuracy – errors – measurement of errors – round off error – truncation error – absolute error – relative error – percentage error – inherent error – accumulated error – general error formulae – convergence – Roots of equations: Iteration method – Newton – Raphson method – Bisection method.

UNIT – II: Matrix and Linear Equations

Introduction – system of linear equations – Gauss Elimination method – Gauss Seidal Iteration method – Gauss Jordan elimination method – Matrix Inversion method.

UNIT – III: Matrices

Eigenvalues and eigenvectors – Cayley Hamilton theorem – Theorems on eigenvalue and eigenvectors – diagonalization of matrices – simple problems.

UNIT – IV: Beta and Gamma functions

Definitions of beta and gamma functions – Symmetric property of beta function – Evaluation of beta function – Other forms of beta function – Evaluation of gamma function – The value of gamma ½ – Other forms of gamma function – Relation between beta and gamma function – Simple problems.

UNIT – V: Numerical Differentiation and Integration

Numerical differentiation – approximation of derivatives using the interpolation polynomials – Taylor series method. Numerical Integration – trapezoidal rule – simpson's 1/3 and 3/8 rules.

TEXT BOOKS:

1. *Computer Oriented Numerical Methods* – 4th Edition, V. Rajaraman, PHI Learning Pvt. Ltd., Delhi (2018)
   Unit – I – Chapter 2 – Section : 2.6
   Chapter 3 – Section : 3.1, 3.2, 3.3, 3.5
   Unit – II – Chapter 4 – Section: 4.1, 4.2, 4.6
   Unit – V – Chapter 8 – Section: 8.1 to 8.4
   Chapter 9 – Section: 9.1, 9.3
2. *Mechanics and Mathematical methods,* R. Murugesan, S. Chand & Co, NewDelhi (1999)
   Unit – III – Chapter 8 – Section : 8.1 to 8.4
   Unit – IV – Chapter 9 – Section: 9.1 to 9.8

REFERENCE BOOKS:

1. *Introductory methods of numerical analysis* – S.S. Sastry, Prentice Hall of India, New Delhi (2000)
2. *Numerical methods* – A. Singaravelu, Meenakshi Agency, Chennai (2001).
3. *The numerical method in Science and Engineering* – M.K. Venkataraman, PHI –New Delhi (1997)
4. *Numerical methods* by P. Kandasamy, K. Thilagavathy and K. Gunavathy, S. Chand & Co. (2002).

DIGITAL TOOLS:

1. https://www.iitg.ac.in/kartha/CE601/LectureSlides.htm
2. https://pfortuny.net/uniovi/numerical_methods/notes.pdf

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3				2	2
CO2	3			2		2
CO3	2			2	2	2
CO4	1			2	1	2
CO5	3				1	2

3. Advanced Application 2. Intermediate Development 1. Introductory Level

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
21UCYA41	ALLIED CHEMISTRY– II (for Physics students)	ALLIED	4	–	4

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
II	IV	25	75	100

NATURE OF COURSE	Employability	Skill Oriented	Entrepreneurship
	✓	✓	

COURSE DESCRIPTION:

This course gives basic information about solid state, electrochemistry and polymer chemistry.

It also supports to identify organic compounds using spectroscopic techniques and expresses industrial chemistry.

COURSE OBJECTIVES:

- To study about the fundamental aspects of solid state
- To acquire the knowledge about electrochemistry
- To give the idea about polymer chemistry
- To discuss the spectroscopy of organic compounds
- To deal with industrial chemistry

COURSE OUTCOMES (COs):

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

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	obtain the basic fundamental idea of solid state.	Upto K3
CO 2	get the information regarding the electrochemistry	Upto K3
CO 3	gain the basic knowledge of polymer chemistry	Upto K3
CO 4	understand the various aspects organic compounds in spectroscopy	Upto K3
CO 5	know the various industrial products	Upto K3

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLY

ALLIED CHEMISTRY –II

UNIT – I: Solid State **(12 hrs.)**

Types of crystals – ionic, molecular, covalent and metallic crystals – structure of NaCl – structure of H_2O in the solid state – structure of diamond and graphite – metallic bond in metals – conductors, insulators and semiconductors – band theory.

UNIT – II: Electrochemistry **(12 hrs.)**

Electrochemical cell – Nernst equation – convention regarding the sign of EMF of a cell – Electrodes – Reference electrodes – hydrogen and calomel electrodes – indicator electrodes – metal–metal ion electrodes – metal–metal insoluble salt electrodes – metal– glass and ion selective electrodes – pH measurement using glass electrode – membrane potential – H_2–O_2 fuel cell.

UNIT – III: Polymer Chemistry **(12 hrs.)**

Introduction: classification of polymers – natural and synthetic; thermoplastic and thermosetting. Types and mechanism of polymerization: addition, condensation and copolymerization. Techniques of polymerization: bulk, emulsion, solution and suspension. Preparation, properties and uses of Nylon and Epoxy resin.

UNIT – IV: Spectroscopy **(12 hrs.)**

a) **UV spectroscopy** – principle – Identification of simple organic molecules: ethylene, cis and trans - butene – electronic transitions: acetaldehyde, styrene, acetone.
b) **IR spectroscopy** – principle – identification of ethanol, dimethyl ether, acetaldehyde, acetone, methylamine and dimethylamine.
c) **NMR spectroscopy**: principle and spectrum of pure ethanol.

UNIT – V: Industrial Chemistry **(12 hrs.)**

a) **Petroleum industry:** Composition of petroleum – Refining of petroleum – various fractions of refining and their uses.
b) **Silicate industry**: Cement and ceramics – raw materials and manufacture.
c) **Fertilizer industry:** Various types and artificial fertilizers – preparation and significance.

TEXT BOOKS:

1. *Fundamental concept of Applied Chemistry* by Jayashree Ghosh, S.Chand & Co. Ltd.(2006).
2. *Principles of Inorganic Chemistry* by Puri, Sharma and Kalia, Milestone publisher & distributor , 48th Edn. (2019).
3. *Principles of Physical Chemistry* by Puri, Sharma and Pathania, Vishal Publishing Co., (2020).

REFERENCE BOOKS:

1. *Elements of Physical Chemistry* by Puri, Sharma and Pathania, Vishal Publishing Co. (2013).
2. *Elementary Organic Spectroscopy* by Y. R. Sharma, S.Chand & Co. Ltd. (2012).

DIGITAL TOOLS:

1. https://www.youtube.com/watch?v=CMwGopvmGo8
2. https://www.nature.com/subjects/polymer–chemistry
3. https://www.youtube.com/watch?v=IV4IUsholjg
4. https://www.youtube.com/watch?v=2Y8pSoS0d1g
5. https://www.youtube.com/watch?v=DaXGsOY9mj0

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	2	2	2	3
CO2	1	2	1	1	3
CO3	2	2	1	2	3
CO4	1	2	2	1	3
CO5	2	2	1	1	3

3. Advanced Application 2. Intermediate Development 1. Introductory Level

COURSE DESIGNER: Dr. M. RAJASEKARAN

Passed in the BOS Meeting held on 19/03/2022 **Signature of the Chairman**

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
21UPSN41	FUNDAMENTALS OF PHYSICS – II	NME	2	–	2

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
II	IV	25	75	100

NATURE OF COURSE	Employability	Skill Oriented	Entrepreneurship
	☐	✓	☐

COURSE DESCRIPTION:

This course helps the students to gain knowledge in the basic concepts in electricity and electromagnetism and also to understand the importance of capacitors, resistors, and inductors.

COURSE OBJECTIVE:

The main objective of this course is to understand the fundamentals of electrostatics and different types of cells. It also provides the knowledge about the importance of capacitors, resistors, and inductors.

COURSE OUTCOMES (COs):

On successful completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	explain the different laws of electrostatics.	Upto K3
CO 2	understand the concepts of different types of cells.	Upto K3
CO 3	recall alternating current generation by various power stations.	Upto K3
CO 4	outline the importance of Induction coil.	Upto K3
CO 5	illustrate various circuits consisting of capacitors, resistors, and inductors and Apply to diode and bridge rectifier	Upto K3

K1 – KNOWLEDGE (REMEMBERING), K2 – UNDERSTANDING, K3 – APPLY

FUNDAMENTALS OF PHYSICS –II

UNIT – I:

Electric current – voltage and resistance – Ohm's law – Kirchhoff's law – Resistances in series and in parallel.

UNIT – II:

DC Source – Primary cells – Leclanche and Daniel cell – Secondary cells – Lead Acid Accumulator – DC generator.

UNIT – III:

Alternating current generation by hydro, thermal and atomic power stations– RMS value – Peak value (Quantitative) – AC generator – no derivation.

UNIT – IV:

Measurement of Electric power by Wattmeter – simple calculations – Induction coil – Wattless current – Power factor.

UNIT – V:

Simple electrical circuits – resistor, capacitor and inductor connected to AC source (independently) – Relationship between emf and current in each case. Diode – Bridge Rectifier.

TEXT BOOKS:

1. R. Murugeshan, Electricity and Magnetism (2008) S Chand & Co, New Delhi
2. BrijLal & Subramanyam, Electricity and Magnetism, (2005)

REFERENCE BOOKS:

1. Electricity and Magnetism – D.N.Vasudeva (Twelfth revised edition)
2. Electricity and Magnetism – K.K.Tiwari (S.Chand&Co.)

DIGITAL TOOLS:

http://engineering.nyu.edu/gk12/amps – cbri/pdf/Intro%20to%20Electricity.pdf
http://web.cecs.pdx.edu/~eas199/A/notes/01/basic_electricity_slides.pdf

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3			1		1
CO2	3	1	1			
CO3	3				1	1
CO4	3			1		
CO5	3	1	1		1	2

3. Advanced Application 2. Intermediate Development 1. Introductory Level

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
21UPSCP2	MAJOR PRACTICAL – 2	CORE PRACTICAL	–	2	2

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
II	IV	40	60	100

LIST OF EXPERIMENTS

Any Fourteen experiments:

1. Calibration of Low range Voltmeter by Potentiometer
2. Calibration of Ammeter by Potentiometer
3. Potentiometer – Comparison of EMFs
4. Figure of Merit – Spot Galvanometer
5. LCR – Series Resonance circuit
6. LCR – Parallel Resonance circuit
7. Determination of M and B_H – Tan C Method
8. Comparison of capacities of the given two capacitors.
9. Determination of Thermal Conductivity of bad conductor by Lee's disc method
10. Self Inductance – Anderson's Bridge
11. Self Inductance – Owen's Bridge
12. Grating N and λ by Normal incidence method
13. Refractive index of the Prism using spectrometer.
14. Air – Wedge – Determination of thickness of the given material.
15. Newton's Rings – Radius of Curvature
16. Carey – Foster's Bridge – Resistance and Resistivity

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
21UCYAP2	VOLUMETRIC ANALYSIS	ALLIED – CHEMISTRY LAB	–	2	2

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
II	IV	40	60	100

NATURE OF COURSE	Employability	✓	Skill Oriented	✓	Entrepreneurship	

COURSE DESCRIPTION:

This course gives the practical knowledge in volumetric analysis.

COURSE OBJECTIVES:

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

COURSE OUTCOMES (COs):

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

No.	Course Outcome	Knowledge Level (According to Bloom's Taxonomy)
CO	Illustrate the estimation of substance by various types of titration method	Upto K3

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLY

VOLUMETRIC ANALYSIS

LIST OF EXPERIEMENTS:

I. **ACIDMETRY AND ALKALIMETRY**

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

II. **REDOX TITRATIONS**

Permanganometry

1. Estimation of Ferrous ion
2. Estimation of Oxalic acid

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

Internal examination		**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

< 2% error	– 40 marks
2.1–3% error	– 30 marks
3.1–4% error	– 20 marks
4.1–5%error	– 10 marks
> 5% error	– 8 marks

TEXT BOOK:

Vogel's *Textbook of Quantitative Inorganic Analysis*, Pearson Education 6th Edn. (2009)

REFERENCE BOOK:

Basic Principles of practical chemistry by V. Venkateswaran, R. Veeraswamy and A. R. Kulandaivelu, S. Chand and Co. Ltd. (2017).

DIGITAL TOOLS:

1. **https://www.youtube.com/watch?v=V9tAQl2XcHw**
2. **https://www.youtube.com/watch?v=cEOvj6jkdDw**

COURSE DESIGNER: Dr. M. RAJASEKARAN