B.Sc., CHEMISTRY

Syllabus

Program Code: UCH

2021-2022 onwards

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)

Re-accredited with "A" Grade by NAAC

PASUMALAI, MADURAI – 625 004

Qualification for Admission

Candidate should have passed the Higher Secondary Examination conducted by the Board of Higher Secondary Education, Government of Tamil Nadu, CBSE Board with Chemistry as one of the subjects in Higher Secondary Education.

Duration of the Course

The students shall undergo the prescribed B.Sc(Chemistry) course of study for a period of three academic years (six semesters).

Subject of Study

Part I: Tamil
Part II: English
Part III:
1. Core Subjects
2. Allied Subjects
3. Electives

Part IV :
1. Non Major Electives
2. Skill Based Subjects
3. Environmental Studies
4. Value Education

Part V :
Extension activities

The scheme of Examination

The components for continuous internal assessment are:

Two tests and their average	--15 marks
Seminar /Group discussion	--5 marks
Assignment	--5 marks
Total	25 Marks

Pattern of the questions paper for the continuous Internal Assessment

(For Part I, Part II, Part III, NME & Skilled Paper in Part IV)

The components for continuous internal assessment are:

Part –A

Four multiple choice questions (answer all) 4 x01= 04 Marks

Part –B

Three short answers questions (answer all) 3 x02= 06 Marks

Part –C

Two questions (‘either …. or ‘type) 2 x 05=10 Marks

Part –D

Two questions out of three 2 x 10 =20 Marks

Total 40 Marks

Pattern of the question paper for the Summative Examinations:

Note: Duration- 3 hours

Part –A

Ten multiple choice questions 10 x01 = 10 Marks

No Unit shall be omitted: not more than two questions from each unit.)

Part –B

Short answer questions (one question from each unit) 5 x02 = 10 Marks

Part –C

Five Paragraph questions (‘either …. or ‘type) 5 x 05 = 25 Marks

(One question from each Unit)

Part –D

Three Essay questions out of five 3 x 10 =30 Marks

(One question from each Unit)

Total 75 Marks

The Scheme of Examination (Environmental Studies and Value Education)

Two tests and their average	--15 marks
Project Report	--10 marks*
Total	--25 marks

** The students as Individual or Group must visit a local area to document environmental assets – river / forest / grassland / hill / mountain – visit a local polluted site – urban / rural / industrial / agricultural – study of common plants, insects, birds – study of simple ecosystem – pond, river, hill slopes, etc.

Question Paper Pattern

(Internal Assessment)

Pattern of the Question Paper for Environmental Studies & Value Education only) (Internal)

45 MCQs will be asked for two internal assessment tests (45 x 1=45 Marks**) and converted for 15 marks**

Two tests and their average	--	15 marks*
Project	--	10 marks

Total		25 Marks

Summative Examination Pattern

Pattern of the Question Paper for Environmental Studies & Value Education only) (External)

75 Multiple choice questions will be asked from five units (75 x 1=75 Marks**)**

(15MCQ's from each unit)

Minimum Marks for a Pass

40% of the aggregate (Internal +Summative Examinations).
No separate pass minimum for the Internal Examinations.
27 marks out of 75 is the pass minimum for the Summative Examinations.

VISION

Department of Chemistry undertakes to aspires young adult to excel in Chemical Education, Research and Services to contribute to a chemically literate society through teaching, scholarship and service.

MISSION

To produce employable graduates in various areas and demonstrate science as a human endeavor and as a way to understand the natural world

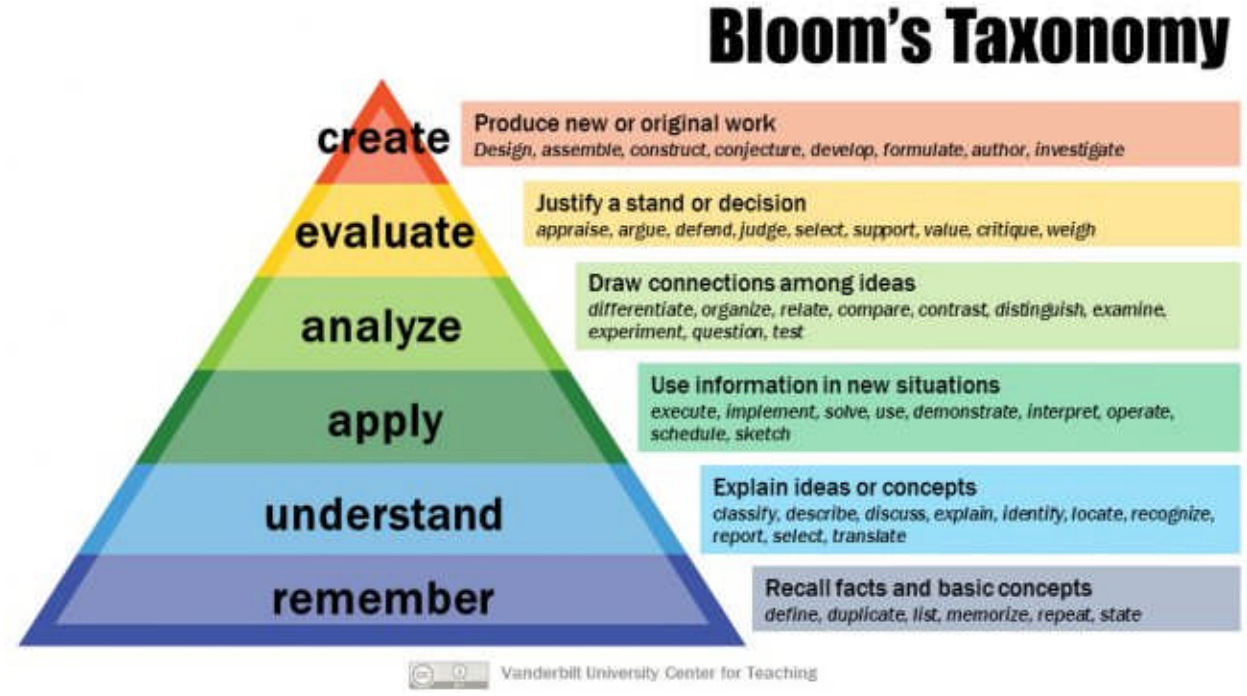
The 12 Graduate Attributes*:

1. (KB) A knowledge base for engineering: Demonstrated competence in university level mathematics, natural sciences, engineering fundamentals, and specialized engineering knowledge appropriate to the program.
2. (PA) Problem analysis: An ability to use appropriate knowledge and skills to identify, formulate, analyze, and solve complex engineering problems in order to reach substantiated conclusions
3. (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.
4. (Des.) Design: An ability to design solutions for complex, open-ended engineering 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.
5. (Tools) Use of engineering tools: An ability to create, select, apply, adapt, and extend appropriate techniques, resources, and modern engineering tools to a range of engineering activities, from simple to complex, with an understanding of the associated limitations.
6. (Team) Individual and teamwork: An ability to work effectively as a member and leader in teams, preferably in a multi-disciplinary setting.
7. (Comm.) Communication skills: An ability to communicate complex engineering concepts within the profession and with society at large. Such ability includes reading, writing, speaking and listening, and the ability to comprehend and write effective reports and design documentation, and to give and effectively respond to clear instructions.
8. (Prof.) Professionalism: An understanding of the roles and responsibilities of the professional engineer in society, especially the primary role of protection of the public and the public interest.
9. (Impacts) Impact of engineering on society and the environment: An ability to analyze social and environmental aspects of engineering activities. Such ability includes an understanding of the interactions that engineering has with the economic, social, health, safety, legal, and

cultural aspects of society, the uncertainties in the prediction of such interactions; and the concepts of sustainable design and development and environmental stewardship.

10. (Ethics) Ethics and equity: An ability to apply professional ethics, accountability, and equity.
11. (Econ.) Economics and project management: An ability to appropriately incorporate economics and business practices including project, risk, and change management into the practice of engineering and to understand their limitations.
12. (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

WA	Graduate Attributes	Caption as
1	Disciplinary Knowledge	KB
2, 3	Problem Analysis & Investigation	PA & Inv.
7, 4	Communication Skills & Design	Comm. & Des.
6	Individual and Team Work	Team
8, 10	Professionalism, Ethics and Equity	Prof. & Ethics
12	Digital Literacy & Life-long Learning	LL



PROGRAM EDUCATIONAL OBJECTIVES (PEOs) **On completion of the Programme, the Student will be able to**	
PEO1:	Enhance the students to nurture the requirements of industries/laboratories related to chemistry including pharmaceutical/analytical chemistry.
PEO2:	Enable the students to demonstrate information literacy skills for acquiring knowledge of chemistry, as a chemist/researcher and also as a life-long learner.
PEO3:	Develop the students to communicate effectively the scientific and research information in both written and oral formats, to both professional scientists and to the public.
PEO4:	Collaborate with Industry and Alumni to explore the new avenues in respective domains and raise the employability ratio.
PEO5:	Adhere towards the ethical and environmental sustainability to create morally upright and empowered citizens to face industry/ institution.
PEO6:	Nurture environmental awareness and develop communal harmony in respective of national integration.

B.Sc., PROGRAMME OUTCOMES

At the end of the programme, the students will be able to

S.No	**PROGRAMME OUTCOMES (POs)**	**Graduate Attributes**
PO1:	Demonstrate about the knowledge and understanding of Science concepts and its relevant fields.	**Disciplinary Knowledge**
PO2:	Communicate the known concepts effectively within the profession and with any forum	**Communication Skills**
PO3:	Use ICT tools in various learning situations, related information sources, suitable software to analyze data and furthermore participating in learning activities throughout life to meet the demands of work place through knowledge /up-skilling / re-skilling	**Digital Literacy & Life-long Learning**
PO4:	Employ critical and analytical thinking in understanding the concepts and apply them in various problems appearing in different branches of Science and in competitive examinations in various sectors.	**Analytical Reasoning & Critical Thinking**
PO5:	Identify, formulate, analyse complex problems and reach valid conclusions using the methodologies of Science.	**Problem Solving**
PO6:	Function successfully as a member/leader in any team and to apply ethics, accountability and equity in their life.	**Team Work and Moral/Ethical Awareness**

S.No.	Graduate Attributes	PROGRAM SPECIFIC OUTCOME (PSOs)
PSO1:	Knowledge Base	Learn various concepts of organic, inorganic, physical chemistry, their biological aspects and their application in day-to-day life.
PSO2:	Problem Analysis & Investigation	Design towards executing experiments and confident handling of equipment's in Chemistry for industries.
PSO3:	Communication Skills & Design	Execute new ideas in the field of research and development using principles and techniques of science learned through activities such as expert lecturers, workshops, seminars and field projects.
PSO4:	Professionalism, Ethics and Equity	Aspire the knowledge of green environment learned through green chemistry and pollution free scenario
PSO5:	Individual & Team Work	Work effectively with a set of teams using modern technical skills and innovative research ideas in Chemistry areas
PSO6:	Lifelong learning	Develop employability and entrepreneurship skills learned through industry-based curriculum

MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous), Pasumalai

B.Sc., CHEMISTRY Curriculum

(For the student admitted during the academic year 2021-2022 onwards)

Course Code	Title of the Course	Hrs	Credits	Maximum Marks		
				Int	Ext	Total
FIRST SEMESTER						
Part – I	**Tamil / Alternative Course**					
21UTAG11	இக்காலக் கவிதையும் நாடகமும்	6	3	25	75	100
Part – II	**English**					
21UENG11	Communicative English - I	6	3	25	75	100
Part - III	**Core Courses**					
21UCHC11	Inorganic Chemistry -I	4	4	25	75	100
21UCHCP1	Major Chemistry Practical – I (Inorganic Semi Micro-Qualitative analysis)	2	-	-	-	
Part III	**Allied Course**					
21UPHA11	Allied Physics – I	4	4	25	75	100
21UPHAP1	Allied Physics Practical – I	2	-	-	-	-
Part IV	**Skill Based Course**					
21UCHS11	Cosmetic Chemistry	2	2	25	75	100
21UCHS12	Green Chemistry	2	2	25	75	100
Part IV	**Mandatory Course**					
21UEVG11	Environmental Studies	2	2	25	75	100
	Total	**30**	**20**	**175**	**525**	**700**
SECOND SEMESTER						
Part – I	**Tamil / Alternative Course**					
21UTAG21	இடைக்கால இலக்கியமும் சிறுகதையும்	6	3	25	75	100
Part – II	**English**					
21UENG21	Communicative English -II	6	3	25	75	100
Part - III	**Core Courses**					
21UCHC21	Organic Chemistry -I	4	4	25	75	100
21UCHCP1	Major Chemistry Practical – I (Inorganic Semi Micro-Qualitative analysis)	2	2	40	60	100
Part III	**Allied Course**					
21UPHA21	Allied Physics – II	4	4	25	75	100
21UPHAP1	Allied Physics Practical – I	2	1	40	60	100
Part IV	**Skill Based Course**					
21UCHS21	Dairy Chemistry	2	2	25	75	100
21UCHS22	Dye Chemistry	2	2	25	75	100
Part IV	**Mandatory Course**					
21UVLG21	Value Education	2	2	25	75	100
	Total	**30**	**23**	**255**	**645**	**900**

THIRD SEMESTER						
Part – I	**Tamil / Alternative Course**					
21UTAG31	காப்பிய இலக்கியமும் உரைநடையும்	6	3	25	75	100
Part – II	**English**					
21UENG31	Communicative English -III	6	3	25	75	100
Part - III	**Core Courses**					
21UCHC31	Physical Chemistry – I	4	4	25	75	100
21UCHC32	Inorganic Chemistry – II	4	4	25	75	100
21UCHCP2	Major Chemistry Practical – II (Volumetric Analysis)	2	-	-	-	
Part III	**Allied Course**					
21UMCA31 / 21UMBA31	Allied Mathematics – I / Allied Microbiology – I	6	4	25	75	100
Part IV	**Non-Major Elective Course**					
21UCHN31	Chemistry in Everyday Life	2	2	25	75	100
	Total	**30**	**20**	**150**	**450**	**600**
FOURTH SEMESTER						
Part – I	**Tamil / Alternative Course**					
21UTAG41	பண்டைய இலக்கியமும் புதினமும்	6	3	25	75	100
Part – II	**English**					
21UENG41	Communicative English -IV	6	3	25	75	100
Part - III	**Core Courses**					
21UCHC41	Organic Chemistry – II	4	4	25	75	100
21UCHC42	Physical Chemistry – II	4	4	25	75	100
21UCHCP2	Major Chemistry Practical – II (Volumetric Analysis)	2	2	40	60	100
Part III	**Allied Course**					
21UMCA41 / 21UMBA41	Allied Mathematics – II / Allied Microbiology – II	6	4	25	75	100
Part IV	**Non-Major Elective Course**					
21UCHN41	Waste Water Treatment	2	2	25	75	100
Part V	**Extension Activities**					
21UEAG40-21UEAG49	NSS, NCC, YRC	-	1	100	-	100
	Total	**30**	**23**	**290**	**510**	**800**
FIFTH SEMESTER						
Part - III	**Core Courses**					
21UCHC51	Organic Chemistry – III	6	5	25	75	100
21UCHCP3	Major Chemistry Practical – III (Gravimetric Analysis and Organic Preparation)	6	5	40	60	100
21UCHCP4	Major Chemistry Practical – IV (Physical Chemistry experiments)	3	-	-	-	-
21UCHCP5	Major Chemistry Practical – V (Organic Analysis and Estimation)	3	-	-	-	-
Part III	**Core Elective**					

21UCHE51	Inorganic and Analytical Chemistry	5	5	25	75	100
21UCHE52	Bioinorganic Chemistry	5	5	25	75	100
Part IV	**Skill Based Course**					
21UCHS51	Drug Chemistry	2	2	25	75	100
	Total	**30**	**22**	**140**	**360**	**500**
SIXTH SEMESTER						
Part - III	**Core Courses**					
21UCHC61	Physical Chemistry – III	6	5	25	75	100
21UCHCP4	Physical Chemistry experiments (Practical)	3	5	40	60	100
21UCHCP5	Organic Analysis and Estimation (Practical)	3	5	40	60	100
21UCHCPR1	PROJECT	6	5	40	60	100
Part III	**Core Elective Courses**					
21UCHE61	Industrial Chemistry	5	5	25	75	100
21UCHE62	Nano Chemistry	5	5	25	75	100
Part IV	**Skill Based Course**					
21UCHS61	Polymer Chemistry	2	2	25	75	100
	Total	**30**	**32**	**220**	**480**	**700**
	Grand Total	**180**	**140**	**1230**	**2970**	**4200**

Semester	Sub Code	List of Elective Courses
SEM V	21UCHE51	Inorganic and Analytical Chemistry
SEM V	21UCHE52	Bioinorganic Chemistry
SEM V	21UCHE53	Forensic Chemistry
SEM VI	21UCHE61	Industrial Chemistry
SEM VI	21UCHE62	Nano Chemistry
SEM VI	21UCHE63	Pharmaceutical Chemistry


FIRST SEMESTER

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)
DEPARTMENT OF CHEMISTRY
(For those who joined in 2021-2022 and after)

Course Name	**INORGANIC CHEMISTRY – I**							
Course Code	21UCHC11					**L**	**P**	**C**
Category	**Core**					4	-	4
Nature of course:	EMPLOYABILITY	✓	SKILL ORIENTED		ENTREPRENURSHIP			✓

Course Objectives:

- To Recall the structure of atom and also know the various model of an atom for the structure of the atoms.
- To Remember the basics of periodic table and atomic properties to relate their principles
- To Compare the types of bonds to relate their relations between them.
- To Perform the chemical bonding and VSEPR theory and their applications to find the geometry of molecules.
- To Determine the various concepts on Acids and Bases and also know the positions of hydrogen and its properties.

Unit: I	**STRUCTURE OF ATOM**	12

An outline of constituents of atom (elementary idea) – Rutherford model of an atom - Mosley's determination of atomic number – mass number. Quantum theory: Black body radiation – photo electric effect – Compton effect – Bohr model of atom: postulate and hydrogen spectrum – de Broglie's equations – Heisenberg's uncertainty principle – Quantum numbers – Pauli's exclusion principle – Aufbau principle – Hund's rule – electronic configuration of atoms.

Unit: II	**PERIODIC TABLE AND ATOMIC PROPERTIES**	12

The long form of periodic table- periodic law and electronic configuration of elements- Horizontal and vertical relationship. Atomic properties- Size of atom- Atomic Volumes - Ionisation energy- electron affinity- Electronegativity- Different scales- Diagonal relationship- Classification of elements on the basis of their electronic configuration- (further extension of periodic table).

Unit: III	**CHEMICAL BONDING**	12

Cause of chemical bonding – octet rule – ionic bond – covalent bond – valence bond approach- its limitations – Fajan's rule – VSEPR theory and its limitations – application of VSEPR theory to find geometry of molecules (NH_3 and H_2O) – hybridization – sp, sp^2, sp^3, sp^3d^2 and (BeF_2, BCl_3, CH_4, SF_6, H_2O) –Molecular Orbital theory – LCAO method – MO diagram for homo nuclear and hetero nuclear diatomic molecules – H_2, He_2, Li_2, Be_2, C_2, N_2, O_2, F_2, CO and HF – determination of magnetic property and bond order

Unit: IV	**ACIDS AND BASES**	12

Arrhenius concept-Lowry Bronsted –Lewis concepts-Lux Flood solvent system concepts - Usonowich concept. Factors influencing the acidic and basis properties (steric effect, +I and –I effect, resonance effect and electronegativity effect). Oxo acids and strength of oxo acids.

Unit: V	**HYDROGEN, OZONE AND HYDROGEN PEROXIDE**	12

Hydrogen: Position of hydrogen in periodic table – resemblance of hydrogen with alkali metals – resemblance with halogens – special position of hydrogen – resemblance with carbon – preparation – manufacture – pure hydrogen – ortho and para hydrogen – occluded hydrogen – uses – Isotopes

of hydrogen – Isotopic effect – hydrides – classification – examples. **Ozone**: Commercial preparation, properties, uses, structure. **Hydrogen peroxide**: Manufacture – properties – structure and uses – estimation by permanganometric and iodimetric method – strength of hydrogen peroxide.

	Total Lecture Hours	**60 Hrs**

Books for Study:

1. B.R. Puri, L.R.Sharma & K.C. Kalia, **Principles of Inorganic Chemistry** Milestone Publisher 31st edition, New Delhi 2013

Books for References:

1. Puri, Sharma & Kalia, **Principles of Inorganic Chemistry** Milestone publisher & distributor, New Delhi 2009.
2. R. D Madan S.Chand, **Modern Inorganic Chemistry** band Co.Ltd, New Delhi 2012.
3. J D.Lee, Wiley India, **Concise Inorganic Chemistry** 5th Edition, New Delhi 2009.

Web Resources:

1. https://bit.ly/3tu7P32
2. https://bit.ly/2Qev0Ac
3. https://bit.ly/3bRnjs6
4. https://bit.ly/30R8dww

Course Outcomes		**K Level**
On the completion of the course the student will be able to		
CO1:	Recall the general characteristics of sub atomic particles of an atom and periodicity	[Up to K2]
CO2:	Discuss the long form periodic table, types of chemical bonds and concept of Acids and Bases.	[Up to K3]
CO3:	Prepare the hydrogen, ozone and hydrogen peroxide and compute the properties with alkali metals	[Up to K3]
CO4:	Examine the Quantum model of an atom and VSEPR theory to find the geometry of molecules	[Up to K4]
CO5:	Apply various types of bonds and quantum model of atom for the geometry of molecules	[Up to K4]

CO & PO Mapping:

Course Outcomes (COs)	**Programme Outcomes (POs)**					
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**
CO 1	**3**	**1**	**2**	**3**	**1**	**2**
CO 2	**1**	**3**	**1**	**1**	**2**	**3**
CO 3	**2**	**2**	**3**	**2**	**3**	**3**
CO 4	**3**	**1**	**2**	**2**	**1**	**2**
CO5	**1**	**3**	**2**	**3**	**2**	**1**
Weightage	**10**	**10**	**10**	**11**	**9**	**11**

***3 –** Advanced Application; **2 –** Intermediate Development; **1 -** Introductory Level

LESSON PLAN

Unit	Course Name	Hrs	Pedagogy
I	**STRUCTURE OF ATOM** An outline of constituents of atom (elementary idea) – Rutherford model of an atom – Mosley's determination of atomic number – mass number. Quantum theory: Black body radiation – photo electric effect – Compton effect – Bohr model of atom: postulate and hydrogen spectrum – de Broglie's equations – Heizenberg's uncertainty principle – Quantum numbers – Pauli's exclusion principle – Aufbau principle – Hund's rule – electronic configuration of atoms.	**12**	**Chalk, Talk & Power point**
II	**PERIODIC TABLE AND ATOMIC PROPERTIES** The long form of periodic table- periodic law and electronic configuration of elements- Horizontal and vertical relationship. Atomic properties- Size of atom- Atomic Volumes - Ionisation energy- electron affinity- Electronegativity- Different scales- Diagonal relationship- Classification of elements on the basis of their electronic configuration - (further extension of periodic table).	**12**	**Chalk, Talk & Power point**
III	**CHEMICAL BONDING** Cause of chemical bonding – octet rule – ionic bond – covalent bond – valence bond approach- its limitations – Fajan's rule – VSEPR theory and its limitations – application of VSEPR theory to find geometry of molecules (NH_3 and H_2O) – hybridization – sp, sp^2, sp^3, sp^3d^2 and (BeF_2, BCl_3, CH_4, SF_6, H_2O)- Molecular Orbital theory – LCAO method – MO diagram for homo nuclear and hetero nuclear diatomic molecules – H_2, He_2, Li_2, Be_2, C_2, N_2, O_2, F_2, CO and HF – determination of magnetic property and bond order	**12**	**Chalk, Talk & Power point**
IV	**ACIDS AND BASES** Arrhenius concept-Lowry Bronsted –Lewis concepts-Lux Flood solvent system concepts -Usonowich concept. Factors influencing the acidic and basis properties (steric effect, +I and –I effect, resonance effect and electronegativity effect). Oxo acids and strength of oxo acids.	**12**	**Chalk, Talk & Power point**
V	**HYDROGEN, OZONE AND HYDROGEN PEROXIDE** **Hydrogen**: Position of hydrogen in periodic table – resemblance of hydrogen with alkali metals – resemblance with halogens – special position of hydrogen – resemblance with carbon – preparation – manufacture – pure hydrogen – ortho and para hydrogen – occluded hydrogen – uses – Isotopes of hydrogen – Isotopic effect – hydrides – classification – examples. **Ozone**: Commercial preparation, properties, uses, structure. **Hydrogen peroxide**: Manufacture – properties – structure and uses – estimation by permanganometric and iodimetric method – strength of hydrogen peroxide.	**12**	**Chalk, Talk & Power point**

Course Designed by: **Dr. V. Ramasamy Raja & Dr. J.E. Sangeetha**

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)								
Internal	**Cos**	**K Level**	**Section A**		**Section B**		**Section C Either or Choice**	**Section D Open Choice**
			MCQs		**Short Answers**			
			No. of. Questions	**K – Level**	**No. of. Questions**	**K - Level**		
CI AI	**CO1**	**Up to K2**	**2**	K1 & K2	1	K1	2 (K2&K2)	1(K2)
	CO2	**Up to K3**	**2**	K1 & K2	2	K2	2 (K3&K3)	2(K2 & K3)
CI AII	**CO3**	**Up to K2**	**2**	K1 & K2	1	K2	2 (K2&K2)	1(K2)
	CO4	**Up to K4**	**2**	K1 & K2	2	K2	2 (K3&K3)	2(K3 &K4)
Question Pattern CIA I & II		No. of Questions to be asked	4		3		4	3
		No. of Questions to be answered	4		3		2	2
		Marks for each question	1		2		5	10
		Total Marks for each section	4		6		10	20

Distribution of Marks with K Level CIA I & CIA II								
	K Level	**Section A (Multiple Choice Questions)**	**Section B (Short Answer Questions)**	**Section C (Either / Or Choice)**	**Section D (Open Choice)**	**Total Marks**	**% of (Marks without choice)**	**Consolidate of %**
CIA I	**K1**	**2**	**2**	**-**	**-**	**4**	**6.67**	**67**
	K2	**2**	**4**	**10**	**20**	**36**	**60**	
	K3	**-**	**-**	**10**	**10**	**20**	**33.33**	**33**
	K4	**-**	**-**	**-**	**-**	**-**	**-**	**-**
	Marks	**4**	**6**	**20**	**30**	**60**	**100**	**100**
CIA II	**K1**	**2**	**2**	**-**	**-**	**4**	**6.67**	**50**
	K2	**2**	**4**	**10**	**10**	**26**	**43.33**	
	K3	**-**	**-**	**10**	**10**	**20**	**33.33**	**33**
	K4	**-**	**-**	**-**	**10**	**10**	**16.67**	**17**
	Marks	**4**	**6**	**20**	**30**	**60**	**100**	**100**

K1- Remembering and recalling facts with specific answers
K2- Basic understanding of facts and stating main ideas with general answers
K3- Application oriented- Solving Problems
K4- Examining, analyzing, presentation and make inferences with evidences
CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)								
S.No	Cos	K - Level	MCQs		Short Answers		Section C (Either / or Choice)	Section D (Open Choice)
			No. of Questions	K – Level	No. of Question	K – Level		
1	CO1	Up to K 2	2	K1,K2	1	K1	2 (K2&K2)	1(K2)
2	CO2	Upto K 3	2	K1&K2	1	K1	2 (K3&K3)	1(K3)
3	CO3	Up to K 3	2	K1&K2	1	K2	2 (K3&K3)	1(K3)
4	CO4	Up to K 4	2	K1&K2	1	K2	2 (K3&K3)	1(K4)
5	CO5	Up to K 4	2	K1&K2	1	K2	2 (K3&K3)	1(K4)
No. of Questions to be Asked			10		5		10	5
No.of Questions to be answered			10		5		5	3
Marks for each question			1		2		5	10
Total Marks for each section			10		10		25	30
(Figures in parenthesis denotes, questions should be asked with the given K level)								

Distribution of Marks with K Level							
K Level	Section A (Multiple Choice Questions)	Section B (Short Answer Questions)	Section C (Either/ or Choice)	Section D (Open Choice)	Total Marks	% of (Marks without choice)	Consolidated %
K1	**5**	**4**	-	-	**9**	**7.5**	33
K2	5	6	10	10	31	25.83	
K3	-	-	40	20	60	50	50
K4	-	-	-	20	20	16.67	17
Marks	10	10	50	50	120	100	100
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.							

Summative Examinations - Question Paper – Format

Section A (Multiple Choice Questions) Answer All Questions (10x1=10 marks)			
Q.No	CO	K Level	Questions
1	CO1	K1	
2	CO1	K2	
3	CO2	K1	
4	CO2	K2	
5	CO3	K1	
6	CO3	K2	
7	CO4	K1	
8	CO4	K2	

9	CO5	K1	
10	CO5	K2	
Section B (Short Answers) **Answer All Questions**			**(5x2=10 marks)**
Q.No	**CO**	**K Level**	**Questions**
11	CO1	K1	
12	CO2	K1	
13	CO3	K2	
14	CO4	K2	
15	CO5	K2	
Section C (Either/Or Type) **Answer All Questions**			**(5 x 5 = 25 marks)**
Q.No	**CO**	**K Level**	**Questions**
16) a	CO1	K2	
16) b	CO1	K2	
17) a	CO2	K3	
17) b	CO2	K3	
18) a	CO3	K3	
18) b	CO3	K3	
19) a	CO4	K3	
19) b	CO4	K3	
20) a	CO5	K3	
20) b	CO5	K3	
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels			
Section D (Open Choice) **Answer Any Three questions**			**(3x10=30 marks)**
Q.No	**CO**	**K Level**	**Questions**
21	CO1	K2	
22	CO2	K3	
23	CO3	K3	
24	CO4	K4	
25	CO5	K4	

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)
DEPARTMENT OF CHEMISTRY
(For those who joined in 2021-2022 and after)

Course Name	**MAJAOR CHEMISTRY PRACTICAL – I (Inorganic Semi Micro – Qualitative Analysis)**			
Course Code	21UCHCP1	**L**	**P**	**C**
Category	**Core**		2	-

Nature of course:	EMPLOYABILITY	✓	SKILL ORIENTED	✓	ENTREPRENURSHIP	✓

Course Objectives:

- To Recall the basic properties of salt mixtures.
- To Reminiscence the anionic and cationic species in the salt mixtures.
- To Apply the concept of anionic and cationic species in semi micro qualitative analysis.
- To Execute the confirmation test for the anions and cations present in the salt mixtures.
- To Construct four radicals with correct procedure during analysis of the salt mixtures.

Duration of examination: 3hrs

Analysis of a mixture containing two anions of which one is an interfering in semi-micro method two cations

30

Anions:

Carbonate, sulphate, nitrate, fluoride, chloride, bromide, iodide, oxalate, Borate, phosphate and chromate.

Cations: Lead, bismuth, copper, cadmium, antimony, iron (II and III), aluminium, Chromium, zinc, manganese, cobalt, nickel, barium, calcium, Magnesium and ammonium.

Distribution of marks

Max marks: 100

Internal : 40 marks			**External : 60 marks**		
Laboratory Performance	:	30 marks	Vivo voce	:	10 marks
Observation note book	:	10 marks	Record note book	:	10 marks
			Four radicals with correct procedure	:	40 marks
Total	:	40 marks	Total	:	60 marks

Total Lecture Hours **30**

		Hrs

Books for Study:

1. Dr. V. V. Ramanujam, Inorganic Semimicro Qualitative Analysis, National Publishing Company, 3rd edition, Chennai, 1974.

Books for References:

1. Vogel, Text book of Qualitative Analysis including Semi Micro Methods, Longman Sc & Tech, 2008.

Web Resources:

1. https://www.youtube.com/watch?v=cEOvj6jkdDw
2. https://www.youtube.com/watch?v=T3hi_xEpaDg
3. https://www.youtube.com/watch?v=BK7rf4XE4f8
4. https://www.youtube.com/watch?v=QQo1e-BUZWs

Course Outcomes:		**K Level**
On the completion of the course the student will be able to		
CO1:	Identify the basic radical and its group in the given salt mixture.	[Up to K2]
CO2:	Understand the qualitative analysis skill of any given inorganic salt mixture.	[Up to K3]
CO3:	Develop the acid radicals present in the given inorganic salt mixture.	[Up to K3]
CO4:	Analyze the basic radical systematically.	[Up to K4]
CO5:	Apply the four radicals with correct procedure during analysis of the salt mixtures	[Up to K4]

CO & PO Mapping:

Course Outcomes (COs)	**Programme Outcomes (POs)**					
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**
CO 1	**3**	**1**	**2**	**3**	**1**	**2**
CO 2	**1**	**3**	**1**	**1**	**2**	**3**
CO 3	**2**	**2**	**3**	**2**	**3**	**3**
CO 4	**3**	**1**	**2**	**2**	**1**	**2**
CO5	**2**	**3**	**1**	**3**	**2**	**1**
Weightage	**11**	**10**	**9**	**11**	**9**	**11**

***3 –** Advanced Application; **2 –** Intermediate Development; **1** - Introductory Level

LESSON PLAN

UNIT	INORGANIC SEMI MICRO – QUALITATIVE ANALYSIS	Hrs	Mode
I	**Duration of examination**: 3hrs Analysis of a mixture containing two anions of which one is an interfering in semi-micro method two cations **Anions:** Carbonate, sulphate, nitrate, fluoride, chloride, bromide, iodide, oxalate, Borate, phosphate and chromate. **Cations:** Lead, bismuth, copper, cadmium, antimony, iron (II and III), aluminium, Chromium, zinc, manganese, cobalt, nickel, barium, calcium, Magnesium and ammonium.	**30**	**Practical**

Course Designed by: **Dr. V. Ramasamy Raja & Dr. R. Satheesh**

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)
DEPARTMENT OF CHEMISTRY
(For those who joined in 2021-2022 and after)

Course Name	**ALLIED PHYSICS–I: Mechanics, Properties of Matter, Heat and Sound**			
Course Code	**21UPHA11**	**L**	**P**	**C**
Category	**Allied**	4	-	4

Nature of course:	EMPLOYABILITY	✓	SKILL ORIENTED	✓	ENTREPRENURSHIP	

Course Objectives:

The learners will be able:

1. To recollect Newton's law of motion
2. To understand the elasticity property and types of modulus
3. To understand the viscosity and application of Bernoulli's theorem
4. To recollect Kinetic theory of gases
5. To understand the concepts of S.H.M

Unit: I	***Mechanics***	**13**

Torque – Angular momentum –Moment of Inertia –Perpendicular and Parallel axes theorem - Kepler's law of planetary motion - Newton's laws of gravitation–Mass and density of Earth – Boy's method for G–Compound pendulum-Expression for period-Experiment to find "g"

Unit: II	***Elasticity***	**12**

Stress and Strain - Elasticity–Different moduli of Elasticity-Poisson's ratio–Bending of beams–Expression for bending moment–Determination of Young's modulus by uniform and non uniform bending–Torsion–Expression for couple per unit twist–Work done in twisting - Torsional oscillations of a body - Workdone in twisting– Rigidity modulus by torsion pendulum

Unit: III	***Viscosity***	**11**

coefficient of viscosity -Derivation of Poiseuille's formula - coefficient of viscosity of a liquid by Poiseuille's method – Equation of continuity-Bernoulli's theorem–derivation–Applications of Bernoulli's theorem (Venturimeter and Pitot tube).

Unit: IV	***Heat***	**12**

Kinetic theory of gases – Mean free path – Transport phenomena – Expression for the coefficient of Diffusion, viscosity and thermal conductivity – Degree of freedom – Boltzman's law of equipartition of energy – calculation of Υ for mono atomic and diatomic gases - Thermodynamics – First and second laws of thermodynamics (statement only) – Entropy – change of entropy in Carnot's cycle – Change of entropy in conversion of ice into stream

Unit: V	***Sound***	**12**
Simple harmonic motion – Composition of two S.H.M's of equal time periods at right angles – Stationary waves – Properties of stationary waves – Melde's experiment for the frequency of electrically maintained tuning fork (Transverse and Longitudinal modes) - Ultrasonics – Production –Piezoelectric method – Detection – Kundt's tube and Piezoelectric - Properties –Applications		
	Total Lecture Hours	**60 Hrs**

Books for Study:

1. R.Murugesan,Mechanics,Properties of Matter and Sound, Madurai, first edition,July2016.[B.Sc.AncillaryPhysics
   - Unit–I: 1.1, 2.1–2.7, 2.13-2.15, 3.1-3.5
   - Unit–II: 4.1-4.5, 4.7,4.8,4.10-4.13
   - Unit–III: 5.2-5.7 -
   - Unit-V: 6.1, 6.3,6.4, 6.7-6.9, 6.12
   - R..Murugeshan, Thermal Physics, Madurai, First edition June2012
   - Unit–IV: 6.1, 6.3-6.7, 6.9-6.11, 7.4-7.7

Books for References:

1. S.L.Kakani,C.Hemarajani,S.Kakani,**Mechanics**,IIIedition,VivaBooks Ltd,NewDelhi,2011.
2. HalidayResnic,JearlWalker,**PrinciplesofPhysics**,9th Edition,WileyIndia Pvt.Ltd, New Delhi, 2012.
3. D.S.Mathur,**Mechanics**,S.ChandandCo.,NewDelhi,2008
4. Brijlaland N.Subramanyam, **Propertiesofmatter**,S.ChandandCo., New Delhi,2004
5. BrijlalandN.Subramanyam,**HeatandThermodynamics**, S.Chandand Co, New Delhi, 2004.

Web Resources:

1. https://latestcontents.com/bsc-physics-mechanics-notes/
2. www.khanacademy.org/science/physics/elasticity/surface tension
3. https://www.askiitians.com/revision-notes/physics/kinetic-theory-of-gases/
4. https://www.askiitians.com/revision-notes/physics/thermodynamics/

Course Outcomes		**K Level**
After successful completion of the course, the student is expected to		
CO1:	Understand the concepts of Newton's law of Gravitation, different modulus of elasticity, mean free path, degrees of freedom, laws of thermodynamics and stationary waves	**K2**
CO2:	Define centripetal and centrifugal force, angular velocity, moment of inertia, elasticity, Poisson's ratio, bending of beams, Bernouli's theorem, Transport Phenomena, mono and diatomic gases, S.H.M, properties of Ultrasonic waves	**K3**
CO3:	Apply torque, angular momentum, expression for bending of moment, couple per unit twist, Bernouli's theorem, Boltzmann's law of equipartition of energy, change of entropy in conversion of ice to steam, applications of Ultrasonic	**K3**

	waves	
CO4:	Analyze parallel and perpendicular axis theorem, Boy's method for G, determine and analyze uniform and non-uniform bending, Poiseuille's formula to find the coefficient viscosity of liquid	**K4**
CO5:	Analyze the change of entropy in Carnot's cycle , Kundt's tube and Piezo electric method for the production of Ultrasonic waves, Melde's experiment for the frequency of tuning fork	**K4**

CO & PO Mapping:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	2	2	2	2	2
CO 2	3	2	1	2	2	2
CO 3	3	2	2	2	2	2
CO 4	3	2	2	1	2	2
CO 5	2	2	1	1	2	2

***3 –** Advanced Application; **2 –** Intermediate Development; **1 -** Introductory Level

LESSON PLAN

Unit	ALLIEDPHYSICS–I Mechanics, Properties of Matter, Heat and Sound	Hrs	Pedagogy
I	**Mechanics** Torque – Angular momentum –Moment of Inertia –Perpendicular and Parallel axes theorem - Kepler'slawsofplanetarymotion-Newton'slawsofgravitation–Massanddensityof Earth–Boy's method for G–Compound pendulum-Expression for period-Experiment to find "g"	13	Lecture method, PPT, Demonstration
II	**Elasticity** Different moduli of Elasticity-Poisson'sratio–Bendingofbeams–Expression for bending moment–Determination of Young's modulus by uniform and non uniform bending – Torsion–Expression for couple per unit twist – Workdone in twisting Torsional oscillations of a body - Workdone in twisting– Rigidity modulus by torsion pendulum	**12**	Lecture method, PPT, Demonstration
III	**Viscosity** Viscosity - Derivation of Poiseuille's formula - coefficient of viscosity of a liquid by Poiseuille's method – Equation of continuity - Bernoulli's theorem – derivation – Applications of Bernoulli's theorem (Venturimeter and Pitot tube)	**11**	Lecture method, PPT, Model
IV	**Heat** Kinetic theory of gases – Mean free path – Transport phenomena – Expression for the coefficient of Diffusion, viscosity and thermal	**12**	Lecture method, PPT

	conductivity – Degree of freedom – Boltzman's law of equipartition of energy – calculation of ϒ for mono atomic and diatomic gases - Thermodynamics – First and second laws of thermodynamics (statement only) – Entropy – change of entropy in Carnot's cycle – Change of entropy in conversion of ice into stream		
V	**Sound** Simple harmonic motion –- Composition of two S.H.M's of equal time periods at right angles - Stationary waves –Properties of stationary waves – Melde's experiment for the frequency of electrically maintained tuning fork (Ttransverse and Longitudinal modes) - Ultrasonics – Production – Piezo electric method – Detection – Kundt's tube and Piezo electric - Properties – Applications	**12**	Lecture method, PPT

Course Designed by: **1. Mrs.A.Lakshmi, 2. Dr.S.S.Jayabalakrishnan**

Learning Outcome Based Education & Assessment (LOBE)
Formative Examination - Blue Print
Articulation Mapping – K Levels with Course Outcomes (COs)

Internal	COs	K - Level	Unit	Section A		Section B		Section C (Either or Choice)		Section D (Open Choice)	
				MCQs		Short Answers					
				No. of. Questions	K - Level	No. of. Questions	K - Level	No. of. Questions	K - Level	No. of. Questions	K - Level
CI AI	CO1 to CO5	K1 to K4	I	2	K1 & K2	1	K1	2	K2	1	K2
			II	2	K1 & K2	2	K2	2	K3	2	K3
CI AII	CO1 to CO5	K1 to K4	III	2	K1 & K2	1	K2	2	K3	1	K3
			IV	2	K1 & K2	2	K2	2	K4	2	K4
Question Pattern CIA I & II		No. of Questions to be asked		4		3		4		3	
		No. of Questions to be answered		4		3		2		2	
		Marks for each question		1		2		5		10	

	Total Marks for each section	4		6		10	20

Distribution of Marks with K Level CIA I & CIA II								
	K Level	**Section A (Multiple Choice Questions)**	**Section B (Short Answer Questions)**	**Section C (Either / Or Choice)**	**Section D (Open Choice)**	**Total Marks**	**% of (Marks without choice)**	**Consolidate of %**
CIA I	**K1**	2	2			4	6.7	50
	K2	2	4	10	10	26	43.3	
	K3			10	20	30	50.0	50
	K4							-
	Marks	4	6	20	30	60	100	100
CIA II	**K1**	2	2			4	6.7	16.7
	K2	2	4			6	10.0	
	K3			10	10	20	33.3	33.3
	K4			10	20	30	50.0	50
	Marks	4	6	20	30	60	100	100

K1- Remembering and recalling facts with specific answers
K2- Basic understanding of facts and stating main ideas with general answers
K3- Application oriented- Solving Problems
K4- Examining, analyzing, presentation and make inferences with evidences

UNIT-V ***will be allotted for individual Assignment in*** **CO5 - K4** ***level which carries five marks as part of CIA component.***

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)											
S.No.	**COs**	**K - Level**	**Unit**	**MOQs**		**Short Answers**		**Section C (Either / or Choice)**		**Section D (Open Choice)**	
				No.of Questions	**K – Level**	**No.of Questions**	**K – Level**	**No.of Questions**	**K – Level**	**No.of Questions**	**K – Level**
1	**CO1 - CO5**	**K1 to K4**	**I**	2	K1 & K2	1	K1	2	K2 & K2	1	K2
2	**CO1 - CO5**	**K1 to K4**	**II**	2	K1 & K2	1	K1	2	K3 & K3	1	K3
3	**CO1 - CO5**	**K1 to K4**	**III**	2	K1 & K2	1	K2	2	K3 & K3	1	K3
4	**CO1**	**K1**	**IV**	2	K1	1	K2	2	K4 &	1	K4

	- CO5	**to K4**			&K2				K4		
5	**CO1 - CO5**	**K1 to K4**	**V**	2	K1 & K2	1	K2	2	K4 & K4	1	K4
No. of Questions to be Asked				10		5		10		5	
No. of Questions to be answered				10		5		5		3	
Marks for each question				1		2		5		10	
Total Marks for each section				10		10		25		30	

Distribution of Marks with K Level							
K Level	**Section A (Multiple Choice Questions)**	**Section B (Short Answer Questions)**	**Section C (Either/ or Choice)**	**Section D (Open Choice)**	**Total Marks**	**% of (Marks without choice)**	**Consolidated %**
K1	5	4			9	12	47
K2	5	6	10	10	31	34.66	
K3			20	20	40	27	27
K4			20	20	40	26.66	26
Marks	10	10	50	50	120	100	100
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.							

Summative Examinations - Question Paper – Format

Section A (Multiple Choice Questions) **Answer All Questions** **(10x1=10 marks)**			
Q.No	**CO**	**K Level**	**Questions**
1	CO1	K1	
2	CO1	K2	
3	CO2	K1	
4	CO2	K2	
5	CO3	K1	
6	CO3	K2	
7	CO4	K1	
8	CO4	K2	
9	CO5	K1	
10	CO5	K2	
Section B (Short Answers) **Answer All Questions** **(5x2=10 marks)**			

Q.No	CO	K Level	Questions
11	CO1	K1	
12	CO2	K1	
13	CO3	K2	
14	CO4	K2	
15	CO5	K2	
Section C (Either/Or Type) **Answer All Questions** **(5 x 5 = 25 marks)**			
Q.No	**CO**	**K Level**	**Questions**
16) a	CO1	K2	
16) b	CO1	K2	
17) a	CO2	K3	
17) b	CO2	K3	
18) a	CO3	K3	
18) b	CO3	K3	
19) a	CO4	K4	
19) b	CO4	K4	
20) a	CO5	K4	
20) b	CO5	K4	
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels			
Section D (Open Choice) **Answer Any Three questions** **(3x10=30 marks)**			
Q.No	**CO**	**K Level**	**Questions**
21	CO1	**K2**	
22	CO2	**K3**	
23	CO3	**K3**	
24	CO4	**K4**	
25	CO5	**K4**	

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)
DEPARTMENT OF CHEMISTRY
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Course Name	**ALLIED PHYSICS PRACTICAL - I**			
Course Code	**21UPHAP1**	**L**	**P**	**C**
Category	**Allied**		2	

Nature of course:	EMPLOYABILITY	✓	SKILL ORIENTED	✓	ENTREPRENURSHIP	

Course Objectives:

The learners will be able:
1. To gain knowledge about the experiments based on Optics, Electricity and Electronics
2. To demonstrate modulus of elasticity
3. To understand the bending of beam, forward and reverse biasing, frequency responce
4. To understand current conduction in electrical circuits.
5. To learn about transistor amplifier, oscillator and Operational amplifier

LIST OF EXPERIMENTS (Any Fourteen Experiments)

1.. Uniform bending	- (Pin & Microscope)
2. Torsion Pendulum	- Determination of Rigidity modulus and M.I
3. Thermal conductivity of Bad conductor	- Lee's disc
4. Sonometer	- Verification of laws
5. Calibration of low range Voltmeter	- Potentiometer
6. Carey Foster Bridge	- Resistance & resistivity of a wire.
7. Spectrometer	- Refractive indexof a Prism
8..Mirror Galvanometer	- Voltage and current sensitiveness
9.LCR – Series resonance	- Determination of L & Q factor
10.Air wedge	- Thickness of a wire
11.Grating N by λ Normal incidence	- Spectrometer
12.Single stage transistor amplifier	- CE mode
13.Hartley oscillator	- Determination of frequency
14.Logic gates – NAND and NOR	- Using Discrete Components.
15.Zener diode	- Forward & Reverse Characteristics
16.OP AMP	- Adder and Subtractor

Total Practical Hours **30 Hrs**

Books for Study:
2. Srinivasan.M.N.,Balasubramanian.S.,Ranganathan.R., **A Text Book of Practical Physics,** 2017 Edition Sultan Chand & Sons
Books for References:
1. Ouseph.C., Practical Physics and Electronics,2013.S.Viswanathan.P.Ltd **2.** Practical Physics and Electronics, C.C.Ouseph, U.J.Rao, V.Vijayendran, S.Viswanathan Publishers(2007)
Web Resources:
1. https://nptel.ac.in/course.html/physics/experimental physics I, II and III 2. https://nptel.ac.in/courses/115/105/115105110/ 3. https://www.youtube.com/playlist?list=PLuiPz6iU5SQ8-rZn_LgLofRX7n8z4tHYK

Course Outcomes		**K Level**
On successful completion of the course, the learners should be able to		
CO1:	Understand and evaluate the Young's modulus and Rigidity modulus of the given material, the ways to calibrate a low range voltmeter using potentiometer	**K4**
CO2:	Acquire the knowledge of the characteristics of an operational amplifier	**K3**
CO3:	Apply the basic principles of optics to determine the thickness of a wire	**K4**
CO4:	Analyze the electrical parameters like resistance and resistivity using Carrey Foster bridge and characteristics of Zener diode	**K4**
CO5:	Construct Amplifier and Oscillator	**K4**

CO & PO Mapping:

COS	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**
CO 1	**3**	**2**	**3**	**3**	**3**	**2**
CO 2	**2**	**2**	**2**	**2**	**5**	**2**
CO 3	**3**	**3**	**3**	**3**	**3**	**3**
CO 4	**3**	**3**	**3**	**3**	**3**	**2**
CO 5	**3**	**2**	**2**	**3**	**3**	**3**

***3 –** Advanced Application; **2 –** Intermediate Development; **1 -** Introductory Level

LESSON PLAN

Semester	Major Physics Practical - I	Hrs	Pedagogy
I	1. Uniform bending - Pin & Microscope 2. Torsion Pendulum - Determination of Rigidity modulus and M.I 3. Thermal conductivity of Bad conductor - Lee's disc 4. Sonometer - Verification of laws 5. Calibration of low range Voltmeter - Potentiometer 6. LCR – Series resonance - Determination of L & Q factor 7. Logic gates – NAND and NOR - (Discrete Components). 8. Zener diode - Forward & Reverse Characteristics	**30**	Demonstration

Course Designed by: **1. Mrs.A.Lakshmi, 2. Dr.R.Sangeetha**

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)
DEPARTMENT OF CHEMISTRY
(For those who joined in 2021-2022 and after)

Course Name	**COSMETIC CHEMISTRY**							
Course Code	21UCHS11					**L**	**P**	**C**
Category	**Skill**					2	0	2
Nature of course:	EMPLOYABILITY	✓	SKILL ORIENTED	✓	ENTREPRENURSHIP			✓

Course Objectives:

- To Recall the basic properties of soap and detergents and also ingredients on tooth pastes.
- To Remember the preparations of hair care products.
- To Compare the consumer products with their compositions.
- To Execute the composition and physical properties of milk products.
- To Determine the adulterants in food materials and first aid and antidots for poisoned persons.

Unit: I	**COSMETICS I**	06

Dental Preparations: Tooth pastes- ingredients, their characteristics and functions. Mouth washes (Composition only). Soap and Detergents: Manufacture of Soap and Detergents. Cleansing action of Soap. Problems of Detergents as waste water in water resources.

Unit: II	**COSMETICS II**	06

Hair care preparations: shampoo; different types and formulations, Moisturizing creams, perfumes, Lip sticks, shaving creams, after shave preparations. (Composition and applications for the above).

Unit: III	**CONSUMER PRODUCTS**	06

Consumer Products: Composition and Uses of Safety Matches, Agarbattis, Naphthalene Balls, Wax candles, shoe polish, Gum, Ink, Chalk crayons.

Unit: IV	**SUGAR**	06

Preparation of bagasse-use of bagasse for the manufacture of paper and electricity- preparation of alcohol from molasses-preparation of absolute alcohol-manufacture of wine, beer, methylated spirit – power alcohol.

Unit: V	**FOOD ADULTERATION**	06

Food adulteration - Contamination of wheat, rice, dhal, milk, butter, with clay, sand, stone, water and toxic chemicals (e.g., Kasseri dhal with mentanil yellow). Food poisons: natural poisons (alkaloids, nephrotoxins), pesticides (DDT, BHC, Follidol), chemical poisons (KCN). First aid and Antidotes for poisoned persons.

	Total Lecture Hours	**30 Hrs**

Books for Study:

1. Sharma, B.K., Industrial Chemistry, Meerut: GOEL Publishing House, 1st Edition, 2008.
2. Poucher, W.A. Perfumes, Cosmetics and soaps, Vol. III, Modern Cosmetics. Simons, J.V. Chemistry and the beauty business, 2018.

3. K.S. Rangappa and K.T Acharya, Indian Dairy products, Asia Publishing House, New Delhi, 1975.
4. Chopra H.K, Panesar, P.S, "Food Chemistry" Narosa Publishing House, New Delhi, 2010.

Books for Reference:

1. R.V.Shreve, Industrial Chemical Process, Tata McGraw Hill publishing company, 2005, Mumbai.
2. Mohan Malhotra, Latest Cottage Industries, 20th Edition Edn, Vishal publishers, 1980, Meerut.
3. Robert Jenness and S. Patom, Principles of dairy chemistry, Wiley, New York.

Web Resources:

1. https://bit.ly/3rVPCex
2. https://bit.ly/38OFFI8

Course Outcomes:		**K Level**
On the completion of the course the student will be able to		
CO1:	Relate the characteristics of tooth pastes, hair care products.	[Up to K2]
CO2:	Understand the concepts of manufacture of soaps, detergents, hair care and consumer products.	[Up to K3]
CO3:	Compare the milk and sugar products on their composition.	[Up to K3]
CO4:	Correlate the consumer products, sugar and food adulteration.	[Up to K4]
CO5:	Construct the characteristics and understand the consumer products	[Up to K4]

CO & PO Mapping:

Course Outcomes (COs)	**Programme Outcomes (POs)**					
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**
CO 1	**3**	**1**	**2**	**3**	**1**	**2**
CO 2	**1**	**3**	**1**	**1**	**2**	**3**
CO 3	**2**	**2**	**3**	**2**	**3**	**3**
CO 4	**3**	**1**	**2**	**2**	**1**	**2**
CO5	**2**	**3**	**1**	**3**	**2**	**1**
Weightage	**11**	**10**	**9**	**11**	**9**	**11**

***3 –** Advanced Application; **2 –** Intermediate Development; **1 -** Introductory Level

LESSON PLAN

UNIT	COSMETIC CHEMISTRY	Hrs	Mode
I	**COSMETICS I** Dental Preparations: Tooth pastes- ingredients, their characteristics and functions. Mouth washes (Composition only). Soap and Detergents: Manufacture of Soap and Detergents. Cleansing action of Soap. Problems of Detergents as waste water in water resources.	**06**	**Chalk & Talk, Power Point**
II	**COSMETICS II** Hair care preparations: shampoo; different types and formulations, Moisturizing creams, perfumes, Lip sticks, shaving creams, after shave preparations. (Composition and applications for the above).	**06**	**Chalk & Talk, Power Point**
III	**CONSUMER PRODUCTS** Consumer Products: Composition and Uses of Safety Matches, Agarbattis, Naphthalene Balls, Wax candles, shoe polish, Gum, Ink, Chalk crayons.	**06**	**Chalk & Talk, Power Point**
IV	**SUGAR** Preparation of bagasse-use of bagasse for the manufacture of paper and electricity- preparation of alcohol from molasses-preparation of absolute alcohol-manufacture of wine, beer, methylated spirit – power alcohol.	**06**	**Chalk & Talk, Power Point**
V	**FOOD ADULTERATION** **Food adulteration** - Contamination of wheat, rice, dhal, milk, butter, with clay, sand, stone, water and toxic chemicals (e.g., Kasseri dhal with mentanil yellow). Food poisons: natural poisons (alkaloids, nephrotoxins), pesticides (DDT, BHC, Follidol), chemical poisons (KCN). First aid and Antidotes for poisoned persons.	**06**	**Chalk & Talk, Power Point**

Course Designed by: **Dr. J.E. Sangeetha & Dr. R. Satheesh**

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)								
Internal	**Cos**	**K Level**	**Section A**		**Section B**		**Section C Either or Choice**	**Section D Open Choice**
			MCQs		**Short Answers**			
			No. of. Questions	**K – Level**	**No. of. Questions**	**K - Level**		
CI AI	**CO1**	**Up to K2**	**2**	**K1&K2**	1	K1	2 (K2&K2)	1(K2)
	CO2	**Up to K3**	**2**	**K1&K2**	2	K2	2 (K3&K3)	2(K2 & K3)
CI AII	**CO3**	**Up to K2**	**2**	**K1&K2**	1	K2	2 (K2&K2)	1(K2)
	CO4	**Up to K4**	**2**	**K1&K2**	2	K2	2 (K3&K3)	2(K3 &K4)
Question Pattern CIA I & II		No. of Questions to be asked	4		3		4	3
		No. of Questions to be answered	4		3		2	2
		Marks for each question	1		2		5	10
		Total Marks for each section	4		6		10	20

Distribution of Marks with K Level CIA I & CIA II								
	K Level	**Section A (Multiple Choice Questions)**	**Section B (Short Answer Questions)**	**Section C (Either / Or Choice)**	**Section D (Open Choice)**	**Total Marks**	**% of (Marks without choice)**	**Consolidate of %**
CIA I	**K1**	2	2	-	-	4	6.67	**67**
	K2	2	4	10	20	36	60	
	K3	-	-	10	10	20	33.33	**33**
	K4	-	-	-	-	-	-	**-**
	Marks	4	6	20	30	60	100	**100**
CIA II	**K1**	2	2	-	-	4	6.67	**50**
	K2	2	4	10	10	26	43.33	
	K3	-	-	10	10	20	33.33	**33**
	K4	-	-	-	10	10	16.67	**17**
	Marks	4	6	20	30	60	100	**100**

K1- Remembering and recalling facts with specific answers
K2- Basic understanding of facts and stating main ideas with general answers
K3- Application oriented- Solving Problems
K4- Examining, analyzing, presentation and make inferences with evidences
CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)								
S.No	**COs**	**K - Level**	**MCQs**		**Short Answers**		**Section C (Either / or Choice)**	**Section D (Open Choice)**
			No. of Questions	**K – Level**	**No. of Question**	**K – Level**		
1	CO1	Up to K2	2	K1,K2	1	K1	2 (K2&K2)	1(K2)
2	CO2	Up to K3	2	K1&K2	1	K1	2 (K3&K3)	1(K3)
3	CO3	Up to K3	2	K1&K2	1	K2	2 (K3&K3)	1(K3)
4	CO4	Up to K4	2	K1&K2	1	K2	2 (K3&K3)	1(K4)
5	CO5	Up to K4	2	K1&K2	1	K2	2 (K3&K3)	1(K4)
No. of Questions to be Asked			10		5		10	5
No.of Questions to be answered			10		5		5	3
Marks for each question			1		2		5	10
Total Marks for each section			10		10		25	30
(Figures in parenthesis denotes, questions should be asked with the given K level)								

Distribution of Marks with K Level							
K Level	**Section A (Multiple Choice Questions)**	**Section B (Short Answer Questions)**	**Section C (Either/ or Choice)**	**Section D (Open Choice)**	**Total Marks**	**% of (Marks without choice)**	**Consolidated %**
K1	5	4	-	-	9	7.5	33
K2	5	6	10	10	31	25.83	
K3	-	-	40	20	60	50	50
K4	-	-	-	20	20	16.67	17
Marks	10	10	50	50	120	100	100
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.							

Summative Examinations - Question Paper – Format

Section A (Multiple Choice Questions) Answer All Questions (10x1=10 marks)			
Q.No	**CO**	**K Level**	**Questions**
1	CO1	K1	
2	CO1	K2	
3	CO2	K1	
4	CO2	K2	
5	CO3	K1	
6	CO3	K2	
7	CO4	K1	
8	CO4	K2	
9	CO5	K1	
10	CO5	K2	
Section B (Short Answers) **Answer All Questions (5x2=10 marks)**			
Q.No	**CO**	**K Level**	**Questions**
11	CO1	K1	
12	CO2	K1	
13	CO3	K2	
14	CO4	K2	
15	CO5	K2	
Section C (Either/Or Type) **Answer All Questions (5 x 5 = 25 marks)**			
Q.No	**CO**	**K Level**	**Questions**
16) a	CO1	K2	
16) b	CO1	K2	
17) a	CO2	K3	
17) b	CO2	K3	
18) a	CO3	K3	
18) b	CO3	K3	
19) a	CO4	K3	
19) b	CO4	K3	
20) a	CO5	K3	
20) b	CO5	K3	
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels			
Section D (Open Choice) **Answer Any Three questions (3x10=30 marks)**			
Q.No	**CO**	**K Level**	**Questions**
21	CO1	K2	
22	CO2	K3	
23	CO3	K3	
24	CO4	K4	
25	CO5	K4	

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)
DEPARTMENT OF CHEMISTRY
(For those who joined in 2021-2022 and after)

Course Name	**GREEN CHEMISTRY**							
Course Code	21UCHS12					**L**	**P**	**C**
Category	**Skill**					2	-	2
Nature of Course:	EMPLOYABILITY	✓	SKILL ORIENTED	✓	ENTREPRENURSHIP			

Course Objectives:

- To Recollect the green environment and basic definition for green chemistry.
- To Remember the twelve principles of green chemistry and examples.
- To Compare the concept of yield and its calculation on atom economy.
- To Execute the concept of selectivity, types of selectivity and reactions using green solvents.
- To Determine the basic concepts in designing green synthesis and choice of starting materials.

Unit: I	**INTRODUCTION**	6

Definition for Green Chemistry, Need for Green Chemistry- Goals of Green Chemistry – Obstacles and Advantages of Green chemistry, Progress of Green Chemistry- Twelve principles of Green Chemistry and Examples.

Unit: II	**YIELD AND ATOM ECONOMY**	6

Concept of Yield and its calculation, Atom economy – Definition, Calculation of Atom economy in rearrangement, addition, substitution and elimination reactions.

Unit: III	**SELECTIVITY IN GREEN CHEMISTRY**	6

Concept of selectivity, Types of selectivity -Chemo-, regio-, enantio- and diastereoselectivities, Reactions using Green solvents - Super critical CO_2- Cleaner technology with CO_2.Ionic liquids- Friedel-crafts reaction, halogenation &Diels- Alder reaction. and water.

Unit: IV	**SOLVENT FREE REACTIONS**	6

Organic synthesis in solid state-Thermal reactions, rearrangements &photochemical reactions. Mode of supplying energy-microwave and ultrasonic-Advantages of MW techniques. Reactions like oxidation, reduction & rearrangements.

Unit: V	**DESIGNING OF GREEN SYNTHESIS**	6

Basic concepts in designing Green synthesis - choice of starting materials, reagents, catalysts-catalytic approach in green chemistry and solvents with suitable examples.

	Total Lecture Hours	**30 Hrs**

Books for Study:

1. V. Kumar, "An Introduction to Green Chemistry" Vishal publishing Co. Reprint Edition 2010
2. Rashmi Sanghi, M.M Srivastava "Green Chemistry" Fourth Reprint - 2009

Books for References:

1. V.K. Ahluwalia and M.R. Kidwai, New Trends in Green Chemistry, Anamalaya Publishers, 2005.
2. P.T. Anastas, and J.K. Warner: Green Chemistry - Theory and Practical, Oxford University Press, 1998.

Web Resources:

1. https://www.youtube.com/watch?v=PUisOKB6sgA
2. https://www.youtube.com/watch?v=qNHW-Pi9c9g

Course Outcomes:	**K Level**

On the completion of the course the student will be able to		
CO1:	List out the twelve principles of Green Chemistry.	[Up to K2]
CO2:	Understand the need for green chemistry and goals of Green Chemistry.	[Up to K3]
CO3:	Apply Green Chemistry principles to organic synthesis.	[Up to K3]
CO4:	Analyze the uses of Microwave and ultrasonic radiations to carry our reaction.	[Up to K4]
CO5:	Construct the basic concepts and twelve principles of Green Chemistry in designing green synthesis	[Up to K4]

CO & PO Mapping:

Course Outcomes (COs)	Programme Outcomes (POs)					
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**
CO 1	**2**	**1**	**2**	**3**	**3**	**2**
CO 2	**1**	**3**	**1**	**1**	**2**	**3**
CO 3	**2**	**2**	**3**	**2**	**3**	**3**
CO 4	**3**	**1**	**2**	**2**	**1**	**2**
CO5	**2**	**3**	**1**	**3**	**2**	**1**
Weightage	**10**	**10**	**9**	**11**	**10**	**11**

***3 –** Advanced Application; **2 –** Intermediate Development; **1 -** Introductory Level

LESSON PLAN

UNIT	GREEN CHEMISTRY	Hrs	Mode
I	**INTRODUCTION** Definition for Green Chemistry, Need for Green Chemistry- Goals of Green Chemistry – Obstacles and Advantages of Green chemistry, Progress of Green Chemistry- Twelve principles of Green Chemistry and Examples.	**06**	**Chalk & Talk, Power Point**
II	**YIELD AND ATOM ECONOMY** Concept of Yield and its calculation, Atom economy – Definition, Calculation of Atom economy in rearrangement, addition, substitution and elimination reactions.	**06**	**Chalk & Talk, Power Point**
III	**SELECTIVITY IN GREEN CHEMISTRY** Concept of selectivity, Types of selectivity -Chemo-, regio-, enantio- and diastereoselectivities, Reactions using Green solvents - Super critical CO_2- Cleaner technology with CO_2.Ionic liquids-Friedel-crafts reaction, halogenation &Diels- Alder reaction. and water.	**06**	**Chalk & Talk, Power Point**
IV	**SOLVENT FREE REACTIONS** Organic synthesis in solid state-Thermal reactions, rearrangements &photochemical reactions. Mode of supplying energy-microwave and	**06**	**Chalk & Talk, Power**

	ultrasonic-Advantages of MW techniques. Reactions like oxidation, reduction & rearrangements.		**Point**
V	**DESIGNING OF GREEN SYNTHESIS** Basic concepts in designing Green synthesis - choice of starting materials, reagents, catalysts-catalytic approach in green chemistry and solvents with suitable examples.	**06**	**Chalk & Talk, Power Point**

Course Designed by: **Dr. Ramasamy Raja & Dr. K. Muthupandi**

Learning Outcome Based Education & Assessment (LOBE)
Formative Examination - Blue Print
Articulation Mapping – K Levels with Course Outcomes (COs)

Internal	**Cos**	**K Level**	**Section A**		**Section B**		**Section Section C Either or Choice**	**Section Section D Open Choice**
			MCQs		**Short Answers**			
			No. of. Questions	**K – Level**	**No. of. Questions**	**K - Level**		
CI AI	**CO1**	**Up to K2**	**2**	**K1&K2**	1	K1	2 (K2&K2)	1(K2)
	CO2	**Up to K3**	**2**	**K1&K2**	2	K2	2 (K3&K3)	2(K2&K3)
CI AII	**CO3**	**Up to K2**	**2**	**K1&K2**	1	K2	2 (K2&K2)	1(K2)
	CO4	**Up to K4**	**2**	**K1&K2**	2	K2	2 (K3&K3)	2(K3 &K4)
Question Pattern CIA I & II		No. of Questions to be asked	4		3		4	3
		No. of Questions to be answered	4		3		2	2
		Marks for each question	1		2		5	10
		Total Marks for each section	4		6		10	20

Distribution of Marks with K Level CIA I & CIA II								
	K Level	**Section A (Multiple Choice Questions)**	**Section B (Short Answer Questions)**	**Section C (Either / Or Choice)**	**Section D (Open Choice)**	**Total Marks**	**% of (Marks without choice)**	**Consolidate of %**
CIA I	**K1**	**2**	**2**	**-**	**-**	**4**	**6.67**	**67**
	K2	**2**	**4**	**10**	**20**	**36**	**60**	
	K3	**-**	**-**	**10**	**10**	**20**	**33.33**	**33**
	K4	**-**	**-**	**-**	**-**	**-**	**-**	**-**
	Marks	**4**	**6**	**20**	**30**	**60**	**100**	**100**
CIA II	**K1**	**2**	**2**	**-**	**-**	**4**	**6.67**	**50**
	K2	**2**	**4**	**10**	**10**	**26**	**43.33**	
	K3	**-**	**-**	**10**	**10**	**20**	**33.33**	**33**
	K4	**-**	**-**	**-**	**10**	**10**	**16.67**	**17**
	Marks	**4**	**6**	**20**	**30**	**60**	**100**	**100**

K1- Remembering and recalling facts with specific answers
K2- Basic understanding of facts and stating main ideas with general answers
K3- Application oriented- Solving Problems
K4- Examining, analyzing, presentation and make inferences with evidences
CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)								
S.No	**COs**	**K - Level**	**MCQs**		**Short Answers**		**Section C (Either / or Choice)**	**Section D (Open Choice)**
			No. of Questions	**K – Level**	**No. of Question**	**K – Level**		
1	CO1	Up to K 2	2	K1,K2	1	K1	2 (K2&K2)	1(K2)
2	CO2	Upto K 3	2	K1&K2	1	K1	2 (K3&K3)	1(K3)
3	CO3	Up to K 3	2	K1&K2	1	K2	2 (K3&K3)	1(K3)
4	CO4	Up to K 4	2	K1&K2	1	K2	2 (K3&K3)	1(K4)
5	CO5	Up to K 4	2	K1&K2	1	K2	2 (K3&K3)	1(K4)
No. of Questions to be Asked			10		5		10	5
No.of Questions to be answered			10		5		5	3
Marks for each question			1		2		5	10
Total Marks for each section			10		10		25	30
(Figures in parenthesis denotes, questions should be asked with the given K level)								

Distribution of Marks with K Level							
K Level	**Section A (Multiple Choice Questions)**	**Section B (Short Answer Questions)**	**Section C (Either/ or Choice)**	**Section D (Open Choice)**	**Total Marks**	**% of (Marks without choice)**	**Consolidated %**
K1	**5**	**4**	-	**-**	**9**	**7.5**	**33**
K2	5	6	10	10	31	25.83	
K3	-	-	40	20	60	50	50
K4	-	-	-	20	20	16.67	17
Marks	10	10	50	50	120	100	100
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.							

Summative Examinations - Question Paper – Format

Section A (Multiple Choice Questions) **Answer All Questions** **(10x1=10 marks)**			
Q.No	**CO**	**K Level**	**Questions**
1	CO1	K1	
2	CO1	K2	
3	CO2	K1	
4	CO2	K2	
5	CO3	K1	
6	CO3	K2	
7	CO4	K1	
8	CO4	K2	
9	CO5	K1	
10	CO5	K2	
Section B (Short Answers) **Answer All Questions** **(5x2=10 marks)**			
Q.No	**CO**	**K Level**	**Questions**
11	CO1	K1	
12	CO2	K1	
13	CO3	K2	
14	CO4	K2	
15	CO5	K2	
Section C (Either/Or Type) **Answer All Questions** **(5 x 5 = 25 marks)**			
Q.No	**CO**	**K Level**	**Questions**
16) a	CO1	K2	
16) b	CO1	K2	
17) a	CO2	K3	
17) b	CO2	K3	

18) a	CO3	K3	
18) b	CO3	K3	
19) a	CO4	K3	
19) b	CO4	K3	
20) a	CO5	K3	
20) b	CO5	K3	
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels			
Section D (Open Choice) **Answer Any Three questions (3x10=30 marks)**			
Q.No	**CO**	**K Level**	**Questions**
21	CO1	K2	
22	CO2	K3	
23	CO3	K3	
24	CO4	K4	
25	CO5	K4	


SECOND SEMESTER

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)
DEPARTMENT OF CHEMISTRY
(For those who joined in 2021-2022 and after)

Course Name	**ORGANIC CHEMISTRY – I**							
Course Code	21UCHC21					**L**	**P**	**C**
Category	**Core**					4	0	4
Nature of course:	EMPLOYABILITY	✓	SKILL ORIENTED		ENTREPRENURSHIP			✓

Course Objectives:

- To Recall the definition of hydrocarbons and classification of organic compounds.
- To Understand the preparation, properties of hydrocarbons, alcohols, ethers, aldehydes, ketones and carboxylic acids.
- To Classify the isomerism and determine the concept of stereoisomerisms.
- To Execute the concept of geometrical and optical isomerism.
- To Construct the preparation and properties of monosaccharides, disaccharides and polysaccharides.

Unit: I	**HYDROCARBONS**	12

Hydrocarbons – Introduction – Definition and Classifications. **Alkanes** – Nomenclature - General methods of preparation and Chemical properties. **Alkenes** – Nomenclature – General methods of preparation – chemical properties – Electrophilic additions – Addition of hydrogen halide – Markownikov's rule – Antimarkovinkov's addition – Addition of H_2SO_4, H_2O, Halogen – Hydroboration – oxidation – ozonolysis – hydroxylation – polymerization. **Alkynes** – Nomenclature – General methods of preparation – physical and chemical properties – polymerization.

Unit: II	**ALCOHOLS, ETHERS, THIOALCOHOLS AND THIOETHERS**	12

Alcohols: Preparation by hydroboration; reduction of carbonyl compounds, acids and esters, by using Grignard reagents. Reaction with metals. Mechanism and reactivity towards HX, dehydration – rearrangement. Ascending and descending the alcohol series – estimation of number of hydroxyl groups. **Ethers**: Mechanism of Williamson's synthesis, mechanism of cleavage by HX, estimation of methoxy group by Zeisel method. Application of crown ethers. **Thioalcohols and thioethers**: Preparation and properties of sulphonal and mustard gas.

Unit: III	**ALDEHYDES, KETONES AND CARBOXYLIC ACIDS**	12

Aldehydes and Ketones: Nomenclature and structure of carbonyl group – Preparation of Aldehydes and Ketones – Physical properties – Chemical reactions and uses of Aldehydes and Ketones. **Carboxylic Acids**: Nomenclature and structure of carboxyl group – Methods of preparation of

Carboxylic acids – Physical properties – Chemical reactions and uses of Carboxylic acids.		
Unit: IV	**STEREO ISOMERISM**	12
Geometrical isomerism: Definition – geometrical isomerism of maleic and fumaric acids – aldoximes and ketoximes – determination of configuration of geometric isomers – E, Z notations – stereo chemistry of addition of bromine to double bond. **Optical isomerism**: Optical activity – specific rotation – definition of optical isomerism – elements of symmetry - Optical isomerism of compounds containing asymmetric carbon atom – racemization and resolution of racemic mixtures – Walden inversion – asymmetric synthesis – chirality – specifications of absolute configuration by R and S notations. Optical activity of compounds without asymmetric carbon atoms, allenes, spiranes and bi phenyl compounds.		
Unit: V	**Carbohydrates**:	12
Definition – classification – monosaccharides – properties and uses of glucose and fructose – configuration of glucose and fructose – Haworth structure – conversion of glucose to fructose and vice versa. **Disaccharides**: Preparation, properties, constitution and configuration of sucrose. **Poly saccharides**: A general study of starch and cellulose – uses of cellulose in industries.		
	Total Lecture Hours	**60 Hrs**

Books for Study:

1. B. S Bahl and Arun Bahl S.Chand, Advanced Organic Chemistry Co Ltd, New Delhi, 2012.

Books for References:

1. B-Mehta and M.Mehta, Organic Chemistry E.E Edition, New Delhi, 2010.
2. P.L Soni and H.M Chawla, Organic Chemistry, 29th Edition, Sultan Chand and sons, New Delhi, 2007.

Web Resources:

1. https://courses.lumenlearning.com/chemistryformajors/chapter/alcohols-and-ethers/
2. https://www.youtube.com/watch?v=_vq9T0htW0Y
3. https://courses.lumenlearning.com/chemistryformajors/chapter/aldehydes-ketones-carboxylic-acids-and-esters-2/
4. https://www.youtube.com/watch?v=JxK5rZxbyQY

Course Outcomes:		**K Level**
On the completion of the course the student will be able to		
CO1:	Identify the basic idea of organic compounds and carbohydrates.	[Up to K2]
CO2:	Classify the hydrocarbons, alcohols, ethers and carbohydrates.	[Up to K3]
CO3:	Determine the preparation of hydrocarbons, alcohols, ethers and the given carbonyl compounds.	[Up to K3]
CO4:	Analyze the physical and chemical properties of hydrocarbons, alcohols, ethers and the given carbonyl compounds.	[Up to K4]

CO5:	Construct the basic idea of preparation, properties of organic compounds and carbohydrates.	[Up to K4]

CO & PO Mapping:

Course Outcomes (COs)	Programme Outcomes (POs)					
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**
CO 1	**3**	**1**	**2**	**3**	**1**	**2**
CO 2	**1**	**3**	**1**	**1**	**2**	**3**
CO 3	**2**	**2**	**3**	**2**	**3**	**3**
CO 4	**3**	**1**	**2**	**2**	**1**	**2**
CO5	**2**	**3**	**1**	**3**	**2**	**1**
Weightage	**11**	**10**	**9**	**11**	**9**	**11**

***3 –** Advanced Application; **2 –** Intermediate Development; **1 -** Introductory Level

LESSON PLAN

UNIT	ORGANIC CHEMISTRY – I	Hrs	Mode
I	**HYDROCARBONS** **Hydrocarbons** – Introduction – Definition and Classifications. **Alkanes** – Nomenclature - General methods of preparation and Chemical properties. **Alkenes** – Nomenclature – General methods of preparation – chemical properties – Electrophilic additions – Addition of hydrogen halide – Markownikov's rule – Antimarkovinkov's addition – Addition of H_2SO_4, H_2O, Halogen – Hydroboration – oxidation – ozonolysis – hydroxylation – polymerization. **Alkynes** – Nomenclature – General methods of preparation – physical and chemical properties – polymerization.	**12**	**Chalk & Talk, Power Point**
II	**ALCOHOLS, ETHERS, THIOALCOHOLS AND THIOETHERS** **Alcohols**: Preparation by hydroboration; reduction of carbonyl compounds, acids and esters, by using Grignard reagents. Reaction with metals. Mechanism and reactivity towards HX, dehydration – rearrangement. Ascending and descending the alcohol series – estimation of number of hydroxyl groups. **Ethers**: Mechanism of Williamson's synthesis, mechanism of cleavage by HX, estimation of methoxy group by Zeisel method. Application of crown ethers. **Thioalcohols and thioethers**: Preparation and properties of sulphonal and mustdard gas.	**12**	**Chalk & Talk, Power Point**
III	**ALDEHYDES, KETONES AND CARBOXYLIC ACIDS**		**Chalk &**

	Aldehydes and Ketones: Nomenclature and structure of carbonyl group – Preparation of Aldehydes and Ketones – Physical properties – Chemical reactions and uses of Aldehydes and Ketones. **Carboxylic Acids**: Nomenclature and structure of carboxyl group – Methods of preparation of Carboxylic acids – Physical properties – Chemical reactions and uses of Carboxylic acids.	**12**	**Talk, Power Point**
IV	**STEREO ISOMERISM** **Geometrical isomerism**: Definition – geometrical isomerism of maleic and fumaric acids – aldoximes and ketoximes – determination of configuration of geometric isomers – E, Z notations – stereo chemistry of addition of bromine to double bond. **Optical isomerism**: Optical activity – specific rotation – definition of optical isomerism – elements of symmetry - Optical isomerism of compounds containing asymmetric carbon atom – racemization and resolution of racemic mixtures – Walden inversion – asymmetric synthesis – chirality – specifications of absolute configuration by R and S notations. Optical activity of compounds without asymmetric carbon atoms, allenes, spiranes and bi phenyl compounds.	**12**	**Chalk & Talk, Power Point**
V	**Carbohydrates**: Definition – classification – monosaccharides – properties and uses of glucose and fructose – configuration of glucose and fructose – Haworth structure – conversion of glucose to fructose and vice versa. **Disaccharides**: Preparation, properties, constitution and configuration of sucrose. **Poly saccharides**: A general study of starch and cellulose – uses of cellulose in industries.	**12**	**Chalk & Talk, Power Point**

Course Designed by**: Dr. K. Muthupandi & Dr. V. Ramasamy Raja**

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)								
Internal	**Cos**	**K Level**	**Section A**		**Section B**		**Section Section C Either or Choice**	**Section Section D Open Choice**
			MCQs		**Short Answers**			
			No. of. Questions	**K – Level**	**No. of. Questions**	**K - Level**		
CI AI	**CO1**	**Up to K2**	**2**	**K1 & K2**	1	K1	2 (K2&K2)	1(K2)
	CO2	**Up to K3**	**2**	**K1 & K2**	2	K2	2 (K3&K3)	2(K2 & K3)
CI AII	**CO3**	**Up to K2**	**2**	**K1 & K2**	1	K2	2 (K2&K2)	1(K2)
	CO4	**Up to K4**	**2**	**K1 & K2**	2	K2	2 (K3&K3)	2(K3 &K4)
Question Pattern CIA I & II		No. of Questions to be asked	4		3		4	3
		No. of Questions to be answered	4		3		2	2
		Marks for each question	1		2		5	10
		Total Marks for each section	4		6		10	20

Distribution of Marks with K Level CIA I & CIA II								
	K Level	**Section A (Multiple Choice Questions)**	**Section B (Short Answer Questions)**	**Section C (Either / Or Choice)**	**Section D (Open Choice)**	**Total Marks**	**% of (Marks without choice)**	**Consolidate of %**
CIA I	**K1**	**2**	**2**	**-**	**-**	**4**	**6.67**	**67**
	K2	**2**	**4**	**10**	**20**	**36**	**60**	
	K3	**-**	**-**	**10**	**10**	**20**	**33.33**	**33**
	K4	**-**	**-**	**-**	**-**	**-**	**-**	**-**
	Marks	**4**	**6**	**20**	**30**	**60**	**100**	**100**
CIA II	**K1**	**2**	**2**	**-**	**-**	**4**	**6.67**	**50**
	K2	**2**	**4**	**10**	**10**	**26**	**43.33**	
	K3	**-**	**-**	**10**	**10**	**20**	**33.33**	**33**
	K4	**-**	**-**	**-**	**10**	**10**	**16.67**	**17**
	Marks	**4**	**6**	**20**	**30**	**60**	**100**	**100**

K1- Remembering and recalling facts with specific answers
K2- Basic understanding of facts and stating main ideas with general answers
K3- Application oriented- Solving Problems
K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)								
S.No	**COs**	**K - Level**	**MCQs**		**Short Answers**		**Section C (Either / or Choice)**	**Section D (Open Choice)**
			No. of Questions	**K – Level**	**No. of Question**	**K – Level**		
1	CO1	Up to K 2	2	K1,K2	1	K1	2 (K2&K2)	1(K2)
2	CO2	Upto K 3	2	K1&K2	1	K1	2 (K3&K3)	1(K3)
3	CO3	Up to K 3	2	K1&K2	1	K2	2 (K3&K3)	1(K3)
4	CO4	Up to K 4	2	K1&K2	1	K2	2 (K3&K3)	1(K4)
5	CO5	Up to K 4	2	K1&K2	1	K2	2 (K3&K3)	1(K4)
No. of Questions to be Asked			10		5		10	5
No.of Questions to be answered			10		5		5	3
Marks for each question			1		2		5	10
Total Marks for each section			10		10		25	30
(Figures in parenthesis denotes, questions should be asked with the given K level)								

Distribution of Marks with K Level							
K Level	**Section A (Multiple Choice Questions)**	**Section B (Short Answer Questions)**	**Section C (Either/ or Choice)**	**Section D (Open Choice)**	**Total Marks**	**% of (Marks without choice)**	**Consolidated %**
K1	**5**	**4**	-	-	**9**	**7.5**	**33**
K2	5	6	10	10	31	25.83	
K3	-	-	40	20	60	50	50
K4	-	-	-	20	20	16.67	17
Marks	10	10	50	50	120	100	100
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.							

Summative Examinations - Question Paper – Format

Section A (Multiple Choice Questions) Answer All Questions (10x1=10 marks)			
Q.No	**CO**	**K Level**	**Questions**
1	CO1	K1	
2	CO1	K2	
3	CO2	K1	
4	CO2	K2	
5	CO3	K1	
6	CO3	K2	
7	CO4	K1	
8	CO4	K2	
9	CO5	K1	
10	CO5	K2	
Section B (Short Answers) **Answer All Questions (5x2=10 marks)**			
Q.No	**CO**	**K Level**	**Questions**
11	CO1	K1	
12	CO2	K1	
13	CO3	K2	
14	CO4	K2	
15	CO5	K2	
Section C (Either/Or Type) **Answer All Questions (5 x 5 = 25 marks)**			
Q.No	**CO**	**K Level**	**Questions**
16) a	CO1	K2	
16) b	CO1	K2	
17) a	CO2	K3	
17) b	CO2	K3	
18) a	CO3	K3	
18) b	CO3	K3	
19) a	CO4	K3	
19) b	CO4	K3	
20) a	CO5	K3	
20) b	CO5	K3	
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels			
Section D (Open Choice) **Answer Any Three questions (3x10=30 marks)**			
Q.No	**CO**	**K Level**	**Questions**
21	CO1	K2	
22	CO2	K3	
23	CO3	K3	
24	CO4	K4	
25	CO5	K4	

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)
DEPARTMENT OF CHEMISTRY
(For those who joined in 2021-2022 and after)

Course Name	**MAJOR CHEMISTRY PRACTICAL – I (Inorganic Semi Micro – Qualitative Analysis)**							
Course Code	21UCHCP1					**L**	**P**	**C**
Category	**Core**					0	2	2
Nature of Course:	EMPLOYABILITY	✓	SKILL ORIENTED	✓	ENTREPRENURSHIP	✓		

Course Objectives:

- Recall the basic properties of salt mixtures.
- Reminiscence the anionic and cationic species in the salt mixtures.
- Apply the concept of anionic and cationic species in semi micro qualitative analysis.
- Execute the confirmation test for the anions and cations present in the salt mixtures.
- Construct four radicals with correct procedure during analysis of the salt mixtures.

Duration of examination: 3hrs

Analysis of a mixture containing two anions of which one is an interfering in semi-micro method two cations

30

Anions:

Carbonate, sulphate, nitrate, fluoride, chloride, bromide, iodide, oxalate, Borate, phosphate and chromate.

Cations: Lead, bismuth, copper, cadmium, antimony, iron (II and III), aluminium, Chromium, zinc, manganese, cobalt, nickel, barium, calcium, Magnesium and ammonium.

Distribution of marks

Max marks: 100

Internal marks : 40 marks			**External : 60**		
Laboratory Performance	:	30 marks	Vivo voce	:	10 marks
Observation note book	:	10 marks	Record note book	:	10 marks
			Four radicals with correct procedure	:	40 marks
Total	:	40 marks	Total	:	60 marks

	Total Lecture Hours	**30 Hrs**

Books for Study:

1. Dr. V. V. Ramanujam, Inorganic Semimicro Qualitative Analysis, National Publishing Company, 3rd edition, Chennai, 1974.

Books for References:

1. Vogel, Text book of Qualitative Analysis including Semi Micro Methods, Longman Sc & Tech, 2008.

Web Resources:

1. https://www.youtube.com/watch?v=cEOvj6jkdDw
2. https://www.youtube.com/watch?v=T3hi_xEpaDg
3. https://www.youtube.com/watch?v=BK7rf4XE4f8
4. https://www.youtube.com/watch?v=QQo1e-BUZWs

Course Outcomes:		**K Level**
On the completion of the course the student will be able to		
CO1:	Identify the basic radical and its group in the given salt mixture.	[Up to K2]
CO2:	Understand the qualitative analysis skill of any given inorganic salt mixture.	[Up to K3]
CO3:	Develop the acid radicals present in the given inorganic salt mixture.	[Up to K3]
CO4:	Analyze the basic radical systematically.	[Up to K4]
CO5:	Apply the four radicals with correct procedure during analysis of the salt mixtures	[Up to K4]

CO & PO Mapping:

Course Outcomes (COs)	**Programme Outcomes (POs)**					
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**
CO 1	**3**	**1**	**2**	**3**	**1**	**2**
CO 2	**1**	**3**	**1**	**1**	**2**	**3**
CO 3	**2**	**2**	**3**	**2**	**3**	**3**
CO 4	**3**	**1**	**2**	**2**	**1**	**2**
CO5	**2**	**3**	**1**	**3**	**2**	**1**
Weightage	**11**	**10**	**9**	**11**	**9**	**11**

***3 –** Advanced Application; **2 –** Intermediate Development; **1 -** Introductory Level

LESSON PLAN

UNIT	INORGANIC SEMI MICRO – QUALITATIVE ANALYSIS	Hrs	Mode
I	**Duration of examination**: 3hrs Analysis of a mixture containing two anions of which one is an interfering in semi-micro method two cations **Anions:** Carbonate, sulphate, nitrate, fluoride, chloride, bromide, iodide, oxalate, Borate, phosphate and chromate. **Cations:** Lead, bismuth, copper, cadmium, antimony, iron (II and III), aluminium, Chromium, zinc, manganese, cobalt, nickel, barium, calcium, Magnesium and ammonium.	**30**	**Practical**

Course Designed by: **Dr. V. Ramasamy Raja & Dr. R. Satheesh**

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)
DEPARTMENT OF CHEMISTRY
(For those who joined in 2021-2022 and after)

Course Name	**ALLIED PHYSICS – II: Electricity, Electronics , Optics and Modern Physics**			
Course Code	**21UPHA21**	**L**	**P**	**C**
Category	**Allied**	4	-	4

Nature of course:	EMPLOYABILITY	✓	SKILL ORIENTED	✓	ENTREPRENURSHIP	

Course Objectives:

The learners will be able:
1. To understand the laws of electricity
2. To recollect different types of diodes and transistors
3. To apply decimal and binary number system
4. To understand the various types of lenses, prism, aberrations, interference and diffraction
5. To understand and apply the basic concepts of Relativity in variation of mass with velocity

Unit: I	***Electricity***	**12**

Capacitors –Expression for C of a parallel plate– Energy of a charged capacitor – Loss of energy on sharing of charges between two capacitors- Kirchoff's laws – Application of Kirchhoff's laws to Wheatstone's network – Meter Bridge – Measurement of resistance – Principle of Potentiometer – Calibration of ammeter and voltmeter(low range only)

Unit: II	***Electronics***	**12**

Transistor –Working of n-p-n transistor– Characteristics(CE mode only) –Common - Emitter transistor amplifier – Frequency response - Hartley oscillator –Modulation – Types of Modulation - OPAMP and its characteristics – OPAMP as adder and subtractor-– Logic circuits – Boolean algebra – De Morgan's theorem – OR, AND, NOR , NOT , NAND gates

Unit: III	***Geometrical Optics***	**12**

Deviation produced by thin lens – Focal length of two thin lenses in and out of contact – Refraction through a thin prism – Dispersion – Dispersive power – Combination of thin prisms to produce (a) Deviation without dispersion and (b) Dispersion without deviation – Direct vision spectroscope – Chromatic aberration in lenses – Spherical aberration in lenses – Theory of primary and secondary rainbows.

Unit: IV	***Physical Optics***	**12**

Interference in thin films – air wedge – Newton's rings (reflected beam only) – Determination of wavelength – Diffraction – Theory of plane transmission grating (normal incidence only) – Experiment to determine wavelengths - Double refraction – Nicol prism – Construction, action and uses – Quarter wave plate (QWP) – Half wave plate (HWP) – Optical activity – Biot's laws – Specific rotatory power – Half shade polarimeter – Determination of specific rotatory power

Unit: V	***Lasers***	**12**
Introduction of Lasers-Spontaneous and stimulated emission-Population Inversion-Einstein's A and B coefficients-derivation. Types of lasers-Nd:YAG,CO_2 ,Semiconductor lasers-Industrial and Medical Applications.		
	Total Lecture Hours	**60 Hrs**

Books for Study:

1. R. Murugesan,**Electricity and Electronics**, Madurai, First Edition, July 2016.
Unit – I : 1.5,1.6, 1.9-1.14, 1.18,1.19,2.1,2.3-2.7
Unit – II : 4.1,4.2,4.4,4.5.4.6,4.1o-4.12,4.14-4.18,4.24,4.25, 5.1-5.7,5.9-14,5.16

2. R.Murugeshan, **Optics Dpectroscopy and ModernPhysics**
Unit – IIII : 1.1-1.3,1.5-1.11,1.13,1.17,1.23,1.24
Unit – IV : 2.1,2.2,2.4-2.6,2.9,2.10,3.1,3.2,3.4,3.5-3.10

3. P.Mani, **A Text book of Engineering Physics**,12th edition, , Dhanam Publications, Chennai
Unit – V : 7.1 – 7.45

Books for References:

1. Kakaniand Bhandari Sultan ,**Optics and Spectroscopy,** Chand and Sons,New Delhi,2004.
2.Brijlaland Subramanyam.,**A Text book of Optics,**S.Chandand Co,New Delhi,2004.
3. B.K.Sharma, **Spectroscopy**, GOEL Publishing House, Meerut, 2006.
4. NarayanamoorthyandNagarathinam, **Electricity and Magnetism,** National Publishing Co,

Web Resources:

1. https://www.youtube.com/watch?v=ML7HcZo6IaE
2. https://www.khanacademy.org/science/physics/light-waves/introduction-to-light-
3. waves/v/polarization-of-light-linear-and-circular

Course Outcomes		**K Level**
After successful completion of the course, the student is expected to		
CO1:	Remember Coulombs theorem, principles of capacitors, Kirchhoff's laws, forward and reverse bias, frequency response, modulation, focal length, dispersive power, cordinal points, double refraction, Biot's law, length contraction, time dilation, De -Brogle wavelength	**K2**
CO2:	Understand Coulombs theorem, energy of a capacitor, principle of potentiometer, diode characteristics, working of npn transistor, logic circuits, rainbows, postulated of special theory of relativity	**K3**
CO3:	Apply coulombs theorem, Kirchhoff's laws, Boolean algebra, Refraction through a prism, Lorentz transformation equation	**K3**
CO4:	Compare electric potential and electric field , calibration of ammeter and voltmeter, OP AMP as an adder and subtractor, logic gates, deviation without dispersion ,dispersion without deviation, Q.W.P, H.W.P, G.P Thomson and Michelson-morley experiment	**K4**
CO5:	Examine parallel plate capacitor, Cary Foster bridge, transistor characteristics CE mode, frequency of Hartley oscillator, Specific rotatory power, Mass energy equivalence	**K4**

CO & PO Mapping:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	2	2	2	2	2
CO 2	3	2	1	2	2	2
CO 3	3	2	2	2	2	2
CO 4	3	2	2	1	2	2
CO 5	2	2	1	1	2	2

***3 –** Advanced Application; **2 –** Intermediate Development; **1 -** Introductory Level

LESSON PLAN

Unit	ALLIEDPHYSICS–I Mechanics, Properties of Matter, Heat and Sound	Hrs	Pedagogy
I	**Mechanics** Torque – Angular momentum –Moment of Inertia –Perpendicular and Parallel axes theorem - Kepler'slawsofplanetarymotion-Newton'slawsofgravitation–Massanddensityof Earth–Boy's method for G–Compound pendulum-Expression for period-Experiment to find "g"	13	Lecture method, PPT, Demonstration
II	**Elasticity** Different moduli of Elasticity-Poisson'sratio–Bendingofbeams–Expression for bending moment–Determination of Young's modulus by uniform and non uniform bending – Torsion–Expression for couple per unit twist – Workdone in twisting Torsional oscillations of a body - Workdone in twisting– Rigidity modulus by torsion pendulum	**12**	Lecture method, PPT, Demonstration
III	**Viscosity** Viscosity - Derivation of Poiseuille's formula - coefficient of viscosity of a liquid by Poiseuille's method – Equation of continuity - Bernoulli's theorem – derivation – Applications of Bernoulli's theorem (Venturimeter and Pitot tube)	**11**	Lecture method, PPT, Model
IV	**Heat** Kinetic theory of gases – Mean free path – Transport phenomena – Expression for the coefficient of Diffusion, viscosity and thermal conductivity – Degree of freedom – Boltzman's law of equipartition of energy – calculation of Υ for mono atomic and diatomic gases - Thermodynamics – First and second laws of thermodynamics (statement only) – Entropy – change of entropy in Carnot's cycle – Change of entropy in conversion of ice into stream	**12**	Lecture method, PPT

V	**Sound** Simple harmonic motion –- Composition of two S.H.M's of equal time periods at right angles - Stationary waves –Properties of stationary waves – Melde's experiment for the frequency of electrically maintained tuning fork (Ttransverse and Longitudinal modes) - Ultrasonics – Production – Piezo electric method – Detection – Kundt's tube and Piezo electric - Properties – Applications	**12**	Lecture method, PPT

Course Designed by: **1. Mrs.A.Lakshmi, 2. Dr.R.Sangeetha**

Learning Outcome Based Education & Assessment (LOBE)
Formative Examination - Blue Print
Articulation Mapping – K Levels with Course Outcomes (COs)

Internal	**COs**	**K - Level**	**Unit**	**Section A**		**Section B**		**Section C (Either or Choice)**		**Section D (Open Choice)**	
				MCQs		**Short Answers**		**No. of. Questions**	**K - Level**	**No. of. Questions**	**K - Level**
				No. of. Questions	**K - Level**	**No. of. Questions**	**K - Level**				
CI AI	**CO1 to CO5**	**K1 to K4**	**I**	2	K1&K2	1	K1	2	K2	1	K2
			II	2	K1&K2	2	K2	2	K3	2	K3
CI AII	**CO1 to CO5**	**K1 to K4**	**III**	2	K1&K2	1	K2	2	K3	1	K3
			IV	2	K1&K2	2	K2	2	K4	2	K4
Question Pattern CIA I & II		No. of Questions to be asked		4		3		4		3	
		No. of Questions to be answered		4		3		2		2	
		Marks for each question		1		2		5		10	
		Total Marks for each section		4		6		10		20	

Distribution of Marks with K Level CIA I & CIA II								
	K Level	**Section A (Multiple Choice Questions)**	**Section B (Short Answer Questions)**	**Section C (Either / Or Choice)**	**Section D (Open Choice)**	**Total Marks**	**% of (Marks without choice)**	**Consolidate of %**
CIA I	**K1**	2	2			4	6.7	50
	K2	2	4	10	10	26	43.3	
	K3			10	20	30	50.0	50
	K4							-
	Marks	4	6	20	30	60	100	100
CIA II	**K1**	2	2			4	6.7	16.7
	K2	2	4			6	10.0	
	K3			10	10	20	33.3	33.3
	K4			10	20	30	50.0	50
	Marks	4	6	20	30	60	100	100

K1- Remembering and recalling facts with specific answers
K2- Basic understanding of facts and stating main ideas with general answers
K3- Application oriented- Solving Problems
K4- Examining, analyzing, presentation and make inferences with evidences
UNIT-V ***will be allotted for individual Assignment in*** **CO5 - K4** ***level which carries five marks as part of CIA component.***

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)											
S.No.	**COs**	**K - Level**	**Unit**	**MOQs**		**Short Answers**		**Section C (Either / or Choice)**		**Section D (Open Choice)**	
				No.of Questions	**K – Level**	**No.of Questions**	**K – Level**	**No.of Questions**	**K – Level**	**No.of Questions**	**K – Level**
1	**CO1 - CO5**	**K1 to K4**	**I**	2	K1 & K2	1	K1	2	K2 & K2	1	K2
2	**CO1 - CO5**	**K1 to K4**	**II**	2	K1 & K2	1	K1	2	K3 & K3	1	K3
3	**CO1 - CO5**	**K1 to K4**	**III**	2	K1 & K2	1	K2	2	K3 & K3	1	K3
4	**CO1 - CO5**	**K1 to K4**	**IV**	2	K1 &K2	1	K2	2	K4 & K4	1	K4
5	**CO1 - CO5**	**K1 to K4**	**V**	2	K1 & K2	1	K2	2	K4 & K4	1	K4
No. of Questions to be Asked				10		5		10		5	

No. of Questions to be answered	10		5		5	3
Marks for each question	1		2		5	10
Total Marks for each section	10		10		25	30

Distribution of Marks with K Level							
K Level	**Section A (Multiple Choice Questions)**	**Section B (Short Answer Questions)**	**Section C (Either/ or Choice)**	**Section D (Open Choice)**	**Total Marks**	**% of (Marks without choice)**	**Consolidated %**
K1	5	4			9	12	47
K2	5	6	10	10	31	34.66	
K3			20	20	40	27	27
K4			20	20	40	26.66	26
Marks	10	10	50	50	120	100	100
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.							

Summative Examinations - Question Paper – Format

Section A (Multiple Choice Questions) **Answer All Questions** **(10x1=10 marks)**			
Q.No	**CO**	**K Level**	**Questions**
1	CO1	K1	
2	CO1	K2	
3	CO2	K1	
4	CO2	K2	
5	CO3	K1	
6	CO3	K2	
7	CO4	K1	
8	CO4	K2	
9	CO5	K1	
10	CO5	K2	
Section B (Short Answers) **Answer All Questions** **(5x2=10 marks)**			
Q.No	**CO**	**K Level**	**Questions**
11	CO1	K1	
12	CO2	K1	
13	CO3	K2	
14	CO4	K2	
15	CO5	K2	
Section C (Either/Or Type) **Answer All Questions** **(5 x 5 = 25 marks)**			
Q.No	**CO**	**K Level**	**Questions**
16) a			

16) b			
17) a			
17) b			
18) a			
18) b			
19) a			
19) b			
20) a			
20) b			
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels			
Section D (Open Choice) **Answer Any Three questions (3x10=30 marks)**			
Q.No	**CO**	**K Level**	**Questions**
21			
22			
23			
24			
25			

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)
DEPARTMENT OF CHEMISTRY
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Course Name	**ALLIED PHYSICS PRACTICAL - I**			
Course Code	**21UPHAP1**	**L**	**P**	**C**
Category	**Allied**		2	1

Nature of course:	EMPLOYABILITY	✓	SKILL ORIENTED	✓	ENTREPRENURSHIP	

Course Objectives:

The learners will be able:
1. To gain knowledge about the experiments based on Optics, Electricity and Electronics
2. To demonstrate modulus of elasticity
3. To understand the bending of beam, forward and reverse biasing, frequency responce
4. To understand current conduction in electrical circuits.
5. To learn about transistor amplifier, oscillator and Operational amplifier

LIST OF EXPERIMENTS (Any Fourteen Experiments)

1. Uniform bending	- (Pin & Microscope)
2. Torsion Pendulum	- Determination of Rigidity modulus and M.I
3. Thermal conductivity of Bad conductor	- Lee's disc
4. Sonometer	- Verification of laws
5. Calibration of low range Voltmeter	- Potentiometer
6. Carey Foster Bridge	- Resistance & resistivity of a wire.
7. Spectrometer	- Refractive indexof a Prism
8..Mirror Galvanometer	- Voltage and current sensitiveness
9.LCR – Series resonance	- Determination of L & Q factor
10.Air wedge	- Thickness of a wire
11.Grating N by λ Normal incidence	- Spectrometer
12.Single stage transistor amplifier	- CE mode
13.Hartley oscillator	- Determination of frequency
14.Logic gates – NAND and NOR	- Using Discrete Components.
15.Zener diode	- Forward & Reverse Characteristics
16.OP AMP	- Adder and Subtractor

Total Practical Hours **30 Hrs**

Books for Study:

1. Srinivasan.M.N.,Balasubramanian.S.,Ranganathan.R., **A Text Book of Practical Physics,** 2017 Edition Sultan Chand & Sons

Books for References:

3. Ouseph.C., Practical Physics and Electronics,2013.S.Viswanathan.P.Ltd
4. Practical Physics and Electronics, C.C.Ouseph, U.J.Rao, V.Vijayendran, S.Viswanathan

Publishers(2007)
Web Resources:
1. https://nptel.ac.in/course.html/physics/experimental physics I, II and III 2. https://nptel.ac.in/courses/115/105/115105110/ 3. https://www.youtube.com/playlist?list=PLuiPz6iU5SQ8-rZn_LgLofRX7n8z4tHYK

Course Outcomes		**K Level**
On successful completion of the course, the learners should be able to		
CO1:	Understand and evaluate the Young's modulus and Rigidity modulus of the given material, the ways to calibrate a low range voltmeter using potentiometer	**K4**
CO2:	Acquire the knowledge of the characteristics of an operational amplifier	**K3**
CO3:	Apply the basic principles of optics to determine the thickness of a wire	**K4**
CO4:	Analyze the electrical parameters like resistance and resistivity using Carrey Foster bridge and characteristics of Zener diode	**K4**
CO5:	Construct Amplifier and Oscillator	**K4**

CO & PO Mapping:

COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	**3**	**2**	**2**	**1**	**2**	**2**
CO 2	**3**	**2**	**2**	**1**	**2**	**2**
CO 3	**3**	**2**	**2**	**1**	**2**	**2**
CO 4	**3**	**2**	**2**	**1**	**2**	**2**
CO 5	**3**	**2**	**2**	**1**	**2**	**2**

***3 –** Advanced Application; **2 –** Intermediate Development; **1 -** Introductory Level

LESSON PLAN

Semester	Major Physics Practical - I	Hrs	Pedagogy
II	1. Carey Foster Bridge - Resistance & resistivity of a wire. 2. Spectrometer - Refractive index of a Prism 3. Mirror Galvanometer - Voltage and current sensitiveness 4. Air wedge - Thickness of a wire 5. Grating N by λ Normal incidence - Spectrometer 6. Single stage transistor amplifier - CE mode 7. Hartley oscillator - Determination of frequency 8. OP AMP - Adder and Subtractor	**30**	Demonstration

Course Designed by: **1. Mrs.A.Lakshmi, 2. Dr.R.Sangeetha**

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)
DEPARTMENT OF CHEMISTRY
(For those who joined in 2021-2022 and after)

Course Name	**DAIRY CHEMISTRY**									
Course Code	21UCHS21						**L**	**P**	**C**
Category	**Skill**						2	-	2
Nature of course:	EMPLOYABILITY		SKILL ORIENTED	✓	ENTREPRENURSHIP	✓			

Course Objectives:

- To Recollect the composition of milk and processing of milk
- To Remember the major milk products and its estimation.
- To Classify the special milk and fermented milk products on their ingredients
- To Execute the types of milk products and its applications.
- To Determine the composition of milk products and their physical properties.

Unit: I	**COMPOSITION OF MILK** Milk – definition – general composition of milk – constituents of milk – lipids, proteins, carbohydrate,vitamins and minerals – physical properties of milk – colour, odour, acidity, specific, gravity, viscosity and conductivity.	6
Unit: II	**PROCESSING OF MILK** Microbiology milk – destruction of microorganisms in milk – physico – chemical changes taking place in milk due to processing – boiling, pasteurization – types of pasteurization –Vacuum pasteurization – Ultra High Temperature Pasteurization.	6
Unit: III	**MAJOR MILK PRODUCTS** Cream – definition – composition – chemistry of creaming process – gravitational and centrifugal methods of separation cream – estimation of fat in cream. Butter – definition -estimation of acidity and moisture content in butter. Ghee – major constituents – common adulterants added to ghee.	6
Unit: IV	**SPECIAL MILK** Standardised milk – definition – merits – reconstituted milk –definition – flow diagram of manufacture – Homogenised milk – flavoured milk –condensed milk – definition composition and nutritive value.	6
Unit: V	**FERMENTED AND OTHER MILK PRODUCTS** Fermentation of milk – definition, condition- Indigeneous products– Gulabjamun, chana sweet, Rasogolla. Ice cream – definition – percentage composition types – Ingredients – manufacture of ice-cream -milk powder – definition – need for making milk powder. **Visit to a pasteurization factory / Milk product company and submission of a report.**	6
	Total Lecture Hours	**30 Hrs**

Books for Study:

1. Jaya Shree Ghosh, Fundamental Concepts of Applied Chemistry. 1st Edition. New Delhi: S.Chand & Company Ltd, 2013.
2. Bagavathi Sundari. K, Applied Chemistry, 1st Edition. Chennai: MJP Publishers, 2006.

Books for References:

1. Wong,N.P. Jenness,R. Keenay,M.& Matrh,E.H, Fundamentals of Dairy Chemistry. 1st Edition. New Delhi: CBS Publishers & Distributors Pvt.Ltd., 1998.
2. Sukumar De. Outlines of Dairy Technology. 1st Edition. New Delhi: Oxford University Press, 2000.
3. K.S. Rangappa and K.T Acharya, Indian Dairy products, Asia Publishing House, 1975.

Web Resources:

1. https://www.youtube.com/watch?v=Vo8m9QvNeAU
2. https://www.youtube.com/watch?v=uYhbekSGMZY
3. https://www.youtube.com/watch?v=oHCntgYIJbE
4. https://nptel.ac.in/courses/126/105/126105013/

Course Outcomes:		**K Level**
On the completion of the course the student will be able to		
CO1:	Understand the chemistry of milk products.	[Up to K2]
CO2:	Outline the techniques of milk processing.	[Up to K3]
CO3:	Construct the flow chart diagram in the manufacture of special milk	[Up to K3]
CO4:	Illustrate the manufacture of various dairy products	[Up to K4]
CO5:	Determine the chemistry of milk products and manufacture of various dairy products.	[Up to K4]

CO & PO Mapping:

Course Outcomes (COs)	**Programme Outcomes (POs)**					
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**
CO 1	**3**	**1**	**2**	**3**	**1**	**2**
CO 2	**1**	**3**	**1**	**1**	**2**	**3**
CO 3	**2**	**2**	**3**	**2**	**3**	**3**
CO 4	**3**	**1**	**2**	**2**	**1**	**2**
CO5	**2**	**3**	**1**	**3**	**2**	**1**
Weightage	**11**	**10**	**9**	**11**	**9**	**11**

***3 –** Advanced Application; **2 –** Intermediate Development; **1** - Introductory Level

LESSON PLAN

UNIT	DAIRY CHEMISTRY	Hrs	Mode
I	**COMPOSITION OF MILK** Milk – definition – general composition of milk – constituents of milk – lipids, proteins, carbohydrate, vitamins and minerals – physical properties of milk – colour, odour, acidity, specific, gravity, viscosity and conductivity.	06	Chalk & Talk, Power Point
II	**PROCESSING OF MILK** Microbiology milk – destruction of microorganisms in milk – physico – chemical changes taking place in milk due to processing – boiling, pasteurization – types of pasteurization –Vacuum pasteurization – Ultra High Temperature Pasteurization.	06	Chalk & Talk, Power Point
III	**MAJOR MILK PRODUCTS** Cream – definition – composition – chemistry of creaming process – gravitational and centrifugal methods of separation cream – estimation of fat in cream. Butter – definition -estimation of acidity and moisture content in butter. Ghee – major constitutents – common adulterants added to ghee.	06	Chalk & Talk, Power Point
IV	**SPECIAL MILK** Standardised milk – definition – merits – reconstituted milk –definition – flow diagram of manufacture – Homogenised milk – flavoured milk – condensed milk – definition composition and nutritive value.	06	Chalk & Talk, Power Point
V	**FERMENTED AND OTHER MILK PRODUCTS** Fermentation of milk – definition, condition- Indigeneous products– Gulabjamun, chana sweet, Rasogolla. Ice cream – definition – percentage composition types – Ingredients – manufacture of ice-cream -milk powder – definition – need for making milk powder. **Visit to a pasteurization factory / Milk product company and submission of a report.**	06	Chalk & Talk, Power Point

Course Designed by: **Dr. V. Ramasamy Raja** & **Dr. K. Muthupandi**

Learning Outcome Based Education & Assessment (LOBE) Formative Examination - Blue Print Articulation Mapping – K Levels with Course Outcomes (COs)								
Internal	**Cos**	**K Level**	**Section A**		**Section B**		**Section C Either or Choice**	**Section D Open Choice**
			MCQs		**Short Answers**			
			No. of. Questions	**K – Level**	**No. of. Questions**	**K - Level**		
CI AI	**CO1**	**Up to K2**	**2**	**K1& K2**	1	K1	2 (K2&K2)	1(K2)
	CO2	**Up to K3**	**2**	**K1 & K2**	2	K2	2 (K3&K3)	2(K2 & K3)
CI AII	**CO3**	**Up to K2**	**2**	**K1 & K2**	1	K2	2 (K2&K2)	1(K2)
	CO4	**Up to K4**	**2**	**K1 & K2**	2	K2	2 (K3&K3)	2(K3 &K4)
Question Pattern CIA I & II		No. of Questions to be asked	4		3		4	3
		No. of Questions to be answered	4		3		2	2
		Marks for each question	1		2		5	10
		Total Marks for each section	4		6		10	20

Distribution of Marks with K Level CIA I & CIA II								
	K Level	**Section A (Multiple Choice Questions)**	**Section B (Short Answer Questions)**	**Section C (Either / Or Choice)**	**Section D (Open Choice)**	**Total Marks**	**% of (Marks without choice)**	**Consolidate of %**
CIA I	**K1**	**2**	**2**	**-**	**-**	**4**	**6.67**	**67**
	K2	**2**	**4**	**10**	**20**	**36**	**60**	
	K3	**-**	**-**	**10**	**10**	**20**	**33.33**	**33**
	K4	**-**	**-**	**-**	**-**	**-**	**-**	**-**
	Marks	**4**	**6**	**20**	**30**	**60**	**100**	**100**
CIA II	**K1**	**2**	**2**	**-**	**-**	**4**	**6.67**	**50**
	K2	**2**	**4**	**10**	**10**	**26**	**43.33**	
	K3	**-**	**-**	**10**	**10**	**20**	**33.33**	**33**
	K4	**-**	**-**	**-**	**10**	**10**	**16.67**	**17**
	Marks	**4**	**6**	**20**	**30**	**60**	**100**	**100**

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)								
S.No	**COs**	**K - Level**	**MCQs**		**Short Answers**		**Section C (Either / or Choice)**	**Section D (Open Choice)**
			No. of Questions	**K – Level**	**No. of Question**	**K – Level**		
1	CO1	Up to K 2	2	K1,K2	1	K1	2 (K2&K2)	1(K2)
2	CO2	Upto K 3	2	K1&K2	1	K1	2 (K3&K3)	1(K3)
3	CO3	Up to K 3	2	K1&K2	1	K2	2 (K3&K3)	1(K3)
4	CO4	Up to K 4	2	K1&K2	1	K2	2 (K3&K3)	1(K4)
5	CO5	Up to K 4	2	K1&K2	1	K2	2 (K3&K3)	1(K4)
No. of Questions to be Asked			10		5		10	5
No.of Questions to be answered			10		5		5	3
Marks for each question			1		2		5	10
Total Marks for each section			10		10		25	30
(Figures in parenthesis denotes, questions should be asked with the given K level)								

Distribution of Marks with K Level							
K Level	**Section A (Multiple Choice Questions)**	**Section B (Short Answer Questions)**	**Section C (Either/ or Choice)**	**Section D (Open Choice)**	**Total Marks**	**% of (Marks without choice)**	**Consolidated %**
K1	**5**	**4**	-	-	**9**	**7.5**	**33**
K2	5	6	10	10	31	25.83	
K3	-	-	40	20	60	50	50
K4	-	-	-	20	20	16.67	17
Marks	10	10	50	50	120	100	100
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.							

Summative Examinations - Question Paper – Format

Section A (Multiple Choice Questions) Answer All Questions (10x1=10 marks)			
Q.No	**CO**	**K Level**	**Questions**
1	CO1	K1	
2	CO1	K2	
3	CO2	K1	
4	CO2	K2	
5	CO3	K1	
6	CO3	K2	
7	CO4	K1	
8	CO4	K2	
9	CO5	K1	
10	CO5	K2	
Section B (Short Answers) **Answer All Questions (5x2=10 marks)**			
Q.No	**CO**	**K Level**	**Questions**
11	CO1	K1	
12	CO2	K1	
13	CO3	K2	
14	CO4	K2	
15	CO5	K2	
Section C (Either/Or Type) **Answer All Questions (5 x 5 = 25 marks)**			
Q.No	**CO**	**K Level**	**Questions**
16) a	CO1	K2	
16) b	CO1	K2	
17) a	CO2	K3	
17) b	CO2	K3	
18) a	CO3	K3	
18) b	CO3	K3	
19) a	CO4	K3	
19) b	CO4	K3	
20) a	CO5	K3	
20) b	CO5	K3	
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels			
Section D (Open Choice) **Answer Any Three questions (3x10=30 marks)**			
Q.No	**CO**	**K Level**	**Questions**
21	CO1	K2	
22	CO2	K3	
23	CO3	K3	
24	CO4	K4	
25	CO5	K4	

MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)
DEPARTMENT OF CHEMISTRY
(For those who joined in 2021-2022 and after)

Course Name	**DYE CHEMISTRY**									
Course Code	21UCHS22							**L**	**P**	**C**
Category	**Skill**							2	0	2
Nature of course:	EMPLOYABILITY		SKILL ORIENTED	✓	ENTREPRE NURSHIP	✓				

Course Objectives:

- To Recall the constitution of colour and dyes.
- To Classify the dyes and demonstration of its various types.
- To Compare nitrogenous, triphenyl, azo and phthalein dyes with their applications
- To Execute the synthesis and applications of quinonoid dyes including vat dyes based
- To Determine the requirement of a pigment and applications and their uses.

Unit: I	**CHEMISTRY AND THEORY OF COLOURS** Colour and Constitution – Relationship of Colour observed to wavelength of light absorbed – Terms used in Colour Chemistry – Chromophores, Auxochromes, Bathochromes shift, Hypsochromic shift.	06
Unit: II	**DIRECT AND DISPERSE DYES** Direct or substantive dyes, mordent dyes, vat dyes, Ingrain or developed dyes, Disperse dyes, sulphur dyes, reactive dyes, oil and spirit soluble dye, food, dry and cosmetic dyes. (Definition, applications and examples only).	06
Unit: III	**NITROGENOUS, TRIPHENYL, AZO AND PHTHALEIN DYES** Classification according to chemical structure: a) Nitro and Nitroso dyes. b) Tripheyl methane dye -malachite green, crystal violet and its applications. c) Azo dyes –, methyl orange, and congo red. d) Phthalein dye– phenolphthalein and fluorescein. (Definition, applications and examples only)	06
Unit: IV	**AZINE, OXACINE AND TRIAZINE DYES** Azine, Oxazine and Triazine Dyes – Synthesis and applications of quinonoid dyes including vat dyes based on anthraquinone.	06
Unit: V	**PIGMENTS AND THEIR APPLICATIONS** Requirement of a pigment – Typical Organic and Inorganic pigments – Applications and their uses in paints – Applications of dyes in other areas – medicine, cosmetics, food and beverages.	06
	Total Lecture Hours	**30 Hrs**

Books for Study:

1. Gurdeep R.Chatwal, Synthetic Dyes – Himalaya Publishing House, 2016.

Books for References:

1. B. S. Bahl and Arun Bahl, Advanced Organic Chemistry, 2012.

2. P.L.Soni and H.M.Chawla , Text book of Organic Chemistry, Sultan & Sons Publications, 2019.
3. K.S.Tewari, N.K.Vishnol & S.N. Mehrotra, A Text book of Organic Chemistry, Vikas Publishing House, 1976.

Web Resources:

1. https://www.youtube.com/watch?v=a6Lw7Dzwvqo
2. https://www.youtube.com/watch?v=sLcT7P-ZS4E
3. https://www.youtube.com/watch?v=SFH0iJmnTLY

Course Outcomes:		**K Level**
On the completion of the course the student will be able to		
CO1:	Identify the colour and constitution observed to wavelength of light.	[Up to K2]
CO2:	Outline the direct or disperse dyes and applications.	[Up to K3]
CO3:	Apply Azine, Oxacine, triazine dyes, pigments towards its applications.	[Up to K3]
CO4:	Classify the Nitro, Nitroso, Triphenyl methane, Azo and Phthalein dyes.	[Up to K4]
CO5:	Determine the properties of dyes and apply in medicine, cosmetics, food and beverages.	[Up to K4]

CO & PO Mapping:

Course Outcomes (COs)	**Programme Outcomes (POs)**					
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**
CO 1	**2**	**3**	**2**	**3**	**1**	**2**
CO 2	**1**	**2**	**3**	**1**	**2**	**3**
CO 3	**2**	**2**	**2**	**2**	**3**	**3**
CO 4	**3**	**1**	**2**	**2**	**1**	**2**
CO5	**2**	**3**	**1**	**3**	**2**	**1**
Weightage	**10**	**11**	**10**	**11**	**9**	**11**

***3 –** Advanced Application; **2 –** Intermediate Development; **1 -** Introductory Level

LESSON PLAN

UNIT	**DYE CHEMISTRY**	**Hrs**	**Mode**
I	**CHEMISTRY AND THEORY OF COLOURS** Colour and Constitution – Relationship of Colour observed to wavelength of light absorbed – Terms used in Colour Chemistry – Chromophores, Auxochromes, Bathochromes shift, Hypsochromic shift.	**06**	**Chalk & Talk, Power Point**
II	**DIRECT AND DISPERSE DYES** Direct or substantive dyes, mordent dyes, vat dyes, Ingrain or developed dyes, Disperse dyes, sulphur dyes, reactive dyes, oil and spirit soluble dye, food, dry and cosmetic dyes. (Definition, applications and examples only).	**06**	**Chalk & Talk, Power Point**

III	**NITROGENOUS, TRIPHENYL, AZO AND PHTHALEIN DYES** Classification according to chemical structure: a) Nitro and Nitroso dyes. b) Tripheyl methane dye -malachite green, crystal violet and its applications. c) Azo dyes –, methyl orange, and congo red. d) Phthalein dye– phenolphthalein and fluorescein. (Definition, applications and examples only)	**06**	**Chalk & Talk, Power Point**
IV	**AZINE, OXACINE AND TRIAZINE DYES** Azine, Oxazine and Triazine Dyes – Synthesis and applications of quinonoid dyes including vat dyes based on anthraquinone.	**06**	**Chalk & Talk, Power Point**
V	**PIGMENTS AND THEIR APPLICATIONS** Requirement of a pigment – Typical Organic and Inorganic pigments – Applications and their uses in paints – Applications of dyes in other areas – medicine, cosmetics, food and beverages.	**06**	**Chalk & Talk, Power Point**

Course Designed by**: Dr. R. Satheesh** & Dr**. J.E. Sangeetha**

Learning Outcome Based Education & Assessment (LOBE)
Formative Examination - Blue Print
Articulation Mapping – K Levels with Course Outcomes (COs)

Internal	**Cos**	**K Level**	**Section A**		**Section B**		**Section Section C Either or Choice**	**Section Section D Open Choice**
			MCQs		**Short Answers**			
			No. of. Questions	**K - Level**	**No. of. Questions**	**K - Level**		
CI AI	**CO1**	**Up to K2**	**2**	**K1 & K2**	1	K1	2 (K2&K2)	1(K2)
	CO2	**Up to K3**	**2**	**K1 & K2**	2	K2	2 (K3&K3)	2(K2 & K3)
CI AII	**CO3**	**Up to K2**	**2**	**K1 & K2**	1	K2	2 (K2&K2)	1(K2)
	CO4	**Up to K4**	**2**	**K1 & K2**	2	K2	2 (K3&K3)	2(K3 &K4)
Question Pattern CIA I & II		No. of Questions to be asked	4		3		4	3
		No. of Questions to be answered	4		3		2	2
		Marks for each question	1		2		5	10
		Total Marks for each section	4		6		10	20

Distribution of Marks with K Level CIA I & CIA II								
	K Level	**Section A (Multiple Choice Questions)**	**Section B (Short Answer Questions)**	**Section C (Either / Or Choice)**	**Section D (Open Choice)**	**Total Marks**	**% of (Marks without choice)**	**Consolidate of %**
CIA I	**K1**	**2**	**2**	**-**	**-**	**4**	**6.67**	**67**
	K2	**2**	**4**	**10**	**20**	**36**	**60**	
	K3	**-**	**-**	**10**	**10**	**20**	**33.33**	**33**
	K4	**-**	**-**	**-**	**-**	**-**	**-**	**-**
	Marks	**4**	**6**	**20**	**30**	**60**	**100**	**100**
CIA II	**K1**	**2**	**2**	**-**	**-**	**4**	**6.67**	**50**
	K2	**2**	**4**	**10**	**10**	**26**	**43.33**	
	K3	**-**	**-**	**10**	**10**	**20**	**33.33**	**33**
	K4	**-**	**-**	**-**	**10**	**10**	**16.67**	**17**
	Marks	**4**	**6**	**20**	**30**	**60**	**100**	**100**

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

CO5 will be allotted for individual Assignment which carries five marks as part of CIA component.

Summative Examination – Blue Print Articulation Mapping – K Level with Course Outcomes (COs)								
S.No	**COs**	**K - Level**	**MCQs**		**Short Answers**		**Section C (Either / or Choice)**	**Section D (Open Choice)**
			No. of Questions	**K – Level**	**No. of Question**	**K – Level**		
1	CO1	Up to K 2	2	K1,K2	1	K1	2 (K2&K2)	1(K2)
2	CO2	Upto K 3	2	K1&K2	1	K1	2 (K3&K3)	1(K3)
3	CO3	Up to K 3	2	K1&K2	1	K2	2 (K3&K3)	1(K3)
4	CO4	Up to K 4	2	K1&K2	1	K2	2 (K3&K3)	1(K4)
5	CO5	Up to K 4	2	K1&K2	1	K2	2 (K3&K3)	1(K4)
No. of Questions to be Asked			10		5		10	5
No.of Questions to be answered			10		5		5	3
Marks for each question			1		2		5	10
Total Marks for each section			10		10		25	30
(Figures in parenthesis denotes, questions should be asked with the given K level)								

Distribution of Marks with K Level							
K Level	**Section A (Multiple Choice Questions)**	**Section B (Short Answer Questions)**	**Section C (Either/ or Choice)**	**Section D (Open Choice)**	**Total Marks**	**% of (Marks without choice)**	**Consolidated %**
K1	**5**	**4**	-	**-**	**9**	**7.5**	**33**
K2	5	6	10	10	31	25.83	
K3	-	-	40	20	60	50	50
K4	-	-	-	20	20	16.67	17
Marks	10	10	50	50	120	100	100
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels.							

Summative Examinations - Question Paper – Format

Section A (Multiple Choice Questions) **Answer All Questions** **(10x1=10 marks)**			
Q.No	**CO**	**K Level**	**Questions**
1	CO1	K1	
2	CO1	K2	
3	CO2	K1	
4	CO2	K2	
5	CO3	K1	
6	CO3	K2	
7	CO4	K1	
8	CO4	K2	
9	CO5	K1	
10	CO5	K2	
Section B (Short Answers) **Answer All Questions** **(5x2=10 marks)**			
Q.No	**CO**	**K Level**	**Questions**
11	CO1	K1	
12	CO2	K1	
13	CO3	K2	
14	CO4	K2	
15	CO5	K2	
Section C (Either/Or Type) **Answer All Questions** **(5 x 5 = 25 marks)**			
Q.No	**CO**	**K Level**	**Questions**
16) a	CO1	K2	
16) b	CO1	K2	
17) a	CO2	K3	
17) b	CO2	K3	

18) a	CO3	K3	
18) b	CO3	K3	
19) a	CO4	K3	
19) b	CO4	K3	
20) a	CO5	K3	
20) b	CO5	K3	
NB: Higher level of performance of the students is to be assessed by attempting higher level of K levels			
Section D (Open Choice) **Answer Any Three questions (3x10=30 marks)**			
Q.No	**CO**	**K Level**	**Questions**
21	CO1	K2	
22	CO2	K3	
23	CO3	K3	
24	CO4	K4	
25	CO5	K4	