

NALLAMUTHU GOUNDER MAHALINGAM COLLEGE (AUTONOMOUS)-POLLACHI

300	B.Sc. Mathematics	Core Elective I: Artificial Intelligence and Machine Learning	21UMS5E2	2021
301	B.Sc. Mathematics	SBE II: Financial Mathematics-II	21UMS6S21	2021
302	B.Sc. Mathematics	Core Elective III: Graph Theory	21UMS6E2	2021
303	B.Sc. Mathematics	Core Elective IV: Introduction to Industry 4.0	21UMS6E4	2021
304	B.Sc. Mathematics	Advanced Learner Course-II: Advanced Operations Research-II	21UMS6AL	2021
305	B.Sc. Mathematics	SBE II: Cryptography	21UMS6S2	2021
306	B.Sc. Mathematics	Programming Lab for Physics Using MATLAB/ Programming Lab for Chemistry Using MATLAB	21UPS2A3/ 21UCY2A3	2021
307	B.Sc. Physics	Mechanics	21UPS507	2021
308	B.Sc. Physics	Advanced Learner Course I: Problem Solving	21UPS5AL1	2021
309	B.Sc. Physics	Programming & Information Security	21UPS6E19	2021
310	B.Sc. Physics	Industrial Instrumentation	21UPS6E20	2021
311	B.Sc. Physics	Python Programming	21UPS6E21	2021
312	B.Sc. Physics	Advanced Learner Course II: Problem Solving	21UPS6AL2	2021
313	B.Sc. Chemistry	Core Paper – I : Inorganic and Organic Chemistry	21UCY101	2021
314	B.Sc. Chemistry	Core Paper-II : Organic and Physical Chemistry	21UCY202	2021
315	B.Sc. Chemistry	Core Practical - I : Inorganic Qualitative Analysis	21UCY203	2021
316	B.Sc. Chemistry	Non Major Elective - I : Introduction to Nanotechnology	21UCY3N11	2021
317	B.Sc. Chemistry	Non Major Elective - II : Textile Chemistry	21UCY4N21	2021
318	B.Sc. Chemistry	Core Paper – VII : Electro Chemistry	21UCY509	2021
319	B.Sc. Chemistry	Core Paper – VIII : Dye Chemistry	21UCY510	2021
320	B.Sc. Chemistry	Core Elective – I : Analytical Chemistry - I	21UCY5E11	2021
321	B.Sc. Chemistry	Core Elective - I : Pharmaceutical Chemistry - I	21UCY5E12	2021
322	B.Sc. Chemistry	Core Elective - I : Leather Chemistry	21UCY5E13	2021
323	B.Sc. Chemistry	Advanced Learner Course – I: Environmental Chemistry (Optional)	21UCY5AL1	2021
324	B.Sc. Chemistry	Core XII: Polymer Chemistry	21UCY614	2021

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325	B.Sc. Chemistry	Core Elective II : Analytical Chemistry - II	21UCY6E21	2021
326	B.Sc. Chemistry	Core Elective - II : Pharmaceutical Chemistry II	21UCY6E22	2021
327	B.Sc. Chemistry	Core Elective - II : Agricultural Chemistry and Analytical Techniques for Agrochemicals	21UCY6E3	2021
328	B.Sc. Chemistry	Advanced Learner Course - II: Applications of Spectroscopy (Optional)	21UCY6AL2	2021
329	B.Sc. Chemistry	Skill Based Elective – II : Green chemistry	21UCY6S21	2021
330	B.Sc. Chemistry	Skill Based Elective - II : Clean energy	21UCY6S22	2021
331	B.Sc. Chemistry	Allied Chemistry Paper – I : Inorganic, Organic And Physical Chemistry	21UPS3A4/ 21UBY3A4/ 21UZY3A4/	2021
332	B.Sc. Chemistry	Allied Chemistry Paper – II : Inorganic, Organic And Physical Chemistry	21UPS4A5/ 21UBY4A5/ 21UZY4A5	2021
333	B.Sc. Botany	Major Paper IX – Bioinformatics	21UBY509	2021
334	B.Sc. Botany	Major Paper X – Mathematics for Biologists	21UBY510	2021
335	B.Sc. Botany	Elective I – Microbiology and Plant pathology	21UBY5E1	2021
336	B.Sc. Botany	Elective I–Ethno Botany	21UBY5E2	2021
337	B.Sc. Botany	Elective I –Herbal cosmetics and Cosmeceuticals	21UBY5E3	2021
338	B.Sc. Botany	Advanced Learner Course - I Biological Disaster – Mitigation & Management	21UBY5AL	2021
339	B.Sc. Botany	Elective II – Habitat Ecology	21UBY6E4	2021
340	B.Sc. Botany	Elective II – Biodiversity and its Conservation	21UBY6E5	2021
341	B.Sc. Botany	Elective II – Environmental Biotechnology	21UBY6E6	2021
342	B.Sc. Botany	Elective III – Bioprospecting	21UBY6E7	2021
343	B.Sc. Botany	Elective III – Biofertilizers	21UBY6E8	2021
344	B.Sc. Botany	Elective III – Seed Technology	21UBY6E9	2021
345	B.Sc. Botany	Major Practical IV (for VI Sem theory papers)	21UBY615	2021
346	B.Sc. Botany	Advanced Learner Course II - Bionanotechnology	21UBY6AL	2021



Metric : 1.2.1

New Course Introduced

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DEPARTMENT OF CHEMISTRY

NALLAMUTHU GOUNDER MAHALINGAM COLLEGE
POLLACHI - 642001

36th Board of Studies Meeting in the Department of Chemistry

Date & Time: 22.05.2021 & 10.00 AM

Agenda.

BoS / CY 36.1	:	Welcome address and Opening Remarks by Chairman, Board of studies in the Department of Chemistry
BoS / CY 36.2	:	Confirmation of the Minutes of the 35 th / Previous meeting of Board of studies in the Department of Chemistry held on 22.02.2020 and Action taken report of 35 th meeting of Board of studies
BoS / CY 36.3	:	36.3.1 Syllabus of I BSc Chemistry under Regulation 2021
		36.3.2 Syllabus of II BSc Chemistry under Regulation 2021
		36.3.3 Syllabus of III BSc Chemistry under Regulation 2021
BoS / CY 36.4	:	Suggestions given by BOS Members
BoS / CY 36.5	:	Any other items



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DEPARTMENT OF CHEMISTRY-(UG Aided)

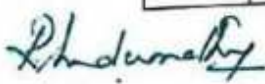
MINUTES OF BOS MEETING

The 36th Meeting of the Board of studies of the Department of Chemistry was held on 22.05.2021 at 10.00 a.m. by online through Google Meet, Nallamuthu Gounder Mahalingam College, Pollachi - 642 001.

1. The following members were present:

1.	Dr. Indumathy Ramasamy Assistant Professor and Head	Chairman
2.	Dr. M. Amutha Assistant Professor of Chemistry	Internal Members
3.	Dr. T. Gowrani Assistant Professor of Chemistry	
4.	Ms. R. Sudha Assistant Professor of Chemistry	
5.	Dr. M. Selladurai Assistant Professor of Chemistry	
6.	Dr. N. Neelakandeswari Assistant Professor of Chemistry	
7.	Dr. R. Prabhakaran Assistant Professor, Department of Chemistry, Bharathiar University, Coimbatore - 641 046. Mobile: +91-9629511620 E-mail: rpnchemist@gmail.com	University Nominee
8.	Dr. M. Malarvizhi Assistant Professor and Head, Department of Chemistry,	Academic Experts

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	Sri GVG Visalakshi College for Women, Udumalpet – 642128. E_mail: malar_gvg@rediffmail.com	
9.	Dr. K. John Adaikalasamy Associate Professor and Head, Department of Chemistry, The American College, Tallakulam, Madurai – 625 002 E_mail: johnadaikala@gmail.com	
10.	Dr. Ashish Mandlik General Manager, Quality Control - R&D, Sakthi Sugar Limited, Soya Division, Ambarampalayam (Post), Pollachi – 642 003. Mobile No: +91 – 9952215577 E_mail : ashishmandlik@yahoo.co.in	Industrial Expert
11.	Ms. N. Pushpalatha Project Associate, CSIR Madras Complex, CSIR – National Environment Engineering Research Institute (CSIR – NEERI), Taramani, Chennai - 600 113	Alumnus
12.	Ms. G. Sushanthini III rd year B.Sc., Chemistry Batch 2018-2021 NGM College, Pollachi – 642 001	Student Member

Dr. Indumathy
HoD

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K. Srinivasan
CDC Co-ordinator

K. SRINIVASAN, M.C.A.,
Co-ordinator
Curriculum Development Cell (CDC)
NGM College (Autonomous)
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Dr. R. Manicka Chezian
COE

Dr. R. MANICKA CHEZIAN, M.Sc., M.S., Ph.D.,
Controller of Examinations
NGM College (Autonomous)
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Dr. R. Manicka Chezian
Principal
Nallamuthu Gounder Mahalingam Coll.
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BoS/CY 36.1

**WELCOME ADDRESS AND OPENING REMARKS BY CHAIRMAN,
BOARD OF STUDIES IN THE DEPARTMENT OF CHEMISTRY**

The Chairman, BoS of the Department of Chemistry welcomed and introduced the members of 35th Board of Studies and thanked each one of them for sparing their valuable time to attend the meeting.

BoS/CY 36.2

TO CONFIRM THE MINUTES OF 35th BOS MEETING HELD ON 22.02.2020. The minutes of the 35th Board of Studies meeting held on 22.02.2020 were communicated to the members. The comments received have been incorporated and placed for confirmation. The same was approved by the PREVIOUS ACADEMIC MEETING NO - 35 Academic council.

~ Action Taken Report (Enclosed in Annexure I)



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BoS/CY 36.3

BoS/CY 36.3.1

I B Sc CHEMISTRY (I & II SEMESTER)

The presented syllabus was accepted by the experts and a few suggestions were given as follows:

➤ **21UCY101 - Core - I : Inorganic and Organic Chemistry**

The subject expert has suggested incorporated the "Atomic structure and Theoretical Principles in Qualitative Analysis" in the Unit - I & II respectively.

➤ **21UCY202 - Core - II : Organic and Physical Chemistry**

The subject expert has suggested incorporated the "Hydroxy acids" in the Unit - I.

➤ **21UCY203 - Core Practical I : Inorganic Qualitative Analysis.**

The concern course teacher added new topics in lab manual like "Inorganic Preparations".

BoS/CY 36.3.2

II B Sc CHEMISTRY (III & IV SEMESTER)

The presented syllabus were accepted by the experts and a few suggestions were given as follows:

➤ **21UCY304 - Core III : Inorganic and Physical Chemistry**

The concern course teacher added new topics "Concept of fugacity" in the Unit - III.

➤ **21UCY405 - Core IV : Inorganic, Organic and Physical Chemistry**

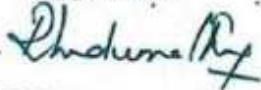
The concern course teacher incorporated new topics "Preparation of phenol and Aromatic amines" in the Unit - II & III respectively.

The following papers from BSc (Chemistry) was accepted by the experts fully without further suggestions

➤ **21UCY406 - Core Practical II : Volumetric and Organic Qualitative Analysis**

New Course Added:

The following papers from BSc (Chemistry) were accepted by the experts fully without further suggestions



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- 21UCY3N11 - Non Major Elective - I : Introduction to Nanotechnology
- 21UCY4N21 - Non Major Elective - II : Textile Chemistry

BoS/CY 36.3.3

III B Sc CHEMISTRY (V & VI SEMESTER)

The following papers from BSc (Chemistry) were accepted by the experts fully without further suggestions

- 21UCY613 - Core XI : Chemical Kinetics and Quantum Mechanics
- 21UPS 4A5/ 21UBY4A6/ 21UZY4A6 - Allied Chemistry Practical

The presented syllabuses were accepted by the experts and a few suggestions were given as follows:

- 21UCY507 - Core V : Coordination and Bioinorganic Chemistry

The concern course teacher incorporated new topics "Factors affecting the stability of chelate complexes" in the Unit - I.

- 21UCY508 - Core VI : Organic Chemistry - I

The subject expert has suggested incorporated the "Introduction to Polysaccharides" in the Unit - III.

- 21UCY509 - Core VII : Electro Chemistry

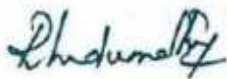
The university nominee has suggested incorporated the "Ionic mobility, determination of solubility, pH scale and H_2-O_2 cell" in the Unit - I, II, III & V.

- 21UCY510 - Core VIII : Dye Chemistry

The subject expert and university nominee has suggested modifying the "textile fibres" in Unit V.

- 21UCY5E11 - Core Elective I : Analytical Chemistry - I

The concern course teacher added new topics the "Sampling, Discussion of various components and Gas liquid chromatography" in the Unit - I, II & V respectively.


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➤ **21UCY611 - Core IX : Physical Methods and Chemical Structure**

The concern course teacher added new topics the "Retro-Diels -Alder Reaction" in Unit – III.

➤ **21UCY612 - Core X : Organic Chemistry – II**

The subject expert has suggested and incorporated the "modification of amino acids and RNA" in Unit II & III respectively.

➤ **21UCY614 - Core XII : Polymer Chemistry**

The concern course teacher modified and added new topics the "Polymer Additives and Application of Spectroscopy" in Unit – III & IV.

➤ **21UCY6E21 - Core Elective II : Analytical Paper – II**

The concern course teacher added new chapter the "Analytical method in chemistry" in Unit - V.

➤ **21UCY615 - Core Lab III : Gravimetric Analysis and Physical Chemistry Experiments**

The concern course teacher added new experiment the "Kinetics study" in lab manual.

➤ **21UCY6S21 - Skill Based Elective - II : Green Chemistry**

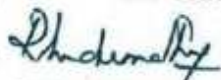
The concern course teacher added new topics the "Future trends in Green Chemistry and uses" in Unit – I & V.

➤ **21UPS3A3/ 21UBY3A4/ 21UZY3A4 - Allied Chemistry Paper – I : Inorganic, organic and physical chemistry**

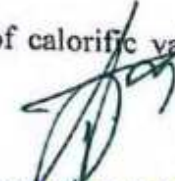
The concern course teacher added new topics the "VSEPR Theory and Mechanism of SN^1 and SN^2 reactions" in Unit – I & III.

➤ **21UPS4A4/ 21UBY4A5/ 21UZY4A5 - Allied Chemistry Paper – II : Inorganic, organic and physical chemistry**

The concern course teacher added new topics the "Determination of calorific value, and


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Components of DNA and RNA" in Unit – I & III.

New Course Added:

The following papers from BSc (Chemistry) were accepted by the experts fully without further suggestions

- 21UCY5E12 - Core Elective - I : Pharmaceutical Chemistry - I
- 21UCY5E13 - Core Elective - I : Leather Chemistry
- 21UCY5AL1 - Advanced Learner Course - I: Environmental Chemistry (Optional) Self Study
- 21UCY6E22 - Core Elective - II : Pharmaceutical Chemistry II
- 21UCY6AL - Core Elective - II : Agricultural chemistry and Analytical techniques for agrochemicals
- 21UCY6S22 - Skill Based Elective - II : Cleanenergy



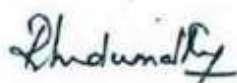
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BoS/CY 36.4 SUGGESTIONS GIVEN BY THE BoS MEMBERS

- 36.4.1: The subject expert has suggested, incorporated the Atomic structure and Theoretical Principles in Qualitative Analysis in Unit - I & II respectively (21UCY101)
- 36.4.2: The concern course teacher added topics in lab manual like Inorganic Preparations (21UCY203).
- 36.4.3: The concern course teacher added new topics "Concept of fugacity" in Unit - III (21UCY304).
- 36.4.4: The concern course teacher incorporated new topics Preparation of phenol and Aromatic amines in the Unit - II & III respectively (21UCY405).
- 36.4.5: The concern course teacher incorporated new topics "Factors affecting the stability of chelate complexes" in Unit - I (21UCY507).
- 36.4.6: The subject expert has suggested incorporated the Introduction to Polysaccharides in Unit - III (21UCY508).
- 36.4.7: The university nominee has suggested incorporated the Ionic mobility, determination of solubility, pH scale and H_2-O_2 cell in Unit - I, II, III & V respectively (21UCY509).
- 36.4.8: The subject expert and university nominee has suggested modifying the Unit V (21UCY510).
- 36.4.9: The concern course teacher added new topics the Sampling, Discussion of various components and Gas liquid chromatography in Unit - I, II & V respectively (21UCY5E11).
- 36.4.10: The concern course teacher added new topics the Retro-Diels -Alder Reaction in Unit - III (21UCY611).



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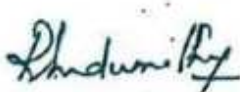
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- 36.4.11: The subject expert has suggested and incorporated the modification of amino acids and RNA in Unit II & III respectively (21UCY612).
- 36.4.12: The concern course teacher modified and added new topics the Polymer Additives and Application of Spectroscopy in Unit – III & IV (21UCY614).
- 36.4.13: The concern course teacher added new chapter the Analytical method in chemistry in Unit - V (21UCY6E21).
- 36.4.14: The concern course teacher added new experiment the Kinetics study in lab manual (21UCY615).
- 36.4.15: The concern course teacher added new topics the Future trends in Green Chemistry and uses in Unit – I & V (21UCY6S21).
- 36.4.16: The concern course teacher added new topics the VSEPR Theory and Mechanism of SN^1 and SN^2 reactions in Unit – I & III (21UPS3A3/ 21UBY3A4/ 21UZY3A4).
- 36.4.17: The concern course teacher added new topics the “Determination of calorific value, and Components of DNA and RNA” in Unit – I & III (21UPS4A4/ 21UBY4A5/ 21UZY4A5).

The members had a brainstorming discussion and interaction among themselves. After discussion, fruitful suggestions were incorporated appropriately in the Curriculum and Syllabi.

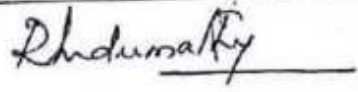
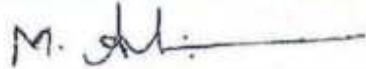
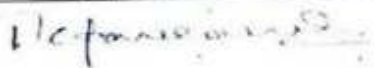
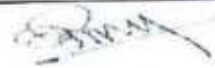
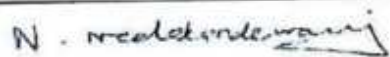
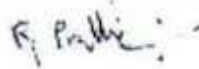
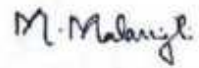
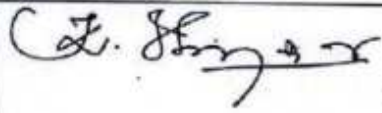
Based on the suggestions given by the members, BOS resolved to recommend the following to the Academic Council for further approval.

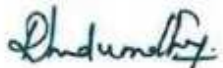
- The syllabus of First Year of B.Sc., Chemistry under Regulation 2021.
- The syllabus of Second Year of B.Sc., Chemistry under Regulation 2021.
- The syllabus of Third Year of B.Sc., Chemistry under Regulation 2021.
- Value added courses


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Members Present:

Chairman	
Dr. Indumathy Ramasamy Assistant Professor and Head	
Internal Members	
Dr. M. Amutha Assistant Professor of Chemistry	
Dr. T. Gowrani Assistant Professor of Chemistry	
Ms. R. Sudha Assistant Professor of Chemistry	
Dr. M. Selladurai Assistant Professor of Chemistry	
Dr. N. Neelakandeswari Assistant Professor of Chemistry	
University Nominee	
Dr. R. Prabhakaran Assistant Professor, Department of Chemistry, Bharathiar University, Coimbatore - 641 046.	
Academic Experts	
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Dr. K. John Adaikalasamy Associate Professor and Head, Department of Chemistry, The American College, Tallakulam, Madurai - 625 002.	


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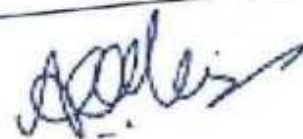
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Industrial Experts

Dr. Ashish Mandlik

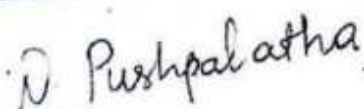
General Manager, Quality Control - R&D,
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Alumnus

Ms. N. Pushpalatha

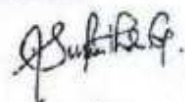
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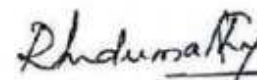
Student Member

Ms. G. Sushanthini

IIIrd year B.Sc., Chemistry
Batch 2018-2021
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ANNEXURE I

Minutes of the 12th / Previous Meeting – Action Taken Report

S.No	Suggestion given by expert members	Action taken
1	The experts have suggested remove the Dehalogenation and HIO_4 and incorporated Nomenclature of organic compounds in Unit – III (20UCY101) offered in the I st Semester.	Reviewed and Implemented
2	The experts have suggested remove the Inorganic Polymers and modified the Fertilizers (20UCY304) offered in the 3 rd Semester.	Implemented
3	The experts have suggested remove the Metallurgy and incorporated the Nuclear Chemistry (20UCY405) offered in the IV th Semester.	Implemented
4	The experts have suggested modify the course title (Nuclear and Coordination Chemistry to Coordination and Bioinorganic Chemistry) and incorporated new topic in all the Unit – I to V (20UCY507) offered in the V th Semester..	Implemented
5	The experts have suggested modify the types of textile fibres in Unit V (20UCY510) offered in the V th Semester.	Implemented
6	The experts have suggested modify the course title (Chemical kinetics and photochemistry to Chemical kinetics and Quantum mechanics) and incorporated new topic in Unit – V (20UCY613) offered in the VI th Semester.	Implemented
7	The experts have suggested modify the Unit II to V (20UCY614) offered in the VI th Semester.	Implemented
8	The experts have suggested modify the Unit III & IV (20UPS3A3/ 20UBY3A4/ 20UZY3A4) offered in the 3 rd Semester.	Implemented

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Percentage of Revision of B.Sc., Chemistry Syllabus under Regulation 2021

DEPARTMENT OF CHEMISTRY							
S.No	Course Code	Course Title	Change Details	% of Changes	Content Deleted	Content Updated	Reason for Change
							Subject Expert / Course Teacher / Alumni Opinion
1	21UCY101	Core paper- I Inorganic and Organic Chemistry	Unit 1	30%		Division of elements into s, p, d and f block elements. Comparison between ionic, covalent and coordinate bonding.	Subject expert
			Unit 2		Ozone: Preparation, properties, structure and uses. Ozone depletion: Causes and effects. Sulphur: Peracids of Sulphur and Sodium	Theoretical Principles in Qualitative Analysis: Basic principles involved in analysis of cations and anions, solubility products, common ion effect. Principles	

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					thiosulphate - Preparation, properties, structure and uses.	involved in separation of cations into groups and choice of group reagents. Interfering anions (fluoride, borate, oxalate and phosphate) and need to remove them after Group II. C_6H_6 molecules.	
			Unit 3			Alkanes: Structure-source-Methods of preparation and properties.	
			Unit 4			Nomenclature	
			Unit 5			Elimination versus substitution- Benzyne mechanism	
2	21UCY202	Core Paper- II Organic and Physical Chemistry	Unit 1	30%		Hydroxy acids: Tartaric acid, citric acid - Preparation and properties.	Course Teacher
			Unit 2			Reimer-	

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						Tiemann, Gattermann. Volumetric analysis: Principle, Preparation of standard solutions, primary and secondary standard substances, Types of titration and Principles of different types of titrations.	
			Unit 3			Applications to particle in one- dimensional box, Orbit and Orbitals,	
			Unit 4			Comparison of isothermal and adiabatic expansions.	
			Unit 5			Hess's law.	

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3	21UCY203	Core Practical-I	Unit	30%	-	Inorganic Preparations: i) Preparation of Tetrammine copper (II) complex. ii) Preparation of Hexammine cobalt (II) Chloride. iii) Preparation of Potassium trioxalato chromate (III).	
4.	21UCY304	Core - III : Inorganic and Physical Chemistry	Unit-3	5 %		Concept of fugacity and concept of activity. Thermodynamic relations for chemical affinity.	Course Teacher
5	21UCY3N11	Non Major Elective - I : Introduction to Nanotechnology	Unit 1	100 %		New Paper (5 Units)	Course Teacher
			Unit 2				
			Unit 3				
			Unit 4				
			Unit 5				
	21UCY3N12	Non Major Elective - I:	Unit 1	0%	-	-	-
			Unit 2				

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		Chemistry of Consumer Products	Unit 3				
			Unit 4				
			Unit 5				
6	21UCY405	Core - IV : Inorganic, Organic and Physical Chemistry	Unit - 2	10%	Duff's reaction	Preparation of phenol from cumene and reactions of phenol in Schotten - Bauman reaction. Preparation of Nitrobenzene	Course Teacher
			Unit - 3		Optical isomerism : Types	Unit 3: Aromatic amines of Reactions: Nitrous acid (HNO ₂). R-S configuration of priority rules with examples. Optical isomerism: Conditions	
7	21UCY406	Core Practical II : Volumetric and Organic Qualitative Analysis	-	-	-	-	-
8	21UCY4N2I	Non Major Elective - II :	Unit 1			New Paper (5 Units)	
			Unit 2				

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		Textile Chemistry	Unit 3	100 %							
			Unit 4								
			Unit 5								
		21UCY4N22	Non Major Elective - II : Food Science and Technology	Unit 1				0%	-	-	-
				Unit 2							
	Unit 3										
	Unit 4										
			Unit 5								
9	21UCY507	Core - V : Coordination and Bioinorganic Chemistry	Unit-I	3%		Factors affecting the stability of chelate complexes	Course Teacher				
10	21UCY508	Core- VI : Organic Chemistry-I	Unit I	5 %		Lossen Rearrangement	Subject Expert				
			Unit III			Saccharin		Introduction to Polysaccharides: Starch and cellulose (Structural determination is not required)			
11	21UCY509	Core VII : Electro Chemistry	Unit 1	20%		Ionic mobility, Discharge of ions on electrolysis	University nominee				
			Unit 2			determination of solubility and solubility product of					

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						sparingly soluble salts	
			Unit 3			pH scale, Common ion effect	
			Unit 4			Determination of Activity Coefficients of Electrolytes	
			Unit 5			Hydrogen - Oxygen fuel cell in manned space flights.	
12	21UCY510	Core - VIII : Dye Chemistry	Unit - 1	20%	Various regions.	-	Subject Expert
			Unit - 2		Diazo coupling and Classification of azo dyes as monoazo and bisazo dyes	Principles governing azo-coupling	



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			Unit - 3	Phthalein and Xanthene dyes: Phenolphthal ein and Rhodamine B. Indigoid dyes: Indigotin - Synthesis and application to fibre. Indigosol - O synthesis	Phthalein dyes: Phenolphthalein - Xanthene dyes: Eosin and Rhodamine B. Synthesis and uses of Indigoid dyes: Indigotin and Indigosol O.
			Unit - 4	Ionic and non-ionic Pigments - Phthalocyanines	-
			Unit - 5	Structure of textile fibres: nylon, polyester and polyacrylamide. Preparation, properties and Uses of Nylon 6.	-


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					Nylon (6,6), Polyester and poly acryl amide, Dye - fibre Interactions - Ionic forces, Hydrogen bonds, Vander Waals forces, Covalent bonds.		
13	2IUCY5E11	Core Elective - I : Analytical Chemistry I	Unit-1	20%		Sampling - Significance of sampling, types of sample, sampling methods for solids, liquid and gases.	Course Teacher
			Unit-2			Discussion of various components with block diagram, Characteristics of TGA curve	
			Unit-3			Estimation of Glucose	
			Unit-5			Gas liquid chromatography.	

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						types, principle, theory and applications of gas liquid chromatography	
14	21UCY5E12	Core Elective - I : Pharmaceutical Chemistry	Unit 1 Unit 2 Unit 3 Unit 4 Unit 5	100%		New Paper (5 Units)	
15	21UCY5E13	Core Elective - I : Leather Chemistry	Unit 1 Unit 2 Unit 3 Unit 4 Unit 5	100%		New Paper (5 Units)	
16	21UCY5S12	Cyber Security – Ethical Hacking	SBE	-	-	-	No correction
17	21UCY5A11	Advanced Learner Course - I: Environmental Chemistry (Optional) Self Study	Unit 1 Unit 2 Unit 3 Unit 4 Unit 5	100 %		New Paper (5 Units)	-
18	21UCY611	Core – IX : Physical Methods and Chemical Structure	Unit III	1%		Retro-Diels Alder Reaction	Course Teacher

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19	21UCY612	Core - X : Organic Chemistry - II	Unit - 2	15%	Classification, Glycine and Alanine:	Definition - chemical and physical properties of amino acids. Tertiary and quaternary structures of proteins	Subject Expert
			Unit - 3		Carbohydrates present in nucleic acids. Lipids: Classification according to Bloor. Sources, extraction, properties and analysis of oils and fats.	Definition, chemical composition Lipids: Classification - oils and fats - structure, chemical reactions, saponification value and iodine value Structure and functions of RNA.	Subject Expert
			Unit - 4		Occurrence of vitamins	Introduction - Importance of vitamins	
			Unit - 5		Antiseptics: Definition, structure and uses of	-	

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					chloramine-T and Iodoform.		
20	21UCY613	Core - XI :Chemical Kinetics and Quantum Mechanics	-	-	-	-	-
21	21UCY614	Core - XII : Polymer Chemistry	Unit 1	20%		Primary And Secondary Bond Forces In Polymers	Course Teacher
			Unit 2			Copolymers - Types, Importance of Copolymers	
			Unit 3		-	Polymer Additives - Fillers, Plasticizers, antioxidants, thermal stabilizers, fire retardants and colourants	
			Unit 4		-	Application of FTIR, UV-visible, NMR, and Mass Spectroscopy for identification of	

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						polymers.	
			Unit 5			Polymethylmethacrylate, Polyethylene terephthalate	
			Unit-1			Characteristic absorption bands of various functional groups	
			Unit-3	25%	Theoretical Principles in Qualitative Analysis and volumetric analysis moved to 1 st and 2 nd Semester	pH of strong and weak acid solutions. Buffer solutions. Henderson equations. Preparation of acidic and basic buffers	
			Unit-4			Theory of complexometric titration, indicators for EDTA titration	
			Unit 5			Analytical method in chemistry (new unit)	
22	2IUCY6E21	Core Elective - II : Analytical Paper II					Course Teacher
23	2IUCY6E22	Core Elective - II : Pharmaceutical	Unit 1			New Paper (5 Units)	
			Unit 2	100 %			
			Unit 3				

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		Chemistry II	Unit 4				
			Unit 5				
24	21UCY6AL2	Core Elective - II : Agricultural chemistry and Analytical techniques for agrochemicals	Unit-1 Unit-2 Unit-3 Unit-4 Unit-5	100%		New Paper (5 Units)	-
25	21UCY615	Core Lab - III : Gravimetric Analysis and Physical Chemistry Experiments		5%	In Gravimetric estimations: Lead as lead sulphate In Kinetics: Persulphate oxidation	In kinetics: Hydrolysis of ethyl acetate using NaOH	Course Teacher
26	21UCY6AL2	Advanced Learner Course - II: Applications of Spectroscopy (Optional) Self Study	Unit-1 Unit-2 Unit-3 Unit-4 Unit-5	100%		New Paper (5 Units)	-
27	21UCY6S21	Skill Based Elective - II: Green Chemistry	Unit-1	20%		Future trends in Green Chemistry - Green nano-synthesis and Green polymer chemistry	Course Teacher

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			Unit-5		Use of Bio-catalysis, Transition metal catalysts, Supported metal catalysts for green synthesis. Solvent less synthesis.	Green Chemistry Using Bio Catalytic Reactions - Introduction - Fermentation and Bio transformations - Production of Bulk and fine chemicals by microbial fermentation	
28	21UCY6S22	Skill Based Elective - II :Cleanenergy	Unit-1 Unit-2 Unit-3 Unit-4 Unit -5	100%		New Paper (5 Units)	
29	21UPS3A3/ 21UBY3A/ 21UZY3A4	Allied Chemistry Paper - I Inorganic, organic and physical chemistry	Unit-1 Unit-2 Unit-3 Unit-5	20%		VSEPR Theory - postulates, limitations and prediction of shapes of molecules. reverse osmosis, electro dialysis Mechanism of SN1 and SN2 reactions Transport number	Course Teacher

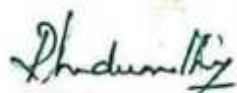
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30	21UPS4A4/ 21UBY4A/ 21UZY4A5	Allied Chemistry Paper – II Inorganic, organic and physical chemistry	Unit-1	20%		Determination of calorific value of solid fuel using Bomb calorimeter	Course Teacher
			Unit-2			Polyester	
			Unit-3			Components of DNA and RNA (Introduction to purines, and pyrimidines only)	
			Unit-5			Catalytic poisoning.	
31	21UPS 4A5/21UBY 4A6/21UZY 4A6	Allied Chemistry Practical	-	-	-	-	-


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NGM COLLEGE CURRICULUM DEVELOPMENT CELL										
B. Sc. CHEMISTRY SCHEME OF EXAMINATION FOR 2021 – 2024 BATCH)										
CHOICE BASED CREDIT SYSTEM & OBES										
SEMESTER – I										
Part	Subject Code	Title of the Paper	Hrs / Week		Hrs / Sem.	Exam Hrs.	Maximum Marks		Total Marks	Credits
			L	P	T		Internal	External		
I	21UTL101 / 21UHN101 / 21UFR101 /	Tamil Paper - I / Hindi Paper - I / French Paper – I	6	-	-	3	50	50	100	3
			6	-	-					
			6	-	-					
II	21UEN101	Communication Skills – I (Level I)	5	-	-	3	50	50	100	3
	21UEN102	Communication Skills – I (Level II)	5	-	-					
III	21UCY101	Core - I : Inorganic and Organic Chemistry	6	-	1	3	50	50	100	5
	21UCY203	Core Practical - I : Inorganic Qualitative Analysis	-	3	-	-	-	-	-	-
	21UCY1A1	Allied - I : Mathematics for Chemistry – I	6	-	-	3	50	50	100	4
	21UCY2A3	Allied Practical I: Programming lab for chemistry using MATLAB	2	-	-	-	-	-	-	-
IV	21UHR101	Human Rights	1	-	-	2	-	50	50	2
	21HEC101	Human Excellence - Personal Values & SKY Yoga Practice - I	1	-	-	2	25	25	50	1
V		Extension Activities: Annexure – I	-	-	-	-	-	-	-	-

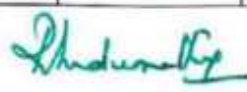
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CC	21CFE101	Fluency in English - I	-	-	-	-	-	-	-	
		Online Course (Optional) (MOOC/NPTEL/SWAYAM)	-	-	-	-	-	-	-	Grade
Total									500	18

SEMESTER – II

Part	Subject Code	Title of the Paper	Hrs / Week		Hrs / Sem.	Exam Hrs.	Maximum Marks		Total Marks	Credits
			L	P	T		Internal	External		
I	21UTL202/	Tamil Paper - II /	6	-	-	3	50	50	100	3
	21UHN202/	Hindi Paper - II /	6	-	-					
	21UFR202	French Paper - II	6	-	-					
II	21UEN202	Communication Skills - II (Level I)	5	-	-	3	50	50	100	3
	21UEN203	Communication Skills - II (Level II)	5	-	-					
III	21UCY202	Core - II : Organic and Physical Chemistry	5	-	1	3	50	50	100	4
	21UCY203	Core Practical I : Inorganic Qualitative Analysis	-	3	-	3	50	50	100	3
	21UCY2A2	Allied - II : Mathematics for Chemistry - II	6	-	-	3	50	50	100	4
	21UCY2A3	Allied Practical I: Programming lab for chemistry using MATLAB	2	-	-	3	50	50	100	2
IV	21EVS201	Environmental Studies	2	-	-	2	-	50	50	2
	21HEC202	Human Excellence - Family Values & SKY Yoga Practice - II	1	-	-	2	25	25	50	1
V		Extension Activities Annexure - I	-	-	-	-	-	-	-	-

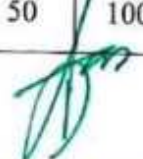

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CC	21CFE202	Fluency in English - II	-	-	-	-	-	-	-	
	21CMM201	Manaiyiyal Mahathuvam - I	1	-	-	2	-	50	50	Grade
	21CUB201	Uzhavu Bharatham - I	1	-	-	2	-	50	50	Grade
		Online Course (Optional) (MOOC/NPTEL/SWAYAM)	-	-	-	-	-	-	-	Grade
Total									700	22

SEMESTER - III										
Part	Subject Code	Title of the Paper	Hrs / Week		Hrs / Sem	Exam Hrs.	Maximum Marks		Total Marks	Credits
			L	P	T		Internal	External		
I	21UTL303/ 21UHN303/ 21UFR303	Tamil Paper - III /	5	-	-	3	50	50	100	3
		Hindi Paper - III /	5	-	-					
		French Paper - III	5	-	-					
II	21UEN303	Communication Skills - III (Level I)	6	-	-	3	50	50	100	3
	21UEN304	Communication Skills - III (Level II)	6	-	-					
III	21UCY304	Core - III : Inorganic and Physical Chemistry	6	-	2	3	50	50	100	4
	21UCY406	Core Practical II : Volumetric and Organic Qualitative Analysis	-	3	-	-	-	-	-	-
	21UCY3A4	Allied III : Physics for	5	-	-	3	50	50	100	4


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		Mathematics & Chemistry I								
	21UCY4A6	Allied Practical II : Physics Lab for Mathematics & Chemistry	-	3	-	-	-	-	-	-
IV	21UCY3N1 / 21UCY3N2	Non Major Elective - I : Introduction to Nanotechnology / Non Major Elective -II : Chemistry of Consumer Products	1	-	2	-	50	50	2	
	21HEC303	Human Excellence - Professional Values & Ethics - III	1	-	2	25	25	50	1	
V		Extension Activities - Annexure - I	-	-	-	-	-	-	-	
CC	21CFE303	Fluency in English - III	-	-	-	-	-	-	-	
	21CMM302	Manaiyiyal Mahathuvam - II	1	-	2	-	50	50	Grade	
	21CUB302	Uzhavu Bharatham - II	1	-	2	-	50	50	Grade	
Total								500	17	

SEMESTER - IV								
Part	Subject Code	Title of the Paper	Hrs /Week	Hrs / Sem	Exam Hrs.	Maximum Marks	Total Marks	Credits

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 M.A., M.Phil., B.Ed., Ph.D.,
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			L	P	T		Interna I	Externa I		
I	21UTL404/ 21UHN404/ 21UFR404	Tamil Paper – IV /	5	-	-	3	50	50	100	3
		Hindi Paper – IV/	5	-	-					
		French Paper – IV	5	-	-					
II	21UEN404	Communic ation Skills - IV (Level I)	6	-	-	3	50	50	100	3
	21UEN405	Communic ation Skills - IV (Level II)	6	-	-					
III	21UCY405	Core - IV : Inorganic, Organic and Physical Chemistry	6	-	1	3	50	50	100	4
	21UCY406	Core Practical II: Volumetric , Organic Qualitative Analysis and Organic Preparation s	-	3	-	6	50	50	100	5
	21UCY4A5	Allied - IV: Physics for Mathemati cs & Chemistry II	5	-	-	3	50	50	100	4
	21UCY4A6	Allied	-	3	-	3	50	50	100	2

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		Practical II: Physics Lab for Mathematics & Chemistry								
IV	21UCY4N1/ 21UCY4N2	Non Major Elective - II : Textile Chemistry / Non Major Elective - II : Food Science and Technology	1	-	-	2	-	50	50	2
	21HEC404	Human Excellence - Social Values & SKY Yoga Practice - IV	1	-	-	2	25	25	50	1
V		Extension Activities - Annexure - I	-	-	-	-	-	50	50	1
CC	21CFE404	Fluency in English - IV	-	-	-	-	-	-	-	
	21CMM403	Manaiyiyal Mahathuvam - III	1	-	-	2	-	50	50	Grade
	21CUB403	Uzhavu Bharatham - III	1	-	-	2	-	50	50	Grade
Total									750	25

SEMESTER - V									
Part	Subject Code	Title of the Paper	Hrs / Week	H rs	Ex a	Maximu m	Tot al	Cr edi	

Indumathy

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R. Muthukumar

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					/ Sem	m Hrs.	Marks		Marks	ts
			L	P			Internal	External		
III	21UCY507	Core - V : Coordination and Bioinorganic Chemistry	4	-	1	3	50	50	100	4
	21UCY508	Core - VI : Organic Chemistry - I	4	-	1	3	50	50	100	4
	21UCY509	Core - VII : Electrochemistry	4	-	1	3	50	50	100	4
	21UCY510	Core - VIII : Dye Chemistry	4	-	1	3	50	50	100	4
	21UCY5E1/ 21UCY5E2/ 21UCY5E3	Core Elective - I : / Analytical Chemistry - I Core Elective - I : / Pharmaceutical Chemistry - I Core Elective - I : Leather Chemistry	4	-	-	3	50	50	100	5
	21UCY615	Core Lab - III : Gravimetric Analysis and Physical Chemistry Experiments	-	6	-	-	-	-	-	-
	21UCY5AL	Advanced Learner Course - I: Environmental Chemistry (Optional) Self Study	-	-	-	2	50	50	100	4*
IV	21UCY5VA	Biofertilizers (Optional)	30 Hrs	-	-	2	-	50	50	2*
	21UCY5S1 / 21UCY5S2	Skill Based Elective - I : Network and Information Security / Skill Based Elective - I : Cyber security and Ethical Hacking	2	-	-	2	-	50	50	2
	21HEC505	Human Excellence - National Values & SKY Yoga Practice - V	1	-	-	2	25	25	50	1
	21GKL501	General Awareness - Self Study	SS	-	-	2	-	50	50	2


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CC	21CFE505	Fluency in English – V	-	-	-	-	-	-	-	-
	21CSD501	Soft Skills Development - I	-	-	-	-	-	-	-	Grade
Total									650	26

SEMESTER – VI										
Part	Subject Code	Title of the Paper	Hrs / Week		Hrs / Sem	Exam Hrs.	Maximum Marks		Total Marks	Credits
			L	P	T		Inter	Exter		
III	21UCY611	Core - IX : Physical Methods and Chemical Structure	4	-	1	3	50	50	100	4
	21UCY612	Core - X : Organic Chemistry – II	4	-	1	3	50	50	100	4
	21UCY613	Core - XI : Chemical Kinetics and Quantum Mechanics	4	-	1	3	50	50	100	4
	21UCY614	Core - XII : Polymer Chemistry	4	-	1	3	50	50	100	4
	21UCY6E1 / 21UCY6E2 / 21UCY6E3	Core Elective - II : / Analytical Chemistry – II Core Elective - II : / Pharmaceutical Chemistry II Core Elective - II : Agricultural Chemistry and Analytical Techniques for Agrochemicals	4	-	-	3	50	50	100	5
	21UCY615	Core Lab - III : Gravimetric Analysis and Physical Chemistry Experiments	-	6	-	6	50	50	100	6
	21UCY616	Summer internship	-	-	-	-	-	100	100	2
	21UCY6AL	Advanced Learner Course - II: Applications of Spectroscopy (Optional) Self Study	-	-	-	3	50	50	100	4*

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IV	21UCY6VA	Chemistry in Every Day Life	30 Hrs	-	2	-	50	50	2*
	21UCY6S1 / 21UCY6S2	Skill Based Elective - II : Green Chemistry / Skill Based Elective - II : Clean energy	2	-	2	-	50	50	2
	21HEC606	Human Excellence - Global Values & SKY Yoga Practice - VI	2	-	2	25	25	50	1
CC	21CFE606	Fluency in English - VI	-	-	-	-	-	-	-
	21CSD602	Soft Skills Development - II	-	-	-	-	-	-	Grade
Total								800	32

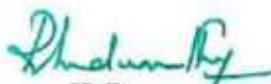
AL - Advanced Learner Course (Optional); VA - Department Specific Value Added Course

*Extra Credits

*Credits - Based on course content maximum, of 4 credits.

Grand Total = 3900;

Total Credits = 140



HoD

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Coimbatore District

DEPARTMENT OF CHEMISTRY
B.Sc., PHYSICS/B.Sc., BOTANY/ B.Sc., ZOOLOGY DEGREE
PROGRAMME
III AND IV SEMESTERS
SCHEME OF EXAMINATIONS

SEM.	SUBJECT CODE	TITLE	HRS/ EXAM	HRS/ WEEK	MAXIMUM MARKS		TOTAL MARKS	CREDITS
					INT	EXT		
III	21UPS3A4/ 21UBY3A4/ 21UZY3A4	ALLIED CHEMISTRY PAPER – I INORGANIC, ORGANIC AND PHYSICAL CHEMISTRY	3	6	50	50	100	4
IV	21UPS4A5/ 21UBY4A5/ 21UZY4A5	ALLIED CHEMISTRY PAPER – II INORGANIC, ORGANIC AND PHYSICAL CHEMISTRY	3	6	50	50	100	4
IV	21UPS4A6/ 21UBY4A6/ 21UZY4A6	ALLIED CHEMISTRY PRACTICAL	3	2	50	50	100	2


HoD

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Coimbatore District

Programme Code:	B.Sc	Programme Title:	Bachelor of Chemistry
Course Code:	21UCY101	Title	Batch: 20
Lecture Hrs./Week	6	Tutorial Hrs./Sem.	Semester:
			Credits:

Core Paper – I
Inorganic and Organic
Chemistry

Course Objective

To understand basic theoretical concepts on chemical bonding and hybridization, acquire aromaticity, mechanistic pathway of aliphatic nucleophilic substitutions and aromatic electrophilic in organic reactions.

Course Outcomes

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

CO Number	CO Statement	Know- Le
CO1	Recollect and understand the types of chemical bonding	K1
CO2	Deduce the geometry of the molecules and apply MOT to Homonuclear and Heteronuclear molecules and understand the basic theoretical concepts in inorganic qualitative analysis.	K2ai
CO3	Write the nomenclature of organic compounds and analyse the reactions of alkenes and examine the relevant name reaction	K2
CO4	Apply the concepts in determining the mechanisms of aliphatic nucleophilic substitution reactions	
CO5	Apply and interpret the factors affecting in determining the orientation and reactivity of substituted benzene	K2

PO / PSO		Mapping with PO / PSO Vs CO								it I
CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1
CO1		H	H	H	M	M	M	M	M	-
CO2		H	H	H	M	M	M	H	H	-
CO3		H	H	H	H	M	H	M	M	-
CO4		H	H	H	M	M	M	M	M	-
CO5		H	H	H	M	M	M	M	M	-

H – High; M – Medium; L – Low

Units	Content	Hrs
Unit I	Periodic Properties and Theory of Bonding: Long form of Periodic Table - Main features, advantages and defects. Division of elements into s, p, d and f block elements. Periodic properties of elements. Chemical bonding: Variable electrovalency - Pseudo inert gas configuration-Inert pair effect. Ionic Bonding - Conditions for the formation of an ionic compound, Characteristics of Ionic compounds. Crystal lattice energy and its determination by Born-Haber Cycle. Covalent Bonding: Lewis - Langmuir concept and Octet rule, Characteristics of covalent compounds- Partial ionic character in covalent bond. Fajan's rules and their applications in explaining melting points and solubility properties. Co-ordinate covalent bonding: Characteristics. Comparison between ionic, covalent and coordinate bonding. Hydrogen bonding-concept, types and applications - melting and boiling points of hydrides of nitrogen, Oxygen, Fluoride and Lesser density of ice.	19
Unit II	Molecular Orbital Theory: Concept of Hybridization- sp, sp^2 and sp^3 with reference to C_2H_2, C_2H_4, CH_4 and C_6H_6 molecules. Applications of VSEPR Theory to $BeCl_2$, BCl_3, H_2O, NH_3, CH_4, PCl_5 and SF_6 molecules. Molecular Orbital Theory: Symmetry of molecular orbitals. Application to simple Homonuclear and Heteronuclear molecules - H_2, He_2, O_2, F_2, N_2, CO and NO. Bond order and magnetic properties. Theoretical Principles in Qualitative Analysis: Basic principles involved in analysis of cations and anions, solubility products, common ion effect. Principles involved in separation of cations into groups and choice of group reagents. Interfering anions (fluoride, borate, oxalate and phosphate) and need to remove them after Group II.	18
Unit II	Polar Effects and Reactions of Alkanes, Alkenes: Nomenclature of organic compounds - IUPAC naming of simple and substituted aliphatic, aromatic and alicyclic compounds - priorities of functional groups in polyfunctional compounds. Polar Effects: Inductive, mesomeric, electromeric and hyperconjugative effects. Steric inhibition of resonance Homolytic and Heterolytic fission: Free radicals, carbocation, carbanion and their stability. Electrophiles and nucleophiles with examples. Alkanes: Structure - source - Methods of preparation and properties. Alkenes: Preparations involving dehydrohalogenation, dehydration, reduction of alkynes and Wittig reaction. Mechanism of $\square$-Elimination: E1 and E2. Saytzeff and	18

	Hofmann rules. Reactions of Alkenes: Addition of hydrogen halide, Markovnikov rule, peroxide effect, hypohalous acid, sulphuric acid, hydroboration. Oxidation by alkaline KMnO ₄ and Ozonolysis.
Unit IV	Reactions of Dienes and Alkynes: Dienes-Nomenclature, Classification and stability, 1,2 and 1,4 addition of Butadiene. Diels-Alder reaction. Alkynes: Preparation of alkynes by dehydrohalogenation, dehalogenation and electrolysis. Reactions: Hydroboration, addition of hydrogen halides, water, formation of acetylides and Ozonolysis. Grignard reagent - Preparation and synthetic utility of Ethyl magnesium iodide. Aliphatic Nucleophilic Substitution: S _N ¹ and S _N ² mechanisms. Effect of structure of substrate, nucleophile and solvent.
Unit V	Electrophilic Substitution: Benzene: Resonance, Resonance energy and structure. Aromaticity: Huckel's rule. Non-benzenoid aromatic compounds. Cyclopropanation, cyclopentadienyl anion and Tropylium cation. Aromatic Electrophilic Substitution: Arenium ion mechanism, mechanism of nitration, sulphonation, halogenation, Friedel-Crafts alkylation and acylation in benzene. Orientation: reactivity of Monosubstituted benzene: ortho, para and meta directing. Role of induction and mesomeric effects in electrophilic aromatic substitution in phenol and nitrobenzene.
	Total Contact Hrs

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Test, Seminar, Quiz, Assignments, Group Task.

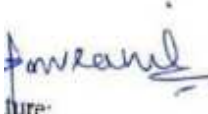
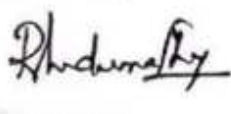
Text Books

S.NO.	AUTHOR	TITLE OF THE BOOK	PUBLISHER/EDITION	YEAR PUBLISHED
1	Soni. P.L	Text book of Inorganic Chemistry	Sultan Chand & Sons, New Delhi	
2	Bahl.B.S. and Arun Bahl	Advanced Organic Chemistry	S.Chand & Company Ltd., New Delhi	

Soni. P.L.	Text book of Organic Chemistry	Sultan Chand & Sons, New Delhi	2012
Madan. R.D.	Advanced Inorganic Chemistry	S.Chand & Company Ltd., New Delhi	2011

ence Books

AUTHOR	TITLE OF THE BOOK	PUBLISHER/EDITION	YEAR OF PUBLICATION
Finar I.L.	Organic Chemistry	Longmans	2006
Morrison. R.T. and Boyd. R.N.	Organic Chemistry	17 th Edition. Pearson Hall Prentice.	2011
Wahid U.Malik, G.D. Tuli, and Madan. R.D.	Selected Topics in Inorganic Chemistry	S.Chand & Company, New Delhi	2006

Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	Name and Signature	Name and Signature	Name and Signature
Dr. T.Gowrani 	Name: Dr. Indumathy Ramasamy 	Name: Mr. K. Srinivasan 	Name: Dr. R. Manicka Chezian 
Signature:	Signature:	Signature:	Signature:

K. SRINIVASAN, M.C.A.,
Co-ordinator
Curriculum Development Cell (CDC)
NGM College (Autonomous)
Pollachi - 642 001.

Dr. R. MANICKA CHEZIAN, M.Sc., M.S. Ph.D.,
Controller of Examinations
NGM College (Autonomous)
POLLACHI - 642 001.

Programme Code:	B.Sc		Programme Title:	Bachelor of Chemistry	
Course Code:	21UCY202		Title	Batch:	2021 – 2024
Duration Hrs./Week	5	Tutorial Hrs./Sem.	1	Semester:	II
			Core Paper – II Organic and Physical Chemistry	Credits:	4

Course Objective

Acquire knowledge on the mechanisms of reactions in carbonyl compounds, understand basic concepts of quantum mechanics and important laws of thermodynamics.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Discuss the preparation, properties of alcohols, dicarboxylic acids, hydroxy acids and esters	K2
CO2	Analyse the reactions of aldehydes / ketones and examine the relevant reactions and understand the basic principles involved in volumetric analysis	K4, K3
CO3	Apply quantum mechanical treatment to sub-atomic particles of atom	K3
CO4	State and apply first law of thermodynamics, perform calculations for physical process	K3, K4
CO5	Analyse the feasibility of the reaction	K4

Mapping with PO / PSO Vs CO

PO / PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	H	H	H	M	M	M	M	H	-	-
CO2	H	H	H	M	M	H	H	H	H	-
CO3	H	H	H	M	M	M	M	M	-	-
CO4	H	M	H	M	M	M	M	M	-	-
CO5	H	H	H	M	M	M	M	H	-	-

H – High; M – Medium; L – Low

Units	Content
Unit I	Alcohols: General methods of Preparation and its chemical properties. Distinction among primary, secondary and tertiary alcohols. Manufacture of ethanol from molasses. Absolute alcohol, methylated spirit, power alcohol. Ethers: General methods of preparation and its chemical properties. Preparation and properties of diethyl ether. Dicarboxylic acids: Preparation and properties of oxalic, malonic, succinic and phthalic acids. Hydroxy acids: Tartaric acid, citric acid - Preparation and properties. Acetoacetic ester: Preparation and its applications in the synthesis of acetone, crotonic acid, crotonic acid and 4-methyl uracil. Keto-enol tautomerism. Malonic ester: Preparation and its applications in the synthesis of crotonic acid, barbituric acid, succinic acid and dimethyl acetic acid. Acid derivatives: Acetyl chloride and acetic anhydride- Preparation, properties and uses.
Unit II	Carbonyl compounds: Preparation by Rosenmund reduction, Stephen reaction, dry distillation of calcium salts of fatty acids. Mechanism of Nucleophilic addition reaction in aldehydes and ketones: Addition of Grignard reagent, HCN, NaHSO₃, NH₃. Addition with NH₂-NH₂, C₆H₅NHNH₂ and ROH. Mechanism of Aldol, Benzoin condensation, Cannizzaro, Reimer-Tiemann, Gattermann and Reformsky reactions. Reduction: Wolff-Kishner, Clemmensen, MPV reductions. Reduction reagents: Lithium Aluminium Hydride and Sodium Borohydride. Oxidation of aldehydes and ketones using Tollen's reagent, Fehling's solution, SeO₂ and Oppenauer oxidation. Volumetric analysis: Principle, Preparation of standard solutions, primary and secondary standard substances, Types of titration and Principles of different types of titrations.
Unit III	Quantum Theory: Failure of classical theory in explaining the black body radiation. Planck's radiation theory, Quantisation of energy. Einstein's theory of Photoelectric effect. Rutherford atomic model- Bohr theory of hydrogen atom - Sommerfeld model.

	Particle and wave character of electrons. De-Broglie's equation. Davison and Germer experiment. Heisenberg's uncertainty principle - Compton effect. Schrodinger wave equation (Derivation not required). Applications to particle in one-dimensional box, Orbit and Orbitals, significance of Ψ and Ψ^2 .	
IV	Thermodynamics: Importance, Limitations and Thermodynamic terms. Types of Thermodynamic equilibrium and processes. First law of Thermodynamics: Law of conservation of energy, internal energy. Enthalpy and Heat capacity: Relation between C_p and C_v . Work done in an isothermal reversible expansion of an ideal gas. Reversible adiabatic expansion of an ideal gas: Relation between temperature and volume and temperature and pressure. Comparison of isothermal and adiabatic expansions. Joule-Thomson Experiment: Joule-Thomson Effect, Joule - Thomson coefficient for an ideal gas, Inversion Temperature. Zeroth law of thermodynamics. Absolute zero of temperature.	15
V	Second law of thermodynamics: Limitations of First law. Need for Second law of thermodynamics. Various statements of Second law of thermodynamics. Thermo chemistry: Definition - Standard Enthalpy of formation and Enthalpy of neutralization. Hess's law, Measurement of enthalpy of reactions by Bomb Calorimeter. Bond energy and its applications. Entropy: Definition, Entropy changes in reversible and irreversible spontaneous processes. Entropy change accompanying change of phase, isothermal expansion of an ideal gas with change in pressure, volume and temperature. Entropy of mixing of ideal gases. Carnot's cycle, Physical significance of entropy. Helmholtz and Gibbs free energy functions: Variation of free energy with temperature or pressure, Gibbs Helmholtz equation. Third law of Thermodynamics (statement only).	15
	Total Contact Hrs	75

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Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

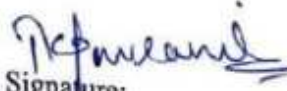
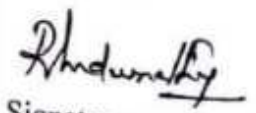
Test, Seminar, Quiz, Assignments, Group Task.

Text Books

S.NO.	AUTHOR	TITLE OF THE BOOK	PUBLISHER/EDITION	YEAR PUBLISHED
1.	Soni. P.L	Text book of Inorganic Chemistry	Sultan Chand & Sons, New Delhi	
2.	Bahl.B.S. and Arun Bahl	Advanced Organic Chemistry	S.Chand & Company Ltd., New Delhi	
3.	Puri B.R., Sharma L.R. and Pathania M. S.	Principles of Physical Chemistry	Vishal Publishing House.	
4.	Negi. A.S., and Anand S.C.	A text book of Physical chemistry	New Age International PVT Ltd	

Reference Books

S.NO.	AUTHOR	TITLE OF THE BOOK	PUBLISHER/EDITION	YEAR PUBLISHED
1	Finar I.L.	Organic Chemistry. Vol.I and II	Pearson Education Singapore	
2	Morrison. R.T. and Boyd. R.N.	Organic Chemistry	17 th Edition. Pearson Hall Prentice.	
3	Soni. P.L. and Dharmarha O.P.	Text book of Physical Chemistry	S.Chand & Company, New Delhi	

Course Designed by	Head of the Department	Curriculum Development Cell	Controller Examination
Name and Signature Name: Dr. T.Gowrani  Signature:	Name and Signature Name: Dr. Indumathy Ramasamy  Signature:	Name and Signature Name: Mr. K. Srinivasan  Signature:	Name and Signature Name: Dr. R. Manicka Chezian  Signature: 

Programme Code:	B.Sc	Programme Title:	Bachelor of Chemistry	
Course Code:	21UCY203	Title	Batch:	2021 – 2024
Duration Hrs./Week	3	Core Practical-I	Semester:	II
		Inorganic Qualitative Analysis	Credits:	3

Course Objective

Know about the skills of using glassware's and apparatus used in qualitative analysis, develop the analytical skills in inorganic qualitative analysis and know the chemistry principles applied in qualitative analysis.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Remember the procedure for the analysis	K1, K2
CO2	Understand and apply the theoretical knowledge to chemical reactions responsible for the reactions leading to identification of the given radicals	K2, K3
CO3	Separate the cations into groups and to identify them	K1, K4
CO4	Apply the theoretical knowledge in the preparation of inorganic metal complexes	K3

Mapping with PO / PSO Vs CO

PO / PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	H	H	H	H	H	H	M	M	H	M
CO2	H	H	H	H	H	H	M	M	H	M
CO3	H	H	H	H	H	H	M	M	H	M
CO4	H	H	H	H	H	H	M	M	H	M

H – High; M – Medium; L – Low

Units	Content
	1. Inorganic mixture analysis: Analysis of mixture containing two anions or which is interfering in nature and two cations: The following radicals may given:- Carbonate, Nitrate, Fluoride, Sulphate, Chloride, Oxalate, Phosphate, Borate, Lead, Copper, Nickel, Bismuth, Cadmium, Manganese, Zinc, Calcium, Strontium, Barium, Magnesium and Ammonium. 2. Inorganic Preparations i) Preparation of Tetrammine copper (II) complex. ii) Preparation of Hexammine cobalt (II) Chloride. iii) Preparation of Potassium trioxalato chromate (III).
	Total Contact Hrs

Pedagogy

Demonstration and individual hands on practical.

Assessment Methods

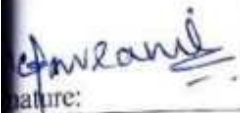
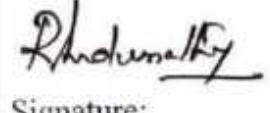
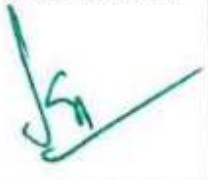
Performance of laboratory work, Report, Recording the report, Submission of

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION
1	Venkateswaran, V., Veeraswamy. R and Kulandaivelu. A.R	Basic Principles of Practical Chemistry	S.Chand Publications.
2	Svehla G. and Sivasankari.B	Vogel's Qualitative Inorganic Analysis	7 th Edn. Pearson India education services.

Reference Books

NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Thomas, A.O	Practical Chemistry	Cannanore: Scientific Book Center	2003
2	Ramanujam V.V.	Inorganic semi micro qualitative analysis	3 rd Edn. The National Publishing Co.	2004

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	Name and Signature	Name and Signature	Name and Signature
Name: Dr. T. Gowrani 	Name: Dr. Indumathy Ramasamy 	Name: Mr. K. Srinivasan 	Name: Dr. R. Manicka Chezian 
Signature:	Signature:	Signature:	Signature:

K. SRINIVASAN, M.C.A.,
Co-ordinator
Curriculum Development Cell (CDC)
NGM College (Autonomous)
Pollachi - 642 001.

Dr. R. MANICKA CHEZIAN, M.Sc.
Controller of Examination
NGM College (Autonomous)
POLLACHI - 642 001

Programme Code:	B.Sc.	Programme Title:	Bachelor of Chemistry	
Course Code:	21UCY3N1	Title	Batch:	2021 – 2024
Duration Hrs./Week	1	Non Major Elective - I	Semester:	III
		Introduction to Nanotechnology	Credits:	2

Course Objective

Generate basic awareness about Nanoscience and Technology and its current applications.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Recollect the basics of nanoscience and nanomaterials	K1
CO2	Understand the various types of nanomaterials and the approaches towards the preparation of nanomaterials	K2
CO3	Sketch the specific properties of nanomaterials	K3
CO4	Illustrate the properties and uses of carbon nanomaterials	K3
CO5	Explain the applications of nanomaterials based on their properties	K3

Mapping with POs / PSOs Vs COs

PO / PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	H	H	H	-	-	-	-	-	-	L
CO2	H	H	H	-	-	-	-	-	-	L
CO3	H	H	H	-	-	-	-	-	-	L
CO4	H	H	H	-	-	-	-	M	-	L
CO5	H	H	H	-	-	-	-	M	-	L

High; M – Medium; L – Low

Units	Content
Unit I	General concepts in Nanotechnology – Nanotechnology – Definition, History, nanotechnology, Nature nanotechnology.
Unit II	Top-down approach and Bottom-up approach for the preparation of nanomaterials, one dimensional, two dimensional and three dimensional nanostructures.
Unit III	Properties of Nanomaterials – High surface – volume ratio, Size dependent properties of nanomaterials, Quantum confinement effect.
Unit IV	Carbon Nanomaterials – Graphite, Graphene, SWCNT, MWCNT – Properties and applications.
Unit V	Applications of Nanomaterials – Energy Storage Devices, Nanosensors, Drug Delivery & Environmental Protection.
	Total Contact

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Test, Seminar, Quiz, Assignments, Group Task.

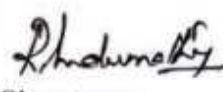
Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS EDITION
1	G. Cao	Nanostructures and nanomaterials: Synthesis, properties and applications	Imperial College Press.
2	T. Pradeep	Nano: The Essentials: Understanding Nanoscience and Nanotechnology	McGraw Hill India.
3	Daniel Ratner	Nanotechnology: A Gentle	5 th Edn., Pearson.

and Ratner	Mark	Introduction to the Next Big Idea		
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Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	C.N.R. Rao, A. Muller, A. K. Cheetham	The Chemistry of Nanomaterials: Synthesis, Properties and Applications	1stEdn (4thRepr), Wiley-VCH Verlag	2011
2	Qing Zhang	Carbon Nanotubes and Their Applications	CRC Press	2012
3	Rajendra Kumar Goyal	Nanomaterials and Nanocomposites: Synthesis, Properties, Characterization Techniques, and Applications	1stEdn., CRC Press	2020

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	Name and Signature	Name and Signature	Name and Signature
Name: Mrs. R. Sudha 	Name: Dr. Indumathy Ramasamy 	Name: Mr. K. Srinivasan 	Name: Dr. R. Manicka Chezian 
Signature:	Signature:	Signature:	Signature:

K. SRINIVASAN, M.C.A.,
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DR. R. MANICKA CHEZIAN, M.Sc., M.S., Ph.D.
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Programme	B.Sc.	Programme Title:	Bachelor of Chemistry	
Course Code:	21UCY4N1	Title	Batch:	2021 – 2024
Week	1	Non Major Elective - II Textile Chemistry	Semester:	IV
			Credits:	2

Course Objective

Develop basic awareness in the area of Textile chemistry.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Recollect the types of polymers, fibres and dyes	K1
CO2	Understand the morphology and properties of fibres	K2
CO3	Compare the natural and manmade fibres	K3
CO4	Classify dyes and dyeing processes	K3
CO5	Explain the nature of fibre and dye to attain a quality product	K3

Mapping with POs / PSOs Vs COs

PO / PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	H	H	H	-	-	-	-	-	-	-
CO2	H	H	H	-	-	-	-	-	-	-
CO3	H	H	H	-	-	-	-	-	-	-
CO4	H	H	H	-	-	-	-	-	-	-
CO5	H	H	H	-	-	-	-	-	-	-

H - High; M - Medium; L - Low

Units	Content
Unit I	Polymers – Introduction, Types – Natural and Synthetic, Fibres – Defects Morphology of fibres.
Unit II	Classification of fibres - Essential and desirable properties of textile fibres and their in final products.
Unit III	Advantages and disadvantages of natural and manmade fibres. Processes involved in textile industry (Flow Chart).
Unit IV	Dyes – Classification - Natural and Synthetic Dyes, Dyeing of Cotton, Wool and with natural dyes.
Unit V	Characteristics of Dye, Classification of Dyes based on the structure and mode of application
	Total Contact

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Test, Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS EDITION	YEAR PUBLISHED
1	Menachem Lewin,	The Handbook of Fiber Chemistry	3 rd Edn., CRC Press.	
2	HVS. Murthy	Introduction to Textile Fibres	1 st Edn., Nabu Press	

Padma S. Vankar.,	Natural Dyes for Textiles: Sources, Chemistry and Applications	1st Edn., Cambridge Elsevier Science & Technology.	2017
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nce Books

AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
Eva Lambert, Tracy Kendall	The Complete Guide to Natural Dyeing: Techniques and Recipes for Dyeing	1 st Edn., Interweave Press	2010
Harry Harper	Introduction to Textile Chemistry.	3rd Edition. Vikas Publishing house.	2012
Robert R Mather, Roger H Wardman	The Chemistry of Textile Fibres,	2nd Edn., Royal Society of Chemistry.	2015

Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
and Signature	Name and Signature	Name and Signature	Name and Signature
Dr. M. Selladurai	Name: Dr. Indumathy Ramasamy 	Name: Mr. K. Srinivasan 	Name: Dr. R. Manicka Chezian 
	Signature:	Signature:	Signature:

K. SRINIVASAN, M.C.A.
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Pollachi - 642 001.

Dr. R. MANICKA CHEZIAN, M.Sc., M.S., Ph.D.
Controller of Examinations
NGM College (Autonomous)
POLLACHI - 642 001.

Programme Code:	B.Sc.		Programme Title:		Bachelor of Chemistry	
Course Code:	21UCY509		Title		Batch:	2021 – 2024
Lecture Hrs./Week	4	Tutorial Hrs./Sem.	1	Core Paper – VII Electro Chemistry	Semester:	V
					Credits:	4

Course Objective

Learn about the theories of conductance, basic principles and applications of electrochemical cells and apply chemical principles to fuel cells, batteries and mechanism of corrosion.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Discuss the theories/laws of conductance, apply the theories of electrolytes	K2, K3
CO2	Construct the electrochemical cell and apply the electrolytic cell reaction to calculate enthalpy, entropy and free energy	K4, K3
CO3	Analyze the types of solutions based on pH and predict suitable indicators for the volumetric titrations	K4, K2
CO4	Appraise the pH, valency, equilibrium constant for a given electrolyte	K4
CO5	Discuss the types of batteries, fuel cells, theories of corrosion & its mechanism	K5

Mapping with PO / PSO Vs CO

PO / PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	H	H	H	M	M	M	H	M	-	-
CO2	H	H	H	M	M	M	H	M	-	-
CO3	H	H	H	M	M	M	H	H	-	-
CO4	H	H	H	M	M	M	H	H	-	-
CO5	H	H	H	M	M	M	H	H	-	-

H, Medium – M, Low – L.

Units	Content
Unit I	Conductivity of Ions: Electrolytic Conduction and Electrolysis - Faradays Law electrolysis. Measurement of conductivity in electrolytic solution. Variation of specific and equivalent conductances with dilution. Ionic mobility, Discharge of ions in electrolysis. Transport Number: Definition, Determination by the Hittorf's method and the Moving Boundary Method. Arrhenius theory of electrolytic dissociation and Ostwald's dilution law. Kohlrausch's law of independent migration of ions and its applications. Debye -Huckel theory of strong electrolytes. Debye Huckel Onset equation for the equivalent conductivity of strong electrolytes (Derivation not required). Wien and Debye Falkenhagen effects.
Unit II	Applications of conductance measurements: Determination of degree of dissociation of weak electrolytes, determination of ionic product of water, determination of solubility and solubility product of sparingly soluble salts and conductometric titrations. Electrochemical cells I: Nernst Equation, EMF of a cell and its measurement. Thermodynamic quantities of cell reactions: ΔH, ΔS and ΔG from EMF data. Reversible electrodes and their types: Metal - Metal ion, Metal - insoluble salt, Gas and redox electrodes. Single electrode potentials, standard electrode potentials, electrochemical series, computation of standard EMF and writing cell reactions.
Unit III	Electrodes for the measurement of pH: Hydrogen gas electrode, Quinhydrone electrode and glass electrode. pH scale, Common ion effect. Buffer solutions: Buffer action, Henderson's equation and the evaluation of the dissociation constant. Acid-Base Indicators: Theories of Acid-Base Indicators. Acid-Base Titrations. Hydrolysis of Salts: Degree of hydrolysis, Relationship between K_h and dissociation constant for salts such as sodium acetate, ammonium chloride, ammonium acetate. Determination of Degree of hydrolysis- indirect method. Electrical Conductance method.
Unit IV	Electrochemical cells II: Concentration cells with and without transference. Liquid junction potential - Formation and elimination. Applications of EMF measurements: Determination of Activity Coefficients

Unit V	Electrolytes. Calculation of valency of ions in doubtful cases ($\text{Hg}^+/\text{Hg}^{2+}$), determination of solubility of sparingly soluble salts. Electrochemical instrumentation and techniques: Potentiostatic and galvanostatic experiments. Cyclic voltammetry, chronoamperometry, chronopotentiometry.	
	Batteries: Dry Cell, Lead-Acid storage cell and Nickel- Cadmium, Nickel- Zinc accumulator. Fuel Cell: Hydrogen - Oxygen fuel cell, Hydrogen - Oxygen fuel cell in manned space flights. Hydrogen over voltage: Measurement and its application to metal deposition. Electrochemical corrosion: Mechanism, Galvanic and differential aeration corrosion. Prevention of corrosion: Proper designing, using pure metal, using metal alloys, and uses of inhibitor (Brief account only). Metallic coatings: Anodic and cathodic coatings. Method of application of metallic coatings: Hot dipping and electro plating (Nickel and chromium plating).	12
	Total Contact Hrs	60

agogy

Instruction, Digital Presentation, Flipped Class

Assessment Methods

Test, Seminar, Quiz, Assignments, Group Task.

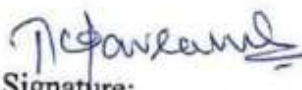
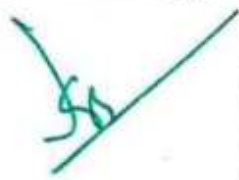
Books

Sl. No.	AUTHOR	TITLE OF THE BOOK	PUBLISHER/EDITION	YEAR OF PUBLICATION
	Soni. P.L., and Dharmarha. O.P. & Dash U.N.	Text book of Physical Chemistry	Sultan Chand & Sons	2016
	Puri. B.R., Sharma L.R., Pathania M.S.	Principles of Physical Chemistry	44 th Edn. Vishal Publishing Company	2010

3	Jain. P.C. and Monica Jain.	Engineering Chemistry, 17th Edition	Dhanpat Rai Publishing Company(P) Ltd	2011
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Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER/EDITION	YEAR PUB
1	Glasstone S	Introduction to Electrochemistry	East-West Press (Pvt) Ltd.	
2	Gurdeep Raj	Advanced Physical Chemistry	35 th Edn. GOEL Publishing House	
3	John.O.M. Bockris & A.K.N. Reddy	Modern Electrochemistry (Vol I & II)	2 nd Edn. Plenum Publishing Corporation	

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of Examination
Name and Signature	Name and Signature	Name and Signature	Name and Signature
Name: Dr. T.Gowrani  Signature:	Name: Dr. Indumathy Ramasamy  Signature:	Name: Mr. K. Srinivasan  Signature:	Name: Dr. R. Chezian  Signature:

K. SRINIVASAN, M.C.A.
Co-ordinator
Curriculum Development Cell
NGM College (Autonomous)
Pollachi - 642 001.

D. TEJANICKA CHEZIAN
Controller of Exam
NGM College (Autonomous)
POLLACHI - 642 001.

Programme Code:	B.Sc.			Programme Title:	Bachelor of Chemistry	
Course Code:	21UCY510			Title	Batch:	2021 – 2024
Lecture Hrs./Week	4	Tutorial Hrs./Sem.	1	Core Paper – VIII Dye Chemistry	Semester:	V
					Credits:	4

Course Objective

enhance the basic knowledge and improve skills on preparation and uses of various dyes and fibres to choose career as dye chemists in dyeing and textile industry.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Recall the classification, basic concepts, theories of colour and constitution	K1
CO2	Understand the preparation and applications of various azo and nitro dyes	K2, K4
CO3	Utilize the classification, preparation and uses of some important phenyl methane dyes	K3
CO4	Analyze the various anthraquinone dyes, organic pigments and fluorescent brightening agents	K4
CO5	Explain the preparation and properties of various types of textile fibres to dye industry and uses of non textile fibres	K2, K5

Mapping with PO / PSO Vs CO

PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	H	H	H	M	H	M	H	H	-	-
CO2	H	H	H	M	H	M	H	H	-	-
CO3	H	H	H	M	H	M	H	H	-	-
CO4	H	H	H	M	H	M	H	H	-	-
CO5	H	H	H	M	H	M	H	H	-	-

High; M – Medium; L – Low

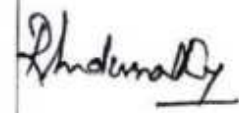
Units	Content
Unit I	Electromagnetic spectrum: Relationship of colour observed to wavelength absorbed. Complementary colours. Terms used in dye Chemistry - Chromophores, Auxochromes, Bathochromic shift, Hypsochromic shift, Hypochromic shift, Hyperchromic shift. Colour and constitution: Otto Witt's theory, Quinonoid theory. Molecular orbital theory of various transitions. Classification of dyes according to chemical constitution and mode of applications.
Unit II	Azo dyes: Principles governing azo-coupling, diazotisation, mechanism of diazotization, coupling with amines and phenols, effects of substituents on diazotization. Synthesis and applications of important azo dyes: Methyl orange, Orange I, Orange II, Metanil yellow, Eriochrome black - T, Bismark brown and Congo red. Synthesis and applications of nitro dyes: Picric acid, Martius yellow and Naphthol yellow S - Nitroso dyes: Fast green O and Naphthol green Y.
Unit III	Synthesis, reactions and uses of Diphenyl methane dyes: Auramine O and Auramin. Triphenyl methane dyes: Malachite green, Rosaniline, Crystal violet - Phthalein. Phenolphthalein - Xanthene dyes: Eosin and Rhodamine B. Synthesis and uses of Indigoid dyes: Indigotin and Indigosol O.
Unit IV	Anthraquinone dyes: Anthraquinone acid dyes - Alizarin cyanine green, Solway ultra blue B. Mordant dyes - Alizarin and Alizarin Blue. Vat dyes - Vat Blue 1 (Carbazole). Disperse dyes - Disperse Red 15. Organic Pigments: Characteristics of pigments, uses of pigments. Types of Pigments: Lakes and Toners. Fluorescent brightening agents. Classification and properties of Fluorescent brighteners for a). Cellulosic fibers b). Acrylic fibers.
Unit V	Textile fibres: Definition - classification of textile fibres - structure, physical properties and uses of cellulose fibre (cotton), protein fibre (silk and wool). Different types of rayon and their sources - manufacture of viscose rayon. Methods of dyeing - Direct dyeing, Mordant dyeing, Vat dyeing, Disperse dyeing. Textile uses of dyes in leather, paper, foods, drugs, colour photography and indicators.
	Total Contents

Approach: Direct Instruction, Digital Presentation and Flipped Class
 Assessment Methods: Test, Seminar, Quiz, Assignments, Group Task

Author	Title of the Book	Publishers \ Edition	Year of Publication
Guadecp, R.	Synthetic dyes, 4th edn	Mumbai: Himalaya Publishing House Pvt Ltd	2016
Arum Bhal & Bahl, B. S.	A textbook organic chemistry, 22nd edn	New Delhi: S. Chand and Company Ltd	2016
Sharma, B. K.	Industrial chemistry. 14th edn	New Delhi: Goel Publishing House	2008
Tyagi, O. D & Yadav, M. A.	A text book of synthetic dyes, 2nd edn.	New Delhi: Anmol Publications Pvt. Ltd.	2002

Reference Book

Author	Title of the Book	Publishers \ Edition	Year of Publication
Rao, R. S., Shridhar, G., Mukherjee, B. & Parulekar, T.	Introduction to synthetic drugs and dyes. 13th end	Mumbai: Himalaya Publishing House Pvt Ltd.	2018
Pope Sine	Synthetic dye, 1st edn.	New Delhi: Rajat Publications.	2003
Rajbir Singh	A handbook of synthetic dyes, 1st edn.	New Delhi: Mittal Publications	2016

Designed by	Head of the Department	Curriculum Development Cell	Controller of Examination
Name with Signature	Name with Signature	Name with Signature	Name with Signature
Dr. M. Selladurai 	Name: Dr. Indumathy Ramasamy  Signature:	Name: Mr. K. Srinivasan  Signature:	Name: Dr. R. Manicka Chezian  Signature:

K. SRINIVASAN, M.C.A.
 73 Co-ordinator
 Curriculum Development Cell (CDC)
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 Pollachi - 642 001.

Dr R MANICKA CHEZIAN M.Sc.M.D.P.D.
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Programme code:	B.Sc.	Programme Title :	Bachelor of Science
Course Code:	21UCY5E1	Title	Batch :
Hrs/Week:	4	Core Elective Paper – I Analytical chemistry- I	Semester
			Credits:

Course Objective

To build a basic knowledge on generation of analytical data in an appropriate manner; to cultivate the analytical skills in instrumental methods of chemical analysis for microgram level; to cultivate the analytical skills in identification of chemical compounds.

Course Outcomes

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

CO Number	CO Statement
CO1	Provide thorough knowledge on gravimetry.
CO2	Learn instrumentation and basic principles and applications of modern analytical tools such as TGA and DTA
CO3	Have knowledge on application of Polarimetry, Nephelometry and Turbidimetry
CO4	Acquire knowledge and analyze analytical tools like polarography and amperometric titrations
CO5	Know the importance of chromatography

Mapping with PO / PSOs Vs COs									
CO \ PO / PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1
CO1	H	H	H	M	M	M	H	H	H
CO2	H	H	H	M	M	M	H	H	H
CO3	H	H	H	M	M	M	H	H	H
CO4	H	H	H	M	M	M	H	H	H
CO5	H	H	H	M	M	M	H	H	H

H – High; M – Medium; L – Low

Content		Hrs
I	Data Analysis: Definition and terms – absolute and relative error. Precision and accuracy. Classification of errors. Sources and minimisation of errors. Significant figures.	12
	Sampling: Significance of sampling, types of sample, sampling methods for solids, liquid and gases. Gravimetric Analysis: Precipitation methods. Conditions of precipitation, co-precipitation and post precipitation. Precipitation from homogeneous solution. Washing of the precipitate. Organic precipitants – DMG, Cupron, Cupferron, oxine and salicylaldoxime.	
II	Thermogravimetric Analysis (TGA): Principle, discussion of various components with block diagram, Characteristics of TGA curve, factors affecting thermogravimetric curves. Applications: Evaluation of gravimetric precipitation, curie point determination and study of organic compounds.	12
	Differential thermal analysis (DTA): Principle, discussion of various components with block diagram, Characteristics of DTA curve, factors affecting the DTA curve. Applications: heat of reaction, specific heat and quality control. Thermometric titrations (TTA): Principle and applications.	
III	Polarimetry: Theory and instrumentation. Comparison of acid strength using polarimeter and estimation of glucose.	12
	Nephelometry and Turbidimetry: Theory, principles and applications in Inorganic analysis, turbidimetric titrations and phase titrations. Flame photometry: Theory, principle and applications in Qualitative and Quantitative analyses.	
IV	Polarography: Principle, dropping mercury electrode – advantages and disadvantages. Experimental assembly, current – voltage curves. Significance of Ilkovic equation (derivation not required). Half wave potential. Applications in qualitative and quantitative analyses.	12
	Amperometric Titrations: Principle, apparatus and technique. Dead stop endpoint method. Advantages and disadvantages of amperometric titrations.	

Unit V	Chromatographic techniques:
	Paper Chromatography: Principle, RF value and experimental details. Application in qualitative and quantitative analyses.
	Thin Layer Chromatography: Principle, brief account of experimental details and advantages. Applications in the separation of amino acids.
	Column Chromatography: Principle, experimental details, factors affecting column efficiency and applications.
	Ion Exchange Chromatography: Principle, types of resins, action of resins and applications in softening of hard water.
	Gas liquid chromatography: types, principle, theory and applications of gas liquid chromatography.
	Total contact Hrs/Semester

*Italics denotes self study topics

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

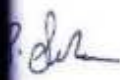
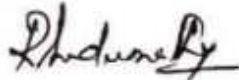
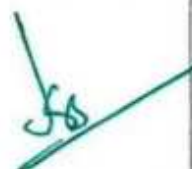
Seminar, Quiz, Assignments, Group Task.

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YE PUBL
1	Khopkar S.M	Basic concepts of Analytical Chemistry.	New Age International Pvt Ltd. 4 th Edition.	2020
2	Gurdeep R Chatwal Sham K. Anand	Instrumental Methods of Chemical Analysis	Himalaya publishing House. 5th Edition.	2014
3	Arthur. I. Vogel	Inorganic Quantitative Analysis.	4 th Edition. Longmans	1978

Reference Books

NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
	Usharani S	Analytical Chemistry.	Laxmi Publications, 1 st Edition.	2019
	Douglas A. Skoog, Donald M. West and F. James Holler	Fundamentals of Analytical Chemistry.	Harcourt Asia Pvt. Ltd. 9 th Edition.	2001
	Douglas A. Skoog, Donald M. West and F. James Holler	Analytical Chemistry, An Introduction.	Saunders College Publishers .7 th Edition.	2000
	Skoog D. A	Principles of Instrumental Analysis	Saunders College Publishers, 5 th Edition	1998

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	Name and Signature	Name and Signature	Name and Signature
Name: Ms.R.Sudha	Name: Dr. Indumathy Ramasamy	Name: Mr. K. Srinivasan	Name: Dr. R. Manicka Chezian
			
Signature:	Signature:	Signature:	Signature:

K. SRINIVASAN, M.C.A.,
Co-ordinator
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Dr R MANICKA CHEZIAN, M.Sc. M.S. Ph.D.,
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Programme Code:	B.Sc.	Programme Title:	Bachelor of Science
Course Code:	21UCY5E2	Title	Batch:
Lecture Hrs./Week	4	Core Elective – I	Semester:
		Pharmaceutical Chemistry-I	Credits:

Course Objective

To create awareness among the students about the historical development of profession of pharmaceutical science, formulation aspects of different dosage forms, and how a drug's chemical structure describes its properties and affect its absorption, distribution, metabolism, and excretion, traditional and alternative systems of medicine and principles involved in limit test for impurities.

Course Outcomes

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

CO Number	CO Statement
CO1	Identify their professional role in the healthcare system
CO2	Classify different dosage forms and apply principles of pharmaceutical science in formulation and dispensing the various dosage forms
CO3	Understand the concept of Pharmacology and pharmacodynamics
CO4	Analyse the scope and development of Pharmacognosy
CO5	Explain the types of impurities, limit test for impurities and classification of Antidotes and Antacids

Mapping with POs / PSOs Vs COs

PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO
CO									
CO1	H	M	M	M	H	M	M	H	H
CO2	M	H	M	L	M	H	M	M	H
CO3	M	H	H	M	H	M	H	H	H
CO4	H	M	M	M	M	H	M	M	H
CO5	H	M	M	M	H	M	M	H	M

H – High; M – Medium; L – Low

	Content	Hrs
Unit I	Historical background and development of profession of Pharmacy: Pharmacy- Definition, Historical development of profession of Pharmacy –History of pharmacy profession in India, Pharmaceutical education and pharmaceutical industry in India, Career opportunities for Pharmacy professionals. Pharmacopoeias: Introduction to IP, BP, USP and Extra Pharmacopoeias.	12
Unit II	Introduction to Pharmaceutics: Pharmaceutics- Definition-Dosage forms- Definition, classification of dosage forms based on sterility and their physical nature. Development and evaluation of new drugs- Stages of drug development – Preclinical development and clinical development.	12
Unit III	Introduction to Pharmacology: Pharmacology-definition. Pharmacodynamics – Definition, Receptor and non-receptor mechanisms, Site of drug action, Dose Response relationship, Structural activity relationship. Pharmacokinetics – Definition, Mechanism of action of Drugs (Absorption, Distribution, Metabolism and Excretion of Drugs). Clearance of a drug. Theoretical Pharmacokinetics –Half life-order of kinetics and steady state plasma concentration. Drug safety and effectiveness- Factors modifying the dosage and action of drugs.	12
Unit IV	Introduction to Pharmacognosy: History, scope and development of Pharmacognosy, Source of Drugs (Biological, Marine, Mineral and plant tissue cultures as source of drugs. Traditional and Alternative system of medicine (Ayurvedha, Unani, Homeopathic, Siddha, Acupuncture and Yoga.) Collection and processing of Herbal drugs.	12
Unit V	Introduction to Pharmaceutical Chemistry: Sources & types of impurities, principles involved in limit test for chloride, sulphate, iron, arsenic, lead, heavy metals, Selected terminology in pharmaceutical chemistry, Antidotes & Antacids -Definition, Classification, Properties. Antimicrobials, Antioxidants, Astringents, Expectorant and Emetics –Definition, examples and uses.	12
	Total Contact Hrs	60

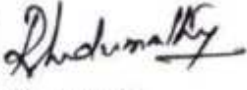
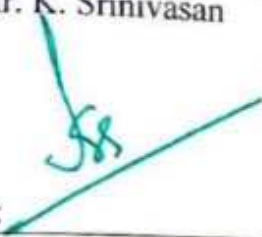
Direct Instruction, Flipped Class, Digital Presentation

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	PUB
1	Ali.M.,	Textbook Of Pharmaceutical Chemistry-I	CBS publishers and distributors Pvt.Ltd	
2.	Muragesh.	Text book of Pharmacognosy.	Sathya Publishers	
3	Mehta R.M.,	Pharmaceutics-I.	Vallabh Prakashan	
4	Suresh P. Vyas, Amit K. Goyal, GoutamRath.,	Handbook of Pharmaceutical dosage forms.	Vallabh Prakashan	

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	PUB
1	<u>Pathania J S.</u>	Textbook of Pharmacology For Bsc Nursing Students With Revision Booklet	CBS Nursing.	
2	Bharath .S.,	Pharmaceutical Technology: Concepts and applications.	Pearson Education India	
3	Shayne Cox Gad.,	Pharmaceutical Manufacturing Handbook: Production and Process.	A John Wiley & Sons, Inc., publication	

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	Name and Signature	Name and Signature	Name and Signature
Name: Dr. Indumathy Ramasamy Signature: 	Name: Mr. K. Srinivasan Signature: 	Name: Dr. R. Manicka Chezian Signature: 	

K. SRINIVASAN, M.C.A.,
Co-ordinator
Curriculum Development Cell (CDC)
NGM College (Autonomous) -
Pollachi - 642 001.

Dr R MANICKA CHEZIAN, M.Sc., M.S., Ph.D.,
Controller of Examinations
NGM College (Autonomous)
POLLACHI - 642 001.

Programme Code:	B.Sc.	Programme Title:	Bachelor of Chemistry
Course Code:	21UCY5E3	Title	Batch:
Lecture Hrs./Week	4	Core Elective – I	Semester:
		Leather Chemistry	Credits:

Course Objective

To understand the basics of skins, leather and their composition, impart the principle of leather structure, process of various tanning, process of dyeing leather and acquire knowledge on the tannery industry and its effluent treatment.

Course Outcomes

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

CO Number	CO Statement
CO1	Relate the basic principle involved in pre-tanning of skins and hides
CO2	Have knowledge on various types of tanning and their physico-chemical properties
CO3	Interpret the chemistry behind the chrome tanning process
CO4	Analyze the process involved in curing of hides and skin and their preservation
CO5	Have clear idea on sources of tannery effluents and their treatment

Mapping with POs / PSOs Vs COs

PO / PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO								
CO1	H	H	H	M	M	M	M	H
CO2	H	H	H	M	M	M	H	H
CO3	H	H	H	M	M	M	M	H
CO4	H	H	H	M	M	M	H	H
CO5	H	H	H	M	M	M	M	H

H – High; M – Medium; L – Low

	Content	Hrs
Unit I	Basic Principles and Leather Constituents: Introduction, chief process involved in leather manufacture - elementary knowledge of the structure and composition of hides and skins. Proteins and their characteristics, Anatomy and histology of protein constituents of leather (an elementary concept). Basic principle involved in pre-tanning such as soaking, liming, deliming, bating, pickling involved in pre-tanning such as soaking, liming, deliming, bating, pickling and depickling.	12
Unit II	Types of Natural and Synthetic Tanning: Types of tanning-vegetable and mineral tanning, Different types of vegetable tanning- materials classification and chemistry of vegetable tanning. Factors and Physio-chemical principle involved in vegetable tanning, Fixation of vegetable tanning. Synthetic tanning-their classifications, general methods of manufacture and use.	12
Unit III	Chemistry of Chrome Tanning: The preparation and chemistry of chrome tanning liquids, Olation, Oxolation and hydrolysis of chrome liquids. Effect of adding tanning agents-Role of pH in the reaction of chromium complexes with hide proteins. Factors governing chrome tanning-chemistry of neutralization process. A brief survey of chemistry of other tanning like Al, Zr and Te salts and their relative merit in contrast with chrome tanning. Chemistry of combination of tannage involving vegetable tanning aldehydes, chrome and other mineral tanning agents.	12
Unit IV	Preservation of Hides and Skins and Leather Dyeing: Chemical methods of curing and preservation of hides and skins in acid and alkaline solution. Principles of analytical methods employed in curing, liming, deliming, bating, pickling. Analysis of vegetable tanning materials and extract. Process of dyeing leather-Use of mordants, dyeing auxiliaries such as levelling, wetting and dispersing agents-Dye fixations.	12
Unit V	Animal Wastes and Treatment Processes: Animal by-products - their collection, handling and preservation methods (such as hair, blood, bones, glands, Keratinous materials and their utilization). Tannery effluents and treatment: Types of water pollution-physical, chemical, physiological and biological. Different types of tannery effluents and wastes-beam-house waste-liquors- tanning and finishing yard waste liquors, solid	12

	waste-origin and disposal. Non-textile uses of dyes in leather, paper, foods and drugs, colour photography and indicators.
	Total Contact Hours

Pedagogy

Instruction, Digital Presentation, Flipped Class

Assessment Methods:

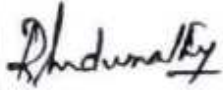
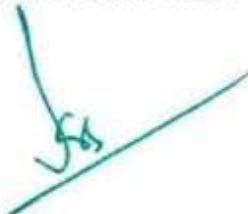
Test, Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR PUBLISHED
1	Jain P.C. & Monica Jain.	Engineering Chemistry	16 th Edn. Dhanpat Rai Publishing Co., Pvt. Ltd	2016
2	Jayashree Ghosh	Fundamental Concepts of Applied Chemistry	S. Chand and Company Ltd	2010
3	Sharma B. K.	Industrial Chemistry.	14 th Edn. Goel Publishing House	2008

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR PUBLISHED
1	Anthony D.Covington	Tanning Chemistry	The Science of Leather. RSC Publishing	2011
2	Fred, William T.Roddy & Robert M. Lollar	The Chemistry and Technology of Leather	1 st Edn. Reinhold Publishing Co.	1956

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	Name and Signature	Name and Signature	Name and Signature
Name: Dr. T. Gowrani 	Name: Dr. Indumathy Ramasamy  Signature:	Name: Mr. K. Srinivasan  Signature:	Name: Dr. R. Manicka Chezian  Signature:

K. SRINIVASAN, M.C.A.,
Co-ordinator
Curriculum Development Cell (CDC)
NGM College (Autonomous)
Pollachi - 642 001.

Dr. R. MANICKA CHEZIAN, M.Sc., M.S., Ph.D.,
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POLLACHI - 642 001,

Programme Code:	B.Sc.	Programme Title:	Bachelor of
Course Code:	21UCY5AL	Title	Batch:
Lecture Hrs./Week	Self Study	Advanced Learner Course – I Environmental Chemistry (Optional)	Semester:
			Credits:

Course Objective

To enhance the knowledge on environmental chemistry and to inculcate the responsibility towards the environment from chemical and biological pollutants.

Course Outcomes

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

CO Number	CO Statement
CO1	Remember the environmental constituents, air, water and soil contaminants and quality parameters.
CO2	Understand the environmental segments, composition and effects of pollution and types of biomedical wastes
CO3	Apply the suitable techniques for pollution control and waste management
CO4	Review the health, environmental and industrial problems caused by pollution
CO5	Distinguish various biomedical wastes judiciously and manage them properly

PO / PSO		Mapping with PO / PSO Vs CO							
CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1		H	H	H	-	-	-	M	M
CO2		H	H	H	-	-	-	M	M
CO3		H	H	H	-	-	-	M	M
CO4		H	H	H	-	-	-	M	M
CO5		H	H	H	-	-	-	M	M

H – High; M – Medium; L – Low

Content	Hrs
Earth and atmosphere Planet Earth-Formation of earth and atmosphere – Big bang theory, environmental segments- biosphere, lithosphere, hydrosphere, atmosphere, composition of atmosphere- troposphere, stratosphere, mesosphere, thermosphere, air quality parameters, methods of air pollution control – scrubbers, air filters, cyclones, electrostatic precipitators and incinerators.	-
Contaminants and their degradation Causes, effects and control measures of Green house effect, global warming and ozone depletion - carbon cycle, nitrogen cycle, sulphur cycle, formation of CO in the atmosphere, organic pollutants, and contaminants from combustion.	-
Water and Water Treatment Water- Hydrological cycle, water quality parameters, ground and surface water contaminants, Hardness-Units of hardness-Estimation of Hardness of water by EDTA method, problems of using hardwater in boilers – Scales and Sludge, corrosion, caustic embrittlement, priming and foaming, Water conditioning – internal and external conditioning of water – limesoda process, zeolite process, demineralization, desalination, electrodialysis, reverse osmosis, water treatment for municipal supply – physical and chemical methods of disinfection- break point chlorination, sewage treatment.	-
Soil Pollution Soil formation, soil characteristics, problems caused by landfills, Waste management – Solid waste management, E- waste management and plastic waste management.	-
Biomedical waste Definition, Sources of biomedical wastes, various types of biomedical wastes, infection control practices, Biomedical waste management – segregation, storage, transportation, reuse, recycle, incineration, land fill and decomposition.	-
Total Contact Hrs	-

Self study

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	Yr PUBL
1	Monika Jain and Jain P.C	Engineering Chemistry	17 th Edn., Dhanpat Rai Publishing Company	
2	Dana Desonie	Atmosphere: Air Pollution and Its Effects	1 st Edn., Chelsea House Publications	
3	Anubha Kaushik	Environmental Science and Engineering	3 rd Edn., New Age international publishers.	
4	Shahanawaz Hamid	A Handbook on Biomedical Waste: National and International Overview, Notion press.	Notion press.	

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	Yr PUBL
1	Linda. D. Williams	AP Environmental Science	5th Edn., McGraw-Hill Education	
2	R. Radhakrishnan	Biomedical waste management	Sumit Enterprises.	
3	R. Rajagopalan	Environmental Studies,	3rd Edn., Oxford University Press.	
4	John. H. Seinfeld, Spyros N. Pandis	Atmospheric Chemistry and Physics: From Air Pollution to Climate Change.	3rd Edn., Wiley.	

Henry

Suggested reading

Keywords: *workplace spirituality, organizational commitment, organizational trust, organizational identification, organizational citizenship behaviors*

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Programme Code:	B.Sc.	Programme Title:	Bachelor of Chemistry
Course Code:	21UCY614	Title	Batch:
Lecture Hrs./Week	4	Tutorial Hrs./Sem.	1
			Semester:
			Credits:

Course Objective

To learn about recent advances in polymers, impart knowledge about polymerization chemistry, familiarize the different polymer processing techniques and synthesis of some important polymers.

Course Outcomes

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

CO Number	CO Statement	
CO1	Classify the types of polymers and recognize the basic concepts	
CO2	Understand and illustrate the mechanisms of polymerization	
CO3	Appraise the stereochemistry of polymers and apply Z-N catalyst for the polymers	
CO4	Calculate the molecular weight of polymers by various methods	
CO5	Acquiring knowledge of commercially important polymer products and its applications.	

Mapping with PO / PSO Vs CO

PO / PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1
CO									
CO1	H	H	H	M	M	M	M	M	-
CO2	H	H	H	M	M	M	M	M	-
CO3	H	H	H	M	M	M	M	M	-
CO4	H	H	H	M	M	M	M	M	-
CO5	H	H	H	M	M	M	M	M	-

H – High; M – Medium; L – Low

	Content	Hrs
Unit I	Basic Concepts and Classification of Polymers: Monomers, Polymers, Polymerization, Degree of polymerization. Classification of polymers: Plastics: Definition - Thermoplastic, Thermosetting plastics and Reinforced Plastic. Elastomers: Definition - Natural & synthetic rubber -smoked rubber -Reclaimed rubber -Foam rubber -Spongy rubber - Laminate rubber. Adhesives: Definition - thermosetting - thermoset resins. Fibres: Definition-Natural and synthetic. Classification: comfort-safety- industrial fibres. Primary And Secondary Bond Forces In Polymers. Thermal stabilisers- Antioxidants-photo stabilisers. Polymerization Techniques: Bulk, Solution, Suspension and Emulsion Polymerization.	13
Unit II	Types of polymerization reactions: Addition Polymerization and Condensation polymerization. Types of Initiators. Inhibitors. Chain transfer agents. Addition Polymerization - Free radical Mechanism, Ionic Polymerisation: Anionic and Cationic Polymerizations. Step growth of polymerisation (Condensation polymerisation) Copolymers - Types, Co-Polymerisation: Random-Alternating-Block and Graft copolymers. Importance of Copolymerization. Miscellaneous Polymerization reactions- Electrochemical Polymerization.	12
Unit III	Stereochemistry of Polymers: Stereo Regular Polymers: Isotactic, syndiotactic & Atactic. Geometrical isomers. Factors influencing Structural regularity. Ziegler-Natta Catalysts -Bi metallic and Mono metallic mechanisms. Glass transition temperature (T _g) and T _m . Determination of T _g by differential scanning calorimeter. Factors affecting T _g , T _g of copolymers. Degradation - Types of degradation - Thermal, Photo, High energy radiation and Oxidative method and Hydrolytic method. Polymer Additives - Fillers, Plasticizers, antioxidants, thermal stabilizers, fire retardants and colourants.	13
Unit IV	Determination of Molecular Weight Methods: Molecular weights of polymers: Number-Average, Weight-Average, Sedimentation-Average & Viscosity-Average molecular weights. Molecular weight distribution - GPC method.Determination of Average molecular weight: Ebulliometry method, Cryoscopy method, osmometry method, Light Scattering method, Viscosity method and End group Analysis. Application of FTIR, UV-visible, NMR, and Mass Spectroscopy for Identification of	12

	polymers.
Unit V	Industrial Polymers: Polymer processing techniques: Calendaring, film casting, compression moulding, blow moulding, extrusion moulding foaming and filament winding technique. Preparation and uses of the following polymers: Polyethylene (LDPE & HDPE), P.V.C, Teflon, polystyrene, Nylon-6, Nylon-66, Polyester, Phenol formaldehyde resins, Polymethylmethacrylate, Polyethyleneterephthalate and Polycarbonate. Recent Advances in Polymers: Polymer and environmental effect- introduction, disposal of polymer waste- recycling system- importance of biopolymers.
	Total Contact Hrs

Pedagogy

Instruction, Digital Presentation, Flipped Class

Assessment Methods

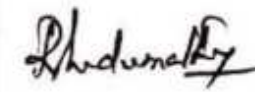
Test, Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR PUBLISHED
1	Fred.W.Billmeyer	Text Book of Polymer Science	2 nd Edn. John Wiley.	2011
2	Gowariker.V.R., Viswanathan. N.V., Jeyadev Sreedhar	Polymer Science	2 nd Edn.New Age International Ltd	2015
3	Sharma B. K.	Polymer chemistry.	4 th Edn. Goel Publishing House	2015

Books

AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
Abhiwalia V.K. & Anuradha Mishra	Polymer Science: A Text Book	1st Edn. Ane Books.	2008
Stevens M.P.	Polymer Science: An Introduction	3rd Edn. Oxford Publication	2009
Fred J.R.	Polymer Science and Technology.	3rd Edn. Prentice-Hall of India.	2014

igned by	Head of the Department	Curriculum Development Cell	Controller of the Examination
signature	Name and Signature	Name and Signature	Name and Signature
T. Gowrani	Name: Dr. Indumathy Ramasamy 	Name: Mr. K. Srinivasan 	Name: Dr. R. Manicka Chezian 
	Signature:	Signature:	Signature:

K. SRINIVASAN, M.C.A.,
Co-ordinator
Curriculum Development Cell (CDC)
NGM College (Autonomous)
Pollachi - 642 001.

Dr. R. MANICKA CHEZIAN, M.Sc. M.S. Ph.D.
Controller of Examinations
NGM College (Autonomous)
POLLACHI - 642 001.

Programme code:	B.Sc.	Programme Title :	Bachelor of Chemistry
Course Code:	21UCY601	Title	Batch :
Hrs/Week:	4	Core Elective - II : Analytical Chemistry - II	Semester : Credits:

Course Objective

To acquire knowledge on basic concepts in separation techniques, volumetric analysis, various types of titrations and Core Elective - II : Analytical Chemistry understand the basic principles of instrumentation.

Course Outcome

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

CO Number	CO Statement	Knowledge
CO1	Understand the basic principles of UV-visible spectrophotometer and IR spectrophotometer.	Know
CO2	Apply separation techniques for the extraction of solvents	Know
CO3	Understand the basic principles involved in neutralization titrations, PH and Buffer solutions.	Know
CO4	Know about different types of titrations	Know
CO5	Gain knowledge on Analytical method in chemistry	Know

Mapping with PO / PSOs Vs Cos									
PO / PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1
CO									
CO1	H	H	H	M	M	M	H	H	H
CO2	H	H	H	M	M	H	H	H	H
CO3	H	H	H	M	H	M	H	M	H
CO4	H	H	H	M	M	M	H	H	H
CO5	H	H	H	M	H	M	H	H	H

H – High; M – Medium; L – Low

Content	Hrs
Instrumentation: Basic principles of UV-visible spectrophotometer, Lambert-Beer Law and its limitations. Instrumentation consisting of source, monochromator, grating and detector. Applications of UV-visible spectroscopy. Basic principles of IR spectrophotometer, Instrumentation consisting of source, monochromator grating and various detector. Spectrophotometric determination of characteristic absorption bands of various functional groups. Applications of infrared spectroscopy.	12
Separation techniques: Solvent extraction: Classification, principle and efficiency of the technique. Mechanism of extraction: extraction by solvation and chelation. Technique of extraction: batch, continuous and counter current extractions. Qualitative and quantitative aspects of solvent extraction: extraction of metal ions from aqueous solution, extraction of organic species from the aqueous and nonaqueous media.	12
Neutralisation Titrations: Principles of titrimetric analysis, titration curves for strong acid-strong base, weak acid-strong base, strong acid-weak base titrations. Indicators: Theory and the choice in acid-base titration. pH and Buffer solution: pH of strong and weak acid solutions. Buffer solutions. Henderson equations. Preparation of acidic and basic buffers.	12
Redox Titration: Principle, Different types of Redox Titrations, Redox indicators and choice of redox Indicators. Complexometric Titrations: Theory of complexometric titration, indicators for EDTA titration, determination of total hardness of water by complexometric titration with EDTA. Precipitation Titrations: Indicators for Argentometric titrations, Estimation of chlorides by Volhard's Method.	12

Unit V	Analytical method in chemistry: Analysis of water-Definition of pure water, sources responsible for contaminating water, water sampling methods, water purification methods.	
	a. Determination of pH, acidity and alkalinity of a water sample.	
	Analysis of food products: Nutritional value of foods, idea about food processing and food preservations and adulteration.	
	a. Identification of adulterants in some common food items like coffee powder, asafoetida, chilli powder, turmeric powder, coriander powder and pulses, etc.	
		Total hours/Semester

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

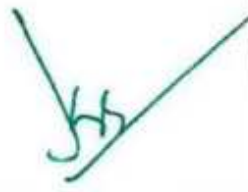
Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR PUBLISHED
1	S M Khopkar	Basic concepts of Analytical Chemistry.	New Age International Pvt Ltd, 4 th Edition.	2020
2	Chatwal and Anand	Instrumental Methods of Chemical Analysis.	Himalaya publishing House, 5 th Edition.	2014
3	Willard, H. H	Instrumental Methods of Analysis.	CBS Publishers	1998
4	Svehla. G	Vogel's Qualitative Inorganic Analysis.	Prentice Hall, 7 th Edition.	1996

Author	TITLE OF THE BOOK	PUBLISHERS EDITION	YEAR OF PUBLICATION
Skoog, D.M.	Fundamentals of Analytical Chemistry	Cengage Learning	2018
West, F.J., Holler and Ishwari, S	Analytical Chemistry	Macmillan India Ltd, 1 st Edition	2000
Skoog, D.A.; West, D.M. & Holler, F.J	Fundamentals of Analytical Chemistry	Saunders College Publishing, Fort Worth, 6th Ed.	1992
Arthur, I. Vogel	Inorganic Quantitative Analysis	Longman, 4 th Edition.	1978
Skoog & Lerry	Instrumental Methods of Analysis	Saunders College Publications, New York	

Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	Name and Signature	Name and Signature	Name and Signature
Is.R. Sudha	Name: Dr. Indumathy Ramasamy 	Name: Mr. K. Srinivasan 	Name: Dr. R. Manicka Chezian 
	Signature:	Signature:	Signature:

K. SRINIVASAN, M.C.A., Co-ordinator
Curriculum Development Cell (CDC)
NGM College (Autonomous)
Pollachi - 642 009.

Dr. R. MANICKA CHEZIAN, M.Sc., M.S., Ph.D.
Controller of Examinations
NGM College (Autonomous)
POLLACHI - 642 001.

Programme Code:	B.Sc.		Programme Title:	Bachelor of Chemistry
Course Code:	21UCY6E2		Title	Batch: 2021-2023
Lecture Hrs./Week	4	Tutorial Hrs./Sem.	10	Semester: VI
			Core Elective- II Pharmaceutical Chemistry-II	Credits: 5

Course Objective

To inculcate the basic knowledge on the preparation, properties and uses of some organic, inorganic, radioactive drugs to make the students opt their career in pharmaceutical industry.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Remember the names of organic, inorganic and radioactive drugs and their basic analysis.	K1
CO2	Understand the preparation of organic and inorganic drugs and the principles behind their analysis.	K2
CO3	Apply the properties of pharmaceuticals towards their respective applications.	K3
CO4	Sketch the radioactivity, precautions and the storage conditions of radioactive drugs.	K3
CO5	Analyze and apply the available analytical techniques towards the quantification of organic and inorganic pharmaceuticals.	K3&K4

Mapping with POs / PSOs Vs COs

PO / PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO										
CO1	H	H	H	-	-	-	H	H	H	H
CO2	H	H	H	H	M	-	H	H	H	H
CO3	H	H	H	M	-	-	H	H	H	H
CO4	H	H	H	-	-	-	H	H	H	H
CO5	H	H	H	H	M	-	H	H	H	H

H – High; M – Medium; L – Low

Content	Hrs
Important organic Drugs: Definition, chemical structure, method of preparation, important physical and chemical properties and uses of the following organic drugs: Sulphonamides – sulfacetamide, Antileprotic Drugs – Dapsone, Anti-tubercular Drugs- Isoniazid, Antibiotics- Ampicillin, Antimalarial Drugs-Chloroquine, Hypnotics- Phenobarbitone, Diuretic Drugs- Furosemide, Cardiovascular Drugs- Ethylnitrite and Analgesics and Anti-pyretics- Aspirin.	13
Important Inorganic Drugs: Definition, properties and medicinal uses of the following inorganic compounds. Electrolytes used in the replacement therapy- Sodium chloride, Calcium gluconate, Gastrointestinal agents Acidifiers- Ammonium chloride, Sodium Bicarbonate, Antimicrobials-Hydrogen peroxide, Chlorinated lime, Expectorants- Ammonium Chloride, Emetics- Copper sulphate, Haematinics- Ferrous sulphate, Antidote- Sodium thiosulphate.	13
Radiopharmaceuticals: Radio activity, Measurement of radioactivity, Properties of α , β , γ radiations, Half life, radio isotopes and study of radio isotopes - Sodium iodide (^{131}I), Storage conditions, precautions & pharmaceutical application of radioactive substances.	10
Pharmaceutical Analysis: Non- aqueous titrations - Solvents, acidimetry and alkalinimetry titration and estimation of Sodium benzoate, Precipitation titrations: Mohr's method, Volhard's, Modified Volhard's, Fajans method, estimation of sodium chloride, Complexometric titration: Classification, metal ion indicators, estimation of Magnesium sulphate, Redox titrations- Concepts of oxidation and reduction, Types of redox titrations (Principles and applications) Cerimetry, Iodimetry, Iodometry, Bromatometry, Dichrometry.	12
Electrochemical methods of analysis - Conductometry - Introduction, Conductivity cell, Conductometric titrations, applications, Potentiometry - Electrochemical cell, construction and working of reference (Standard hydrogen and calomel electrode) and indicator electrodes (metal electrodes and glass electrode), methods to determine end point of potentiometric titration and applications.	12
Total Contact Hrs	60

Teaching Methods: Chalk & Talk, Power point Presentations, Group discussions, Seminar, Quiz, etc.

Text Books

S.No.	Author	Title of the Book	Publishers \ Edition
1	Vardanyan R.S., Hruby V. J	Synthesis of Essential Drugs	1 st Edn., Elsevier.
2	Gundu Rao. P	Pharmaceutical and Medical Inorganic Chemistry and updated version of Inorganic Pharmaceutical Chemistry	1 st Edn., Vallabh Prakashan publisher.
3	Gurdeep R Chatwal, Madhu Arora	Analytical Chemistry	1 st Edn., Himalaya Publishing House
4	Chatwal. G.R	Pharmaceutical Chemistry-Inorganic	5 th Edn., Himalaya Publishing House.
5	Atherden L.M	Bentley and Driver's Textbook of Pharmaceutical Chemistry	1 st Edn., Oxford University Press.

Reference Books

S.No.	Author	Title of the Book	Publishers \ Edition
1	Vogel A. I, Bassett, Jeffrey, Mendam and Denney	Vogel's Textbook of Quantitative Chemical Analysis	1 st Edn., Longman Higher Education Publisher.
2	Skoog A, West D. M, Holler F. J	Fundamentals of Analytical Chemistry	Cengage Learning Publisher..
3	Abhishek Tiwari, Neeraj Upmanyu, Anup K. Chakraborty	Pharmaceutical Organic Chemistry-I	1 st Edn., Nirali Prakashan Publisher.
4	Rajasekaran	Textbook of Pharmaceutical Inorganic	2ndEdn., CBS Publication.

	Chemistry Theory and Practical		
M. Ali	Textbook of Pharmaceutical Chemistry I (Inorganic)	1stEdn., CBS Publication	2020

Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	Name and Signature	Name and Signature	Name and Signature
Dr. Indumathy amy 	Name: Dr. Indumathy Ramasamy 	Name: Mr. K. Srinivasan 	Name: Dr. R. Manicka Chezian 
Signature:	Signature:	Signature:	Signature:

K. SRINIVASAN, M.C.A.,
Co-ordinator
Curriculum Development Cell (CDC)
NGM College (Autonomous)
Pollachi - 642 001.

Dr. R. MANICKA CHEZIAN, M.Sc., M.S., Ph.D.
Controller of Examinations
NGM College (Autonomous)
POLLACHI - 642 001.

Programme Code:	B.Sc.	Programme Title:	Bachelor of Chemistry
Course Code:	21UCY6E3	Title	Batch: 2021-22
Lecture Hrs./Week	4	Core Elective- II- Agricultural Chemistry and Analytical Techniques for Agrochemicals	Semester: VI
			Credits: 5

Course Objective

To give the students the importance of Agricultural chemistry and an exposure to find, analyse and find a method to cultivate and promote agricultural methods.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	To understand the nature of soil.	K1, K2
CO2	Gain Knowledge on Soil fertility and Organic Manures	K2, K3
CO3	Find applications of Pesticides, Rodenticides and Herbicides and weedicides	K3
CO4	Know the analysis of agrochemicals by Potentiometry and Electrical conductivity	K4
CO5	Know the application of Non Instrumental Techniques in the analysis of agrochemicals	K4

Mapping with PO / PSO Vs CO

PO / PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1
CO1	H	H	H	M	M	M	M	M	M
CO2	H	H	H	M	M	M	M	M	M
CO3	H	H	H	M	M	M	M	M	M
CO4	H	H	H	M	M	M	M	M	M
CO5	H	H	H	M	M	H	H	H	M

High- H, Medium-M, Low-L

Content

	Soil chemistry: Soil analysis . Composition of soil : Organic and Inorganic constituents. Soil acidity : buffering capacity of soils. Limiting of soil. Absorption of cations and anions : availability of soil nutrients to plants..
II	Soil fertility and productivity: Organic Manures - Farmyard Manure - Compost - Oil cakes - Bone meal - Meat meal - Fish meal - Blood meal and green Manures - Fertilizers - Classification of fertilizers - Requisites of a good fertilizers - NPK fertilizers - ill effects of fertilizers - effect of mixed fertilizers on soil pH - Micronutrients - role of micronutrients sources - Need for nutrient balance - Soil management and Micronutrients needs.
III	Insecticides: stomach and contact poisons. Plant derivatives: pyrethrine, Nicotine and rotenone Synthetic organic: carbophos, carbaryl, p-DCB, dimethoate, butachlor, Endrin, Aldrin (Chemical name and uses).
III	Fungicides: Inorganic (Bordeaux Mixture) and organic(dithiocarbamate). Industrial fungicides: creosote fractions.
	Herbicides and weedicides: Selective and non-selective, 2, 4-D and 2, 4, 5-t (structure and function) Intenerated pest management.
	Potentiometry: Measurement of EMF, PH-metry and its applications in the analysis of pesticide residues in Agrochemicals, Food, Juices and Water.
IV	Electrical conductivity: Electrical conductivity of electrolyte, Conductivity meter, Specific and Equivalent conductivities, Applications of conductivity measurement in the Analysis of Salinity, Halide and Soil moisture.
IV	Non Instrumental Techniques: Acid base titrations acid-base indicators; Redox titrations determination of halide ions by Complexometric titration, Precipitation titrations methods of determination of Mg, Zn, Ca, Al, Cu, Metallochromic indicators, Gravimetric estimation of SO_4^{2-} and Fe^{++} .

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

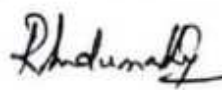
Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Jayashree Ghosh	Fundamental concept of Applied chemistry.	S. Chand & Company Ltd.,	2010
2	B.A. Yagodin (Ed).	Agricultural Chemistry.	2 Volumes, Mir Publishers Moscow	1984
3	K.Bagavathi - Sundari	Applied chemistry,	MJP Publishers.	

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	T.D. Biswas and S.K. Mukerijee	Text book of soil science.	McGraw Hill Education, 2 nd Edition.	2017
2	G.T. Austin	Shreve's Chemical Process Industries.	Mc-Graw-Hill, 5 th Edition.	2017
3	Nyle.C.Bready	The nature and properties of soils.	Pearson Education, 14 th Edition.	2012
4	Louis M.Thompson - and Frederick. R.Troch	Soils and soil fertility.	Oxford University Press Inc. 5 th Edition.	1993

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	Name and Signature	Name and Signature	Name and Signature
Name: Ms.R.Sudha  Signature:	Name: Dr. Indumathy Ramasamy  Signature:	Name: Mr. K. Srinivasan  Signature:	Name: Dr. R. Manicka Chezian  Signature:

K. SRINIVASAN, M.C.A.,
Co-ordinator
Curriculum Development Cell (CDC)
120 NGM College (Autonomous)
Pollachi - 642 001.

Dr. R. MANICKA CHEZIAN, M.Sc. M.S.W.
Controller of Examinations
NGM College (Autonomous)
POLLACHI - 642 001.

Programme Code:	B.Sc.	Programme Title:	Bachelor of Chemistry	
Course Code:	21UCY6AL	Title	Batch:	2021 - 2024
Duration Hrs./Week	Self study	Advanced Learner Course – II: Applications of Spectroscopy (Optional)	Semester:	VI
			Credits:	4*

Course Objective

Acquire knowledge and skills in the interpretation of various spectra of the molecules and applications of spectroscopy.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Calculate the absorption maxima and interpret the types of electronic transitions of compounds in absorption spectra	K3, K4
CO2	Analyse the IR spectra and predict the type of functional group	K4
CO3	Identify the structure of molecule with the NMR Spectra	K4
CO4	Determine and deduce the molecular mass and structure of the molecules using fragmentation pattern of mass spectra	K3, K4
CO5	Apply the knowledge of hyperfine splitting in the prediction of EPR spectra	K3

Mapping with POs / PSOs Vs COs

PO / PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	H	M	H	H	H	H	H	H	H	H
CO2	H	M	H	H	H	H	H	H	H	H
CO3	H	M	H	H	H	H	H	H	H	H
CO4	H	M	H	H	H	H	H	H	H	H
CO5	H	M	H	H	H	H	H	H	H	H

H – High; M – Medium; L – Low

Units	Content
Unit I	UV-visible spectroscopy: Principles, absorption bands, Effect of temperature and on the fine structure of absorption bands, Woodward-fieser Rules for calculating absorption maximum in poly-ynes and α , β -unsaturated carbonyl compounds, acids and Electronic transitions for charge transfer complexes, spectrophotometric titrations.
Unit II	IR Spectroscopy: Principles, sampling techniques, Interpretation of spectra of hydrocarbon halogen compounds, alcohols, phenols, ethers, carbonyl compounds, esters, acids, acid anhydrides and nitro compounds. Application of IR to quantitative analysis. Limitations of IR spectroscopy.
Unit III	NMR spectroscopy: Principle, Instrumentation, Chemical Shift, splitting signals, Interpretation of NMR spectra of organic molecules like propene, 1-pentyne, methyl ether, acetaldehyde, acetone, ethyl acetate, acetic acid, 1-nitrobutane. ^{13}C spectroscopy, Chemical shift, proton coupled and decoupled ^{13}C spectra and Applications of NMR spectroscopy.
Unit IV	Mass Spectroscopy: Principles, Instrumentation, General fragmentation and Interpretation of mass spectra of compounds containing different functional groups. Applications of Mass spectrometry and solving numerical problems of mass spectrometry pertaining to simple organic compounds.
Unit V	EPR Spectroscopy: Theory, Instrumentation, g-factor and hyperfine splitting. EPR spectra of the following compounds 1,4-Benzoquinone radical anion, naphthalene negative radical, Co^{2+} and Cu^{2+} systems. Anisotropic systems: anisotropic effect, zero field splitting, Krammer's degeneracy and applications of ESR spectroscopy for organic and inorganic systems.

Assessment Methods:

Text Books

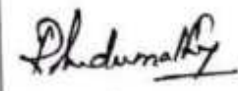
Test, Seminar, Quiz, Assignments, Group Task.

S.NO.	AUTHOR	TITLE OF THE BOOK	PUBLISHER/EDITION	YEAR OF PUBLICATION
1.	Sharma, Y.R.	Elementary Organic Spectroscopy, 5 th edn.	S. Chand & Company Pvt. Ltd.	2013

Gurdeep, C. & Anand, S.K.	Spectroscopy. 5 th edn.	Himalaya Publishing House	2002
Kemp, W.	Organic Spectroscopy	ELBS edition	1985

Reference Books

AUTHOR	TITLE OF THE BOOK	PUBLISHER/EDITION	YEAR OF PUBLICATION
Silverstein, R. M., Bassler, G. C. and Morrill, T. C.	Spectrometric identification of organic compounds	Wiley India Pvt. Ltd. 6 th edn.	1991
Kalsi, P.S.	Spectroscopy of Organic Compounds.	New Age International Pvt Ltd Publisher, 6 th edn	2007
Pavia, D.L., Lampman, G.M., Kriz, G.S. and Vyvyan, J.R.	Spectroscopy.	Brooks/Cole, Cengage Learning. 1 st edn	2008

Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	Name and Signature	Name and Signature	Name and Signature
Name: Dr. Indumathy Ramasamy 	Name: Dr. Indumathy Ramasamy 	Name: Mr. K. Srinivasan 	Name: Dr. R. Manicka Chezian 
Signature:	Signature:	Signature:	Signature:

K. SRINIVASAN, M.C.A.,
Co-ordinator
Curriculum Development Cell (CDC)
NGM College (Autonomous)
Pollachi - 642 001.

Dr. R. MANICKA CHEZIAN, M.Sc., M.S., Ph.D.,
Controller of Examinations
NGM College (Autonomous)
POLLACHI - 642 001.

Programme code:	B.Sc.	Programme Title :	Bachelor of Chemistry
Course Code:	21UCY6S1	Title	Batch :
Hrs/Week:	2	Skill Based Elective –II Green Chemistry	Semester
			Credits:

Course Objective

To learn about the environmental status, public awareness in evolution, principles involved in green bio-catalytic reactions, global warming and its control measures, availability of green analytical methods.

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	Define the green chemistry	K1
CO2	Understand the basic principles of green chemistry	K2
CO3	Identify the environment friendly technologies and working conditions	K3
CO4	Analyse eco-friendly and less wasteful manufacturing process for the sustainable development of our country	K2 & K3
CO5	Know about the various analytical green methods	K1

Mapping with PO / PSO Vs CO

PO / PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1
CO1	M	M	M	M	M	M	M	M	-
CO2	M	M	M	M	M	M	M	M	-
CO3	H	M	M	M	H	M	M	M	-
CO4	H	H	H	M	H	M	M	M	-
CO5	M	M	H	M	M	M	M	M	-

High- H, Medium-M, Low-L

	Content	Hrs
Unit I	The need for green chemistry: Sustainability and cleaner production. Greenchemistry and Eco- efficiency. Environmental Protection Laws. Challenges ahead for a chemist. Green chemistry education.	3
Unit I	Future trends in Green Chemistry: Green nano-synthesis and Green polymer chemistry.	
Unit II	Twelve Principles of Green Chemistry: Explanation with examples. AwardsforGreen Chemistry.	3
Unit III	Water as greener solvent: An alternative approach to solvent chemistry: Solvent free reactions. Solvent free microwave assisted organic synthesis.	3
Unit III	Ionic Liquids: Prospects and Retrospects	
Unit IV	Super critical fluid extraction: Supercritical fluids. Advantages and applications of super fluid extraction technology.	3
Unit IV	Carbon dioxide as a super critical fluid: Advantages and industrialapplications.	
Unit V	Green Techniques: Green Chemistry Using Bio Catalytic Reactions – Introduction - Fermentation and Bio transformations - Production of Bulk and fine chemicals by microbial fermentation. Oxidation technology for waste water treatment-photocatalytic oxidation.Chitin – Green polymer.	3
	Total contact Hrs/Semester	15

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Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

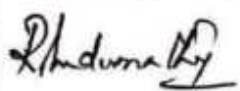
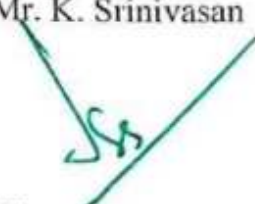
Book

AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
Indu Tucker Sidhwani and Rakesh	An Introductory Text on Green Chemistry: For Undergraduate	Wiley.	2020

	K. Sharma	Student.		
2	V. Kumar	An Introduction to Green Chemistry.	1st (Reprint) Edition. Vishal Publishing Co.,	2013
3	Rashmi Sanghi and M.M. Srivastava	Green Chemistry, (Environment Friendly Alternatives).	1 st Edition. Narosa Publishing House, New Delhi.	2007

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS EDITION	YEAR PUBLICAT
1	Asim K. Das	Environmental Chemistry with Green Chemistry.	1 st Edition. Books and Allied (P) Ltd., Kolkata	2014
2	Samuel Delvin	Green Chemistry.	1 st Edition. IVY Publishing House, New Delhi.	2006
3	V.K. Ahluwalia	Green Chemistry (Environmentally Benign)	1 st Edition. Ane Books Pvt.Ltd., New Delhi.	2006

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	Name and Signature	Name and Signature	Name and Signature
Name: Ms.R.Sudha  Signature:	Name: Dr. Indumathy Ramasamy  Signature:	Name: Mr. K. Srinivasan  Signature:	Name: Dr. R. Manick Chezian  Signature:

K. SRINIVASAN, M.C.
Co-ordinator
Curriculum Development Cell
NGM College (Autonomous)
Pollachi - 642 001.

DR. R. MANICKA
Controller
NGM College (Autonomous)
POLLACHI - 642 001.

Programme code:	B.Sc.	Programme Title :	Bachelor of Chemistry	
Course Code:	21UCY6S2	Title	Batch :	2021-2024
Hrs/Week:	2	Skill Based Elective-II	Semester	VI
		Clean energy	Credits:	2

Course Objective

Develop the theoretical knowledge in practical chemistry.

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	Know about renewable and non-renewable energy resources	K1, K2
CO2	Understand solar energy and working of solar cells	K2, K3
CO3	Develop knowledge on working of wind mill	K1, K2
CO4	Find the application of bio energy	K3
CO5	Study environmental aspect of Tidal, ocean and geothermal energy	K3

Mapping with PO / PSO Vs CO

PO / PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	H	H	H	M	M	M	M	M	-	L
CO2	H	H	H	M	M	M	M	M	-	L
CO3	H	H	H	M	M	M	M	M	-	L
CO4	H	H	H	M	M	M	M	M	-	L
CO5	H	H	H	M	M	M	M	M	-	L

High; M – Medium; L – Low

Unit	Content
Unit I	Consumption of energy - Indian and global energy status- commercial and non-commercial energy sources. Renewable and non-renewable energy resources- Conservation of energy.
Unit II	Solar energy: Solar Radiation – Solar Thermal Collectors – Flat Plate and Concentrating Collectors– Solar Applications – fundamentals of photo Voltaic Conversion – Solar Cells – PV Systems – PV applications.
Unit III	Wind energy: Wind power – mean wind velocity- factors affecting velocity- Wind Energy generators-types.-construction of a Wind Turbine - Important Factors for building windmill.
Unit IV	Bio – energy: Biomass, Biogas, Source, Composition, Technology for utilization – Biomass direct combustion – Biomass gasifier – Biogas plant – Digesters – Ethanol production., Bio-Diesel production.
Unit V	Tidal, ocean and geothermal energy: Wave energy - converting system. Ocean thermal energy -Open and closed cycles. Geothermal energy sources-utilizations- environmental aspects.
Total contact Hrs/Semester	

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS EDITION	YEAR PUBLICA
1	Solanki C.S	Solar Photovoltaic Technology and Systems.	Prentice Hall India Learning Private Limited	2013
2	Rai, G.D.	Non Conventional Energy Sources.	Khanna publishers New Delhi	1990

Reference Books

AUTHOR	TITLE OF THE BOOK	PUBLISHERS EDITION	YEAR OF PUBLICATION
Asim K Das	Environmental chemistry with Green chemistry	Books and Allied (P) Ltd, Kolkata	2010
Sukhatme, S.P.	Solar Energy	Tata McGraw-Hill Publishing Company Ltd	1997

Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	Name and Signature	Name and Signature	Name and Signature
Ms.R.Sudha 	Name: Dr. Indumathy Ramasamy 	Name: Mr. K. Srinivasan 	Name: Dr. R. Manicka Chezian 
Signature:	Signature:	Signature:	Signature:

K. SRINIVASAN, M.C.A.,
Co-ordinator

Curriculum Development Cell (CDC)
NGM College (Autonomous)
Pollachi - 642 001.

Dr. R. MANICKA CHEZIAN, M.Sc., M.S., Ph.D.
Controller of Examinations
NGM College (Autonomous)
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Programme code:	B.Sc.	Programme Title :	Bachelor of Chemistry	
Course Code:	21UPS3A4/	Title	Batch :	2021-2024
	21UBY3A4/	Allied Chemistry Paper – I Inorganic, Organic and Physical Chemistry	Semester	III
	21UZY3A4		Credits:	4
Hrs/Week:	6			

Course Objective

To learn the chemistry of chemical bonding and co-ordination compounds. To understand basic principles of volumetric analysis and water treatment. To learn the chemistry of basic aromatic compounds. To know about some common diseases and the drugs used. To study about electrochemical cell.

Course Outcomes

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

CO number	CO Statement	Knowledge Level
CO1	Understand the principle of chemical bonding, coordination chemistry and applications of biologically important molecules.	K1,K2
CO2	Gain Knowledge on volumetric analysis and water treatment process	K2, K3
CO3	Sketch the synthesis of heterocyclic compounds and reactions of aromatic compounds and heterocycles.	K3
CO4	Explain pharmaceutical chemistry with some important drugs	K4
CO5	Know the basic principle of electro chemistry and corrosion	K4

Mapping with PO / PSO Vs CO

PO / PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	M	H	M	M	M	M	M	H	-	-
CO2	M	H	M	M	M	M	M	M	-	-
CO3	M	H	H	M	M	M	M	M	-	-
CO4	M	H	H	M	M	M	M	H	-	-
CO5	M	H	H	M	M	M	M	H	-	-

H, Medium-M, Low-L

Unit	Content
Unit I	Chemical bonding: Molecular orbital theory - bonding, anti-bonding and non-bonding orbitals, Application of Molecular orbital theory - MO configuration and bond order of H₂, N₂, O₂, F₂. VSEPR Theory - postulates, limitations and prediction of shapes of molecules. Coordination Chemistry: Ligands-Mono and bidentate ligands; Coordination number. Nomenclature - Mononuclear complexes. Werner & Sidgwick Theories; Chelation and its industrial importance with reference to EDTA. Biological role of Haemoglobin and Chlorophyll. Applications in qualitative and quantitative analyses.
Unit II	Volumetric Analysis: Primary and Secondary standards. Principles of volumetric analysis. Preparation of normal, molal and molar solutions. Principle of acid - base titrations. Water treatment: Hardness of water. Temporary and permanent hardness. Units of hardness. Disadvantages of hard water. Softening of hard water - Zeolite process, reverse osmosis, electro dialysis and De-mineralization process - Purification of water for domestic use - Disinfection by Chlorine, Ozone and UV light.
Unit III	Aromatic compounds: Mechanism of SN₁ and SN₂ reactions. Electrophilic substitution in benzene. Mechanism of nitration, halogenation, alkylation, acylation and sulphonation. Heterocyclic compounds - Huckel's rule - Aromaticity of Heterocyclic compounds - Nomenclature of heterocyclic compounds- synthesis and reactions of furan- pyrrole- thiophene and pyridine.

t IV	Chemotherapy: Introduction, Sulphadruugs- sulphanilamide, sulphapyridine, sulphadiazine, sulphaacetamide and sulphathiazole. Mode of action- sulphanilamide Antimalarials: Classification and use of Chloroquine and Pamaquine. Antiseptics: Definition and uses of Chloramines -T, Iodoform and Dettol. Anaesthetics: Classification, characteristics and uses of procaine and pentothal sodium. Antibiotics: Introduction, use of Penicillin, Chloromycetin, Streptomycin and Tetracyclin. Vitamins: Classifications, occurrence and deficiency diseases caused by Vitamin A, B complex, C, D, E and K. (Note : Structure of the compounds is not required.)	18
v	Electrochemistry: Electronic and electrolytic conductors – Faraday's laws of electrolysis – Arrhenius theory of electrolytic dissociation- Transport number - Conductance: Specific and molar conductance, Variation of conductance with dilution. Kohlrausch law and its applications. Applications of conductance measurements – determination of degree of dissociation of weak electrolyte. Ionic product of water and conductometric titrations. pH: Definition, Buffer solutions, Importance of buffer in the living systems. Corrosion and its prevention.	18
		90
		Total Contact Hrs/Semester

ogy

Direct Instruction, Flipped Class, Digital Presentation

smment Methods:

Test, Seminar, Quiz, Assignments, Group Task.

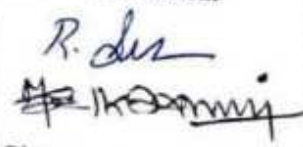
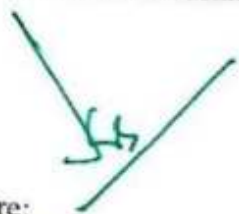
books

Author	Title of the Book	Publishers \ Edition	Year of Publication
Vaidyanathan K., Venkateswaran A. and Ramasamy R	Allied chemistry	1. 1 st Edition. Priya publications.	2005

2	Veeraiyan., V. and Vasudevan. A.N.S	Ancillary chemistry	1 st Edition. Einstein publishing house	20
3	Yadav, M.S.(2001),Electrochemistry	Electrochemistry	2 nd Edition. Anmol Publications	20
4	Jayashree Ghosh	A Text book of Pharmaceutical Chemistry	New Delhi: S. Chand & Co.,	20

Reference Books

S.No.	Author	Title of the Book	Publishers \ Edition	Year Published
1	B. R. Puri, L. R. Sharma and K. C. Kalia	Principles of Inorganic Chemistry	33rd Edition. Vishal Publishing Co.,	20
2	2. Jain P.C. and Monica Jain	Engineering Chemistry	17 th Edition. Dhanpat Rai Publishing Company(P)Ltd.	20
3	P. L. Soni	Text Book of Inorganic Chemistry	Sultan Chand & Sons	20
4	Arun Bahl and B.S. Bahl	Advanced Organic Chemistry	5th Edition. S Chand	20
5	M.K. Jain and S. C. Sharma	Modern Organic Chemistry	Golden Jubilee Year Vishal	20

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature Name: Ms.R.Sudha Dr. M. Selladurai  Signature:	Name and Signature Name: Dr. Indumathy Ramasamy  Signature:	Name and Signature Name: Mr. K. Srinivasan  Signature: K. SRINIVASAN, M.C.A. Co-ordinator Curriculum Development Cell (CDC) NGM College (Autonomous) 138, Pollachi - 642 001.	Name and Signature Name: Dr. R. Manicka Chezian  Signature: Dr. R. MANICKA CHEZIAN, M.C.A. Controller of Examination NGM College (Autonomous) POLLACHI - 642 001.

Programme code:	B.Sc.	Programme Title :	Bachelor of Science	
Course Code:	21UPS 4A6/ 21UBY4A6/ 21UZY4A6	Title	Batch :	2021-2024
		Allied Chemistry Practical	Semester	III & IV
Hrs/Week:	2		Credits:	2

Course Objective

Understand the principles of volumetric analysis. To enable the students to have hands-on training on qualitative analysis of organic compounds.

Course Outcome

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

CO number	CO Statement	Knowledge Level
CO1	Learn how to conduct a volumetric estimation process precisely.	K1, K2
CO2	Understand reactions taking place during the experiment.	K2, K5
CO3	Get the idea about organic qualitative analysis	K2, K4
CO4	Distinguish between aliphatic and aromatic, saturated and unsaturated compounds.	K3
CO5	Evaluate the reactivity of various functional groups	K2, K5

Mapping with PO / PSO Vs CO

PO / PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	H	H	H	H	H	H	M	H	H	H
CO2	H	H	H	H	M	H	M	H	H	H
CO3	H	H	H	H	M	H	M	H	H	H
CO4	H	H	H	H	M	H	M	H	H	M
CO5	H	H	H	H	H	H	M	H	H	H

H, High; M, Medium; L, Low

Unit	Contents	Hours
	Volumetric Analysis: 1. Estimation of sodium carbonate. 2. Estimation of oxalic acid(Acidimetry) 3. Estimation of ferrous ion. 4. Estimation of oxalic acid.(Permanganometry) 5. Estimation of potassium dichromate using sodium thiosulphate 6. Estimation of temporary, permanent and total hardness of water 7. Estimation of Zinc using EDTA. 8. Estimation of Mg using EDTA. Organic analysis: Detection of elements. Nitrogen, Sulphur and Halogens. 1. To distinguish between aliphatic and aromatic, saturated and unsaturated compounds. 2. Functional group tests for : i) Mono and Dicarboxylic acids ii) Phenols iii) Carbohydrates(Reducing and non reducing) iv) Aromatic primary amines and v) Amides.	
	Total contact Hrs/Semester	30

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

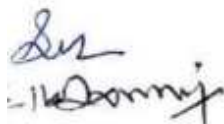
Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR PUBLICATION
1	A.I. Vogel	Elementary practical organic chemistry-qualitative organic analysis part 2.	2 nd Edition. Prentice Hall.	2014

V. Venkateswaran, R. Veeraswamy, A. R. Kulandaivelu	Basic Principles of Practical Chemistry.	2 nd Edition. New Delhi:Sultan Chand & Sons	2012
F. G. Mann. & B. C. Saunders	Practical Organic Chemistry.	4 th Edition. Pearson Education India	2009

Reference Books

0	AUTHOR	TITLE OF THE BOOK	PUBLISHERS EDITION	YEAR OF PUBLICATION
	Pandey O. P, Bajpai D. N., Giri S.	Practical Chemistry.	S.Chand& Co.	2010
	G. Svehla	Vogel's Qualitative Inorganic Analysis.	Dorling Kindersley. 7 th Edition.	2009
	A.O. Thomas	Practical Chemistry.	Scientific Book Centre, Cannanore, 3 rd Edition.	2003

Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	Name and Signature	Name and Signature	Name and Signature
Ms.R.Sudha I. Selladurai 	Name: Dr. Indumathy Ramasamy 	Name: Mr. K. Srinivasan 	Name: Dr. R. Manicka Chezian 
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