FACULTY OF HUMANITIES, SCIENCES & MANAGEMENT

DEPARTMENT OF CHEMISTRY

Periyar Nagar, Vallam, Thanjavur-613403, Tamilnadu
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FACULTY OF HUMANITIES, SCIENCES & MANAGEMENT

DEPARTMENT OF CHEMISTRY

CURRICULUM & SYLLABUS
(I-VI SEMESTER)

B.Sc. CHEMISTRY
(FULL TIME-3 Years)

REGULATION 2023
PERIYAR MANIAMMAI INSTITUTE OF SCIENCE & TECHNOLOGY

FACULTY OF HUMANITIES, SCIENCES & MANAGEMENT

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CURRICULUM & SYLLABUS (I to VI SEMESTER) FOR B.Sc. CHEMISTRY

FULL TIME-3 Years

PERIYAR MANIAMMAI INSTITUTE OF SCIENCE &TECHNOLOGY

CURRICULUM AND SYLLABUS

FOR BACHELOR OF SCIENCE

B.Sc. Chemistry – (THREE YEARS - FULL TIME)

REGULATION 2023

(Applicable to the students admitted from the academic year 2023-2024 onwards)

1. PMIST VISION & MISSION

Vision:

To be a University of global dynamism with excellence in knowledge and innovation ensuring social responsibility for creating an egalitarian society.

Mission:

UM1: Offering well balanced programmes with scholarly faculty and state-of-art facilities to impart high level of knowledge.

UM2: Providing student - centered education and foster their growth in critical thinking, creativity, entrepreneurship, problem solving and collaborative work.

UM3: Involving progressive and meaningful research with concern for sustainable development.

UM4: Enabling the students to acquire the skills for global competencies.

UM5: Inculcating Universal values, Self- respect, Gender equality, Dignity and Ethics.

II. DEPARTMENT VISION AND MISSION

VISION

To prepare the students with basic scientific knowledge in Chemistry for technological Development and to provide resources for industry and society through education and Research to achieve environmental protection, energy generation and drug development.

MISSION

DM 1: To provide in-depth knowledge in Chemistry to impart technology.

DM 2: To create new idea to improve the technology by offering Doctoral programme.

DM 3: To undertake project in thrust areas with societal requirements.

DM 4: To develop novel method for clean technology, Bio energy and drug development.

Mapping of Department Mission with University Mission:

	DM1	DM2	DM3	DM4	Total
UM1	3	3	2	1	**9**
UM2	3	2	3	1	**9**
UM3	2	2	3	3	**10**
UM4	3	2	3	2	**10**
UM5	2	2	3	3	**10**

3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

III. PROGRAMME EDUCATIONAL OBJECTIVE (PEO's)

The Graduate will be

PEO-1: proficient in applying a broad understanding of the basic principles of chemistry to the solution of chemical problems

PEO-2: able to become a highly professional teacher/professor or renowned scientist

PEO-3: able to plan, coordinate, communicate, organize, make decision and lead a team to solve problems and develop application using chemistry.

PEO-4: professional, ethical, responsible and will contribute to society through active management.

Mapping of Programme Educational Objectives (PEO) with Department Mission:

B.Sc. Chemistry	PEO1	PEO2	PEO3	PEO4	Total
DM1	3	2	1	0	**6**
DM2	3	1	1	1	**6**
DM3	2	2	1	3	**8**
DM4	0	2	0	3	**5**

3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

IV. GRADUATE ATTRIBUTES

Graduates Attributes (GAs) form a set of individually assessable outcomes that are the components indicative of the graduate's potential to acquire competence to practice at the appropriate level. The GAs are examples of the attributes expected of a graduate from an accredited programme. The Graduate Attributes of a Chemist are as follows:

GA-1: Disciplinary Knowledge: Apply knowledge of chemistry along with mathematics, physics and other domains appropriate to the programme.

GA-2: Problem analysis and solution: Identify, formulate, analyse and solve problems pertaining to chemistry by interdisciplinary approach

GA-3: Design / Development of solutions: Design and develop solutions for problem with appropriate consideration to public health, safety, environment and society.

GA-5: Tool usage: Acquire, select, manipulate relevant techniques, resources and ICT tools to interpret solutions to the problems.

GA-6: Ethics and Social responsibility: Practice ethical codes as a chemistry professional and realize the responsibility to environment and society.

GA-7: Effective Communication: Professional communication with the society to comprehend and formulate reports, documentation, effective delivery of presentation and responsible to clear instructions.

GA-8: Individual and teamwork: Perform as an individual and as a leader in diverse teams and in multi-disciplinary environment.

GA-9: Lifelong learning: Recognize the need and have the ability to engage in independent learning for continual development as a chemist.

V. PROGRAMME OUTCOMES (POs)

The Graduates will be able to

PO-1: understand how scientific and mathematical knowledge continually evolve andthat is course to change.

PO-2: identify and apply universal chemical laws to the problem.

PO-3: communicate effectively (written /oral) and work effectively as an individual or team.

PO-4: understand the impact and ethics of scientific discoveries on influencing society locally and globally.

PO-5: work effectively in bringing multidisciplinary ideas to diverse professional environment.

PO-6: find, collect and assess scientific-based information - its relevance and reliability.

PO-7: design and perform experiments and thereby analyze and interpret data.

PO-8: use techniques, tools and skills necessary for emerging technologies.

PO-9: exhibit competence in educational, industrial and research pursuits that contribute towards the holistic development of self and community.

VI. PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO1: Students can disseminate the basics of chemistry and advanced topics and analytical skills in organic, inorganic and physical chemistry.

PSO2: apply the concepts of chemistry to solve problems in the community, entrepreneurial and research pursuits.

CURRICULUM FOR B.Sc. CHEMISTRY- BACHELOR OF SCIENCE

(THREE YEARS - FULL TIME) REGULATION - 2023

(Applicable to the students admitted from the academic year 2023 – 2024 onwards)

Semester I									
Part	**Category**	**Course Code**	**Course Name**	**L**	**T**	**P**	**SS**	**H**	**C**
I	Language	XGT101/XFT 101	Tamil – I/ Foundational Tamil – I	3	0	0	0	3	3
II	Language	XGE102	English – I	3	0	0	0	3	3
III	CC - 1	XCY103	General Chemistry-I	3	1	0	2	6	4
	CC - 2	XCY104	Quantitative Inorganic estimation (titrimetry) and Inorganic Preparations	0	0	3	0	3	2
	EC-1/ DSC	XMG105	Allied Mathematics -I	3	1	0	2	5	4
	SEC -1	XCY106	Cosmetics and Personal care Products	2	0	0	0	2	2
	FC	XCY100	Foundation Course	2	0	0	0	2	2
IV	UMAN - 1	XUM001	Human Ethics, Values, Rights and Gender Equality	1	0	0	1	2	1
	Total			**17**	**2**	**3**	**8**	**30**	**21**

Semester II									
Part	**Category**	**Course Code**	**Course Name**	**L**	**T**	**P**	**SS**	**H**	**C**
I	Language	XGT201/ XFT201	Tamil – II/Foundational Tamil – II	3	0	0	0	3	3
II	Language	XGE202	English – II	3	0	0	0	3	3
III	CC - 3	XCY203	General Chemistry–II	3	1	0	2	6	4
	CC - 4	XCY204	Qualitative Organic Analysis and Preparation of Organic Compounds	0	0	3	0	3	2
	EC -2/ DSC	XMG205	Allied Mathematics -II	3	1	0	2	6	4
	SEC- 2	XCY206	Dairy Chemistry	2	0	0	0	2	2
	SEC-3	XCY207	Role of Chemistry in daily life	2	0	0	0	2	2
IV	UMAN - 2	XUM002	Environmental Studies	1	0	0	1	2	1
			Field Visit	0	0	0	0	0	2
			Total	**17**	**2**	**3**	**8**	**30**	**23**

Semester III									
Part	**Category**	**Course Code**	**Course Name**	**L**	**T**	**P**	**SS**	**H**	**C**
I	Language	XGT301	Tamil – III	3	0	0	0	3	3
II	Language	XGE302	English – III	3	0	0	0	3	3
III	CC - 5	XCY303	General Chemistry–III	3	1	0	0	4	4
	CC - 6	XCY304	Qualitative Inorganic Analysis	0	0	3	0	3	2
	EC-3/ DSC	XPH305	Allied Physics-I	3	0	0	0	3	3
	EC-4/ DSC	XPH306	Allied Physics Practical -I	0	0	3	0	3	2
	SEC-4	XCY307	Water Quality Analysis	2	0	0	0	2	2
	SEC-5	XCY308	Pesticide Chemistry	2	0	0	0	2	2
IV	GE: Open Elective	XCY309	Open Elective- I	3	0	0	0	3	3
	UMAN -3	XUM003	Disaster Management	1	0	0	1	2	1
			Total	**20**	**1**	**6**	**2**	**30**	**25**

Semester IV									
Part	**Category**	**Course Code**	**Course Name**	**L**	**T**	**P**	**SS**	**H**	**C**
I	Language	XGT401	Tamil – IV	3	0	0	0	3	3
II	Language	XGE402	English – IV	3	0	0	0	3	3
III	CC - 7	XCY403	General Chemistry–IV	3	1	0	0	4	4
	CC - 8	XCY404	Physical Chemistry Practical- I	0	0	3	0	3	2
	EC -5/DSC	XCY405	Allied Physics -II	3	0	0	0	3	3
	EC-6/DSC	XPH406	Allied Physics Practical -II	0	0	3	0	3	2
	SEC-6	XCY407	Instrumental Methods Of Chemical Analysis	2	0	0	0	2	2
	SEC-7	XCY408	Forensic Science	2	0	0	0	2	2
IV	GE: Open Elective		Open Elective- 2	3	0	0	0	3	3
	UMAN - 4	XUM004	Introduction to Entrepreneurship Development	1	0	0	1	2	1
			Total	**20**	**1**	**6**	**3**	**30**	**25**

Semester V									
Part	**Category**	**Course Code**	**Course Name**	**L**	**T**	**P**	**SS**	**H**	**C**
III	CC - 9	XCY501	Organic Chemistry -I	3	1	0	1	5	4
	CC - 10	XCY502	Inorganic Chemistry - I	3	1	0	1	5	4
	CC - 11	XCY503	Physical Chemistry -I	3	1	0	1	5	4
	CC - 12	XCY504	Gravimetric Estimation practical	0	0	3	0	3	2
	EC-5/ DSE	XCY505	Industrial Chemistry	2	1	0	1	4	3
	GE: Open Elective		Open Elective- 3	3	0	0	0	3	3
	CC -13	XCY506	Project -Phase 1	0	0	3	0	3	1
IV	IPT	XCY507	Internship / Industrial Visit / Field Visit (Carried out in II Year Summer vacation) (30 hours)	0	0	0	0	0	2
Total				**14**	**4**	**6**	**6**	**30**	**23**

Semester VI									
Part	**Category**	**Course Code**	**Course Name**	**L**	**T**	**P**	**SS**	**H**	**C**
III	CC -14	XCY601	Organic Chemistry -II	3	1	0	0	4	4
	CC -15	XCY602	Inorganic Chemistry - II	3	1	0	0	4	4
	CC -16	XCY603	Physical Chemistry -II	3	1	0	1	5	4
	EC - 6	XCY604	Renewable Energy	2	1	0	0	3	3
	EC - 7 (Elective based)	XCY605A/ XCY605B/ XCY605C	Nanoscience	2	1	0	0	3	3
			Pharmaceutical Chemistry						
			Polymer science						
	CC - 17	XCY607	Project Phase – II with viva voce	0	0	4	0	4	3
IV	NME	XCY608	Python for Chemist	2	0	0	1	3	2
	UMAN - 5	XUM005	Cyber Security	1	0	0	1	2	1
V	EA		Extension Activities (NSS, NCC, NSO,RRC and YRC)	0	0	0	1	1	1
Total				**16**	**5**	**4**	**5**	**30**	**25**
Total Credit									**142**

Value Added course will be offered during the programme.

L - Lecture **T- Tutorial** **P – Practical** **C-Credit**

Skill Based Enhancement Course-Area Title (Offered by Dept. of Chemistry)	**Non-Major Elective-Title(Offered by Dept. of Chemistry)**
Semester III : Water Quality Analysis **Semester VI :** Renewable Energy	**Semester VI** : Python for Chemist

ABBREVIATIONS

FC: Foundation Course	GE: Generic Elective
EC: Elective Course	NME: Non-Major Elective
SEC: Skill Based Enhancement Course	EA: Extension Activities
DSC: Discipline Specific Course	SS: Self Study
CC: Core Course	UMAN: University Mandatory

Course Structure: B.Sc. Chemistry (2023)

Part	Nature of course	Total No. of Courses	Total Marks	Total Credits
Part I	Language (Tamil)	04	400	12
Part II	English	04	400	12
Part III	Core Course	17	1700	49
	Project	2	200	4
	Elective Courses (Generic/ Discipline Centric-DSC) – Allied	5	500	18
	Elective courses (Discipline Specific Elective) – DSE	3	300	9
	Skill Based Enhancement courses (SEC) – General	2	200	4
	Skill Based Enhancement courses (SEC) –Indian Knowledge System (IKS)	5	500	10
Part IV	UMAN	5	500	5
	Foundation Course – Bridge Course	1	100	2
	GE: Open Elective	3	300	9
	Internship	1	100	2
	Field Visit	1	100	2
	NME	1	100	2
Part V	Extension Activities (NSS, NCC, NSO,RRC and YRC)	1	-	2
	Total	**58**	**5800**	**142**

Field Visit / Industrial Visit / Hands on Training Programme having minimum 15 hours of contact time is introduced for II-year UG students to gain experiential learning. Evaluation of the visit report will be held at the end of IV Semester.

Components of Evaluation

1. **CIA Marks - 50**

Evaluation Scheme

1. **Formative (FA) Marks - 50**
2. **Summative (SA) Marks - 50**

Total Marks - 100

Project is introduced for III-year students to cater for the needs of students to excel in Higher studies and research.

Non – Major Elective Course offered by the Department

Skill Based Elective Course offered by the Department.

SEMESTER – I

பாடக்குறியீடு / Course Code	பாடப்பெயர் / Course Name	Category	L	T	P	S S	H	C
XGT101	பொதுத்தமிழ் - 1	Supportive	3	0	0	0	3	3
Pre-requisite	பன்னிரெண்டாம் வகுப்பில் தமிழை ஒரு பாடமாகப் பயின்றிருக்க வேண்டும்.							
பாடப் பயன்கள் / Course outcomes	இப்பாடத்தைக் கற்பதால் பின்வரும் பயன்களை மாணவர்கள் அடைவர்.							
CO1	கவிதை இலக்கியம் அறிமுகப்படுத்தப்படுவதால் படைப்பாற்றல் திறன் பெறுதல்.	புரிந்துகொள்ளல் (Understand)						
CO2	புதுக்கவிதை வரலாற்றினை அறிந்து கொள்வர்.	புரிந்துகொள்ளல் (Understand)						
CO3	இக்கால இலக்கிய வகையினைக் கற்பதன் மூலம் படைப்பாக்கத்திறனைப் பெறுவர்.	பகுப்பாய்வுசெய்தல் Analyze						
CO4	மொழிஅறிவோடுசிந்தனைத்திறன்அதிகரித்தல்.	தெரிந்துகொள்ளல் (Apply)						
CO5	தமிழ்மொழியைப் பிழையின்றி எழுதவும், புதியகலைச் சொற்களை உருவாக்கவும் அறிந்துகொள்ளுதல்.	புரிந்துகொள்ளல் (Understand)						
K1- Remember; K2 – Understand; K3 –Apply; K4 Analyze; K5 Evaluate; K6 – Create.								

அலகு – I	மரபுக்கவிதை	9+0+0=9

1. பெ. சுந்தரனார் - தமிழ்த்தெய்வவணக்கம்.
2. பாரதிதாசன் – சிறுத்தையே வெளியேவா.
3. கவிமணி - புத்தரும் சிறுவனும்
4. முடியரசன் - மொழிஉணர்ச்சி
5. கண்ணதாசன் – ஆட்டனத்தி ஆதிமந்தி – ஆதிமந்தி புலம்பல்.
6. சுரதா - துறைமுகம்தொகுப்பிலிருந்துஏதேனும்ஒருகவிதை

தமிழ்ஒளி - கடல்

அலகு - II	புதுக்கவிதை	9+0+0=9

1. அப்துல்ரகுமான் - வீட்டுக்குஒருமரம்வளர்ப்போம்.
2. ஈரோடுதமிழன்பன்- வணக்கம்வள்ளுவ.
3. வைரமுத்து – பிற்சேர்க்கை

4. மு.மேத்தா - வாழைமரம்.
5. அறிவுமதி - வள்ளுவன்பத்து.
6. நா.முத்துக்குமார் - ஆனந்தயாழைமீட்டுகிறாய்.
7. சுகிர்தாரணி - சபிக்கப்பட்டமுத்தம்.

இளம்பிறை - நீஎழுதமறுக்கும்எனதுஅழகு.

அலகு - III	சிறுகதைகள்	9+0+0=9

1. வாய்ச்சொற்கள் – ஜெயகாந்தன்(மாலைமயக்கம்தொகுப்பு)
2. கடிதம் - புதுப்பித்தன்.
3. கரு - உமாமகேஸ்வரி.
4. முள்முடி - திஜானகிராமன்.
5. சிதறல்கள் - விழி.பா.இதயவேந்தன்.
6. காகிதஉறவு - சு.சமுத்திரம்.
7. வீட்டின்மூலையில்சமையலறை - அம்பை.

(மொழிபெயர்ப்புக்கதை) ஆண்டன்செக்காவ் - நாய்க்காரச்சீமாட்டி.

அலகு - IV	இலக்கியவரலாறு	9+0+0=9
	பாடம்தழுவியஇலக்கியவரலாறு	
அலகு - V	மொழித்திறன்/ போட்டித்தேர்வு	9+0+0=9

1. பொருள்பொதிந்த சொற்றொடர் அமைத்தல்
2. ஓர்எழுத்து ஒருமொழி
3. வேற்றுமை உருபுகள்
4. திணை, பால், எண், இடம்
5. கலைச்சொல்லாக்கம், மொழிபெயர்ப்பு

(குறிப்பு:அலகு4,5 ஆகிய பகுதிகள் போட்டித்தேர்வு நோக்கில் நடத்தப்படவேண்டும்)

கூடுதல் மணிகள்	45+0+0=45

பாடநூல்கள்

1. மேலே சுட்டப்பட்டுள்ள கவிதைகள் அடங்கியபாடம் தொடர்புடைய நூல்கள்

பார்வைநூல்கள்

1. தமிழ்இலக்கியவரலாறு – சிற்பிபாலசுப்பிரமணியன்.
2. புதியநோக்கில் தமிழ் இலக்கிய வரலாறு – தமிழண்ணல்

3. வகைமைநோக்கில் தமிழ்இலக்கிய வரலாறு – எஃப்.பாக்கியமேரி.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]
Web Sources
• Tamil Heritage Foundation - www.tamilheritage.org<http://www.tamilheritage.org> • Tamil virtual University Library - www.tamilvu.org/libraryhttp://www.virtualvu.org/library • Project Madurai - www.projectmadurai.org. • Chennai Library - www.chennailibrary.com<http://www.chennailibrary.com>. • Tamil Universal Digital Library-www.ulib.prg<http://www.ulib.prg>. • Tamil E-Books Downloads – tamilebooksdownloads.blogspot.com • Tamil Books online - books.tamilcube.com • Catalogue of the Tamil books in the Library of British Congress archive.org • Tamil novels online - books.tamilcube.com
Strong-3, Medium-2, Low-1

Mapping of COs with POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO1	0	0	3	3	3	0	0	0	0	0	0
CO2	0	0	3	3	3	0	0	0	0	0	0
CO3	0	0	3	3	3	0	0	0	0	0	0
CO4	0	0	3	3	3	0	0	0	0	0	0
CO5	0	0	3	3	3	0	0	0	0	0	0
Total	0	0	15	15	15	0	0	0	0	0	0
Scaled Value	0	0	3	3	3	0	0	0	0	0	0

1 – 5 →1, 6 – 10→ 2, 11 – 15→ 3

0-No Relation, 1- Low Relation, 2-Medium Relation, 3-High Relation

COURSE CODE	XGE102	L	T	P	SS	H	C
COURSENAME	ENGLISH I	3	0	0	0	3	3
C:P:A	3:0:0						

COURSE OUTCOMES: After the completion of course, the learners will be able to get comprehensive skills like:		Domain	Level
CO1	***Develop*** and integrate the use of the four language skills i.e. Reading, Listening, Speaking and Writing	Cognitive	Understand
CO2	***Understand*** the total content and underlying meaning in the context.	Cognitive	Apply
CO3	***Form*** the habit of reading for pleasure and for information	Cognitive	Understand
CO4	***Comprehend*** material other than the prescribed text	Cognitive	Understand
CO5	***Develop*** the linguistic competence that enables them, in the future, to present the culture and civilization of their nation.	Cognitive	Understand

SYLLABUS		HOURS
UNIT-I	**POETRY**	**6+3+0=9**
1.1 A Patch of Land - Subramania Bharati 1.2 The Sparrow - Paul Laurence Dunbar 1.3 A Nation's Strength – Ralph Waldo Emerson 1.4 Love Cycle - Chinua Achebe		
UNIT-II	**PROSE**	**6+3+0=9**
2.1 JRD - Harish Bhat 2.2 Us and Them - David Sedaris From Dress Your Family in Corduroy and Denim 2.3 Uncle Podger Hangs a Picture - Jerome K Jerome		
UNIT-III	**SHORT STORIES**	**6+3+0=9**
3.1 The Faltering Pendulum- Bhabani Bhattacharya 3.2 How I Taught my Grandmother to Read - Sudha Murthy 3.3 The Gold Frame- R.K. Laxman		
UNIT-IV	**LANGUAGE COMPETENCY**	**6+3+0=9**
4.1 Vocabulary : Synonyms, Antonyms, Word Formation 4.2 Appropriate use of Articles and Parts of Speech 4.3 Error correction		
UNIT - V	**ENGLISH FOR WORKPLACE**	**6+3+0=9**
5.1 Self - introduction, Greetings 5.2 Introducing others 5.3 Listening for General and Specific Information 5.4 Listening to and Giving Instructions / Directions		
L=30 / T=15	**Total Hours**	**45**
Tutorial Activities 1) Reading and understanding incomplete texts		

2) Summarize a piece of prose or poetry 3) Communication Practice 4) Role play	
Text books • Hogan, Sharon. The Art of Civilized Conversation: A Guide to Expressing Yourself with Style and Grace -Margaret Shepherd, Penny Carter, (Illustrator), 2015. • Kumar, Vijay T. English in Use - *A Textbook For College Students* (English ,Paper back, - K Durga Bhavani, YL Srinivas,2015 • Murthy, Sudha. *How I taught my Grandmother to Read and other Stories*. Penguin Books, India, 2014 • Swan, Michael. *Practical English Usage* - 4th Edition By, 2018	

Mapping of COs with POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO1	0	0	3	3	3	1	0	0	2	0	0
CO2	0	0	3	3	3	1	0	0	2	0	0
CO3	0	0	3	3	3	1	0	0	2	0	0
CO4	0	0	3	3	3	1	0	0	2	0	0
CO5	0	0	3	3	3	1	0	0	2	0	0
Total	0	0	15	15	15	5	0	0	10	0	0
Scaled Value	0	0	3	3	3	1	0	0	2	0	0

1 – 5 →1, 6 – 10→ 2, 11 – 15→ 3
0-No Relation, 1- Low Relation, 2-Medium Relation, 3-High Relation

COURSECODE	XCY103	L	T	P	SS	C
COURSENAME	GENERAL CHEMISTRY I	3	1	0	2	4
C:P:A	3.2:0:0.8	L	T	P	SS	H
		3	1	0	2	6

COURSEOUTCOMES:		Domain	Level
CO1	***Explain*** the classification and IUPAC nomenclature of organic compounds.	Cognitive	Understand
CO2	***Recall*** the types of hybridization and ***describe*** geometry of organic molecules and the influence of electronic effects in bonding.	Cognitive	Remember Understand
CO3	***Interpret*** the type of chemical bonding, hybridization and geometry of inorganic molecules.	Cognitive Affective	Apply Receiving
CO4	***Recognize***the periodic properties of elements and ***describe*** various types of Quantum numbers.	Cognitive Affective	Remember Responding
CO5	***Identify*** and ***apply***the variousatomic models and concept of Quantum chemistry to analyze the chemical molecules.	Cognitive	Remember Apply

UNIT-I CLASSIFICATION AND NOMENCLATURE **10+3**

Classification of organic compounds - based on the nature of carbon skeleton and functional groups - classification of C and H atoms of organic compounds (primary/secondary/tertiary) - IUPAC system of nomenclature of common organic compounds (upto C-10) - alkanes, alkenes, alkynes, cycloalkanes, bicycloalkanes with and without bridges and aromatic compounds - Naming of organic compounds with one functional group - halogen compounds, alcohols, phenol, aldehydes, ketones, carboxylic acids and its derivatives, cyano compounds, amines, nitro compounds (Both aliphatic and aromatic) - Naming of compounds with two functional groups - naming of compounds with more than one carbon chain - Naming of heterocyclic compounds containing one and two hetero atoms present in five/six membered rings

UNIT-II BONDING IN ORGANIC MOLECULES **6+3**

Hybridization and geometry - bond angle, bond length, bond strength of C-H and C-C bonds -Van der Waal's interactions, Inter & Intra molecular forces and their effects on physical properties - Electronic effects - inductive effect, resonance effect - drawing of resonance structures - conditions for resonance - stability of resonance structures, hyper conjugation, electromeric effect, steric effect - steric overcrowding - steric inhibition of resonance - steric relief (with examples). Dissociation of bonds - homolysis and heterolysis - radicals, carbocations, carbanions - electrophiles and nucleophiles - Influence of electronic effects - dipole moment - relative strengths of acids and bases - stability of olefins - stability of radicals, carbocations and carbanions.

UNIT–III CHEMICAL BONDING **9+3**

Ionic bond – Properties of ionic compounds, factors favoring the ionic compounds ionization potential – electron affinity – electronegativity – Lattice energy – Born-Haber Cycle – Pauling and Mulliken's scales of electronegativity – Polarizing power and Polarizability – Partial ionic character from electronegativity. Transition from ionic to covalent character and vice versa – Covalent character of ionic compounds – Fajan's rules – Covalent bond – structure and bonding of homo and heteronuclear molecules – Hydrogen bonding – Its nature, types, effect on properties – Intermolecular forces – London forces and van der Waals forces – ion dipole-dipole interactions. VSEPR Theory – Principles and hybridization- Shapes of simple inorganic molecules (BeCl2, BF3, SiCl4, PCl5, SF6, IF7,H2O, NH3, XeF6) – MO Theory –Bonding and anti-bonding orbitals – Applications of MO theory H2, He, N2, O2, HF and CO molecules – Comparison of VB and MO Theories

UNIT–IV PERIODIC PROPERTIES **10+3**

Atomic orbitals - Quantum numbers- Principal, Azimuthal, Magnetic and Spin quantum numbers and their significance - principles governing the occupancy of electrons in various quantum levels- Pauli's exclusion principle – Hund's rule- Aufbau Principle, (n+1) rule Stability of half-filled and completely filled orbitals- inert pair effect. Periodic properties – classification of elements as s, p, d and f-block elements – variation of atomic volume – atomic and ionic radii – ionization potential – electron affinity and electro negativity along period and groups – variation of metallic characters - Factors affecting the periodic properties. Periodic table anomalies and variations in atomic radius, ionic radius, electronic configuration, , electron affinity and electro negativity, ionization energy and metallic character of elements along the group and periods and their influences on stability, colour, coordination number, geometry, physical and chemical properties.

UNIT–V ATOMIC STRUCTURE **10+3**

Planck's quantum theory - Photoelectric effect, Compton effect, Bohr's model of hydrogen atom (no derivation), Wave particle duality, de Broglie equation, Heisenberg uncertainty principle - Eigen function and Eigen value - Postulates of Quantum mechanics - Schrodinger's time independent wave equation (no derivation), wave functions and its physical properties -Normalization and Orthogonal function.

LECTURE	TUTORIALS	PRACTICALS	SELFSTUDY	TOTAL
45	15	0	0	60

TEXTBOOKS

1. PuriB.R..,SharmaL.R.,KaliaK.K.,PrinciplesofInorganicChemistry,(23rdedition),NewDelhi, ShobanLalNaginChand&Co.,(1993).
2. LeeJ.D.,ConciseInorganicChemistry,UK,Blackwellscience (2006).
3. PuriB.R..,SharmaL.R.,PathaniaM.S.,PrinciplesofPhysicalChemistry,(23rdedition),NewDelhi, ShobanLalNagin Chand&Co., (1993).
4. GlasstoneS.,LewisD.,ElementsofPhysicalChemistry,London,MacMillan&Co.Ltd.
5. ArunBahl and B.S. Bahl, A Text Book of Organic Chemistry, 22ndedn, S Chand & Company, 2016.

REFERENCES

Reference Books:

1. R. T. Morrison, R. N. Boyd and S.K.Bhattacharjee, Organic chemistry, 7thedn, Pearson Education
2. Asia, 2010. 2. F. A. Carey and R. J. Sundberg, Advanced Organic Chemistry, Part A and B, 5 thedn, pringer Publishers, 2008. .
3. I. L. Finar, Organic Chemistry Vol-1& 2, 6thedn, Pearson Education Asia, 2004.
4. P. Y.Bruice, Organic Chemistry, Vol-1 & 2, 7thedn, Pearson Education Asia, 2012.
5. J.Clayden, N. Greeves, S. Warren, Organic Chemistry, 2ndedn, Oxford, 2012.
6. R. D. Madan, Modern Inorganic Chemistry, 3rdedn, S. Chand & Company Ltd., Reprint 2014.
7. P.L. Soni, Text book of Ionrganic Chemistry, 20thedn, Sultan chand& Sons, 2000.
8. B.R. Puri, L.R. Sharma, K.K. Kalia, Principles of Inorganic Chemistry, 23rdedn, New Delhi, ShobanLalNaginChand & Co., 1993.
9. Sp. Banerjee, Advanced Inorganic Chemistry 2ndedn,Vol-1, ArunabhaSen, Books and Allied (P)

ERESOURCES

1) https://onlinecourses.nptel.ac.in
2) http://www.mikeblaber.org/oldwine/chm1045/notes_m.htm
3) http://www.ias.ac.in/initiat/sci_ed/resources/chemistry/Inorganic.html
4) https://swayam.gov.in/course/64-atomic-structure-and-chemical-bonding
5) https://www.chemtube3d.com/

Mapping of COs with POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO1	3	3	0	0	2	2	0	0	0	3	2
CO2	3	3	0	0	2	2	0	0	3	3	3
CO3	3	3	0	0	2	2	0	0	3	3	3
CO4	3	3	0	3	2	3	0	0	3	3	3
CO5	3	3	0	2	2	3	0	0	3	3	3
Total	15	15	0	5	10	12	0	0	15	15	14
Scaled Value	3	3	0	1	2	3	0	0	3	3	3

1 – 5 →1, 6 – 10→ 2, 11 – 15→ 3

0-No Relation, 1- Low Relation, 2-Medium Relation, 3-High Relation

COURSE CODE	XCY104	L	T	P	SS	C
COURSE NAME	QUANTITATIVE INORGANIC ESTIMATION (TITRIMETRY) AND INORGANICPREPARATIONS	0	0	3	0	2
C:P:A	1: 0.8:0.2	L	T	P	SS	H
		0	0	3	0	3

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	***Identify*** the various Metals in the solution.	Cognitive Psychomotor	Remember Perception
CO2	***Estimate*** the amount of acids using volumetric method.	Cognitive Psychomotor	Understand Set
CO3	***Estimate*** the amount of bases using volumetric method.	Cognitive Psychomotor Affective	Apply Set Receiving

2 hours each exp

Quantitative Estimation(Volumetric)
Preparation of standard solution, dilution from stock solution

Permanganometry
Estimation of sodium oxalate using standard ferrous ammonium sulphate

Dichrometry
Estimation of ferric alum using standard dichromate (external indicator)Estimation of ferric alum using standard dichromate (internal indicator)

Iodometry
Estimation of copper in copper sulphate using standard dichromate

Argentimetry
Estimation of chloride in barium chloride using standard sodium chloride/Estimation of chloride in sodium chloride (Volhard's method)

Complexometry
Estimation of hardness of water using EDTA

Estimations
Estimation of iron in iron tablets.
Preparation of Inorganic compounds-Potash alum
Tetraammine copper (II) sulphateHexamminecobalt (III) chloride Mohr's Salt

LECTURE	TUTORIAL	PRACTICAL	SELF STUDY	TOTAL
0	0	30	0	30

TEXT BOOKS

1. Venkateswaran, V.; Veeraswamy, R.; Kulandivelu, A.R. Basic Principles ofPractical Chemistry,2nd ed.; Sultan Chand &Sons: New Delhi, 1997.
2. Nad, A. K.; Mahapatra, B.; Ghoshal, A.; An advanced course in Practical Chemistry, 3rd ed.; New Central Book Agency: Kolkata, 2007.

REFERENCES

1. Vogel's Textbook of Quantitative Chemical Analysis, 6th ed.; PearsonEducation Ltd: New Delhi, 2000.

E RESOURCES

1.http://www.federica.unina.it/agraria/analytical-chemistry/volumetric- analysis

2. https://chemdictionary.org/titration-indicator/

Mapping of COs with POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO1	3	3	2	2	2	3	3	3	3	3	3
CO2	3	3	2	2	2	3	3	3	3	3	3
CO3	3	3	2	2	2	3	3	3	3	3	3
Total	9	9	6	6	6	9	9	9	9	9	9
Scaled Value	2	2	2	2	2	2	2	2	2	2	2

1 – 5 →1, 6 – 10→ 2, 11 – 15→ 3

0-No Relation, 1- Low Relation, 2-Medium Relation, 3-High Relation

COURSE CODE	XMG 105	L	T	P	SS	C
COURSE NAME	ALLIED MATHEMATICS - I	3	1	0	2	4
PREREQUISITES	BASIC CONCEPTS OF MATRICES, DIFFERENTIATION AND INTEGRATION	L	T	P	SS	H
C:P:A	4:0:0	3	1	0	2	6

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	***Find*** the roots of the polynomials equations with real coefficients. ***Explain*** the transformation of equation and to ***solve*** the reciprocal equation using Newton's method.	Cognitive	Remembering Understanding Applying
CO2	***Find*** eigen values and eigen vectors of the matrices and ***Apply*** Cayley Hamilton theorem to find the inverse of a matrix.	Cognitive	Remembering Applying
CO3	***Expand*** the trigonometric functions, hyperbolic and inverse hyperbolic functions and to ***find*** the series of trigonometric functions.	Cognitive	Remembering Understanding
CO4	***Find*** the Laplace transforms and inverse Laplace transforms of standard functions and to ***find*** the Laplace transforms of tf(t), f(t)/t and derivatives.	Cognitive	Remembering
CO5	***Apply*** Laplace transforms to ***solve*** the differential equations of first and second order and to ***find*** Fourier series of a functions.	Cognitive	Remembering Applying

UNIT I - THEORY OF EQUATIONS **15**

Polynomial Equations with real coefficients irrational roots, complex roots - symmetric function of roots – Transformation of equations by increasing or decreasing roots by a constant – Reciprocal Equations - Newton's method to find a root approximately.

UNIT II - MATRICES **15**

Eigen Values and eigen vectors, Cayley-Hamilton theorem (without proof) – Verification and computation of inverse.

UNIT III - TRIGONOMETRY **15**

Expansion in Series – Expansion of $\cos^n\theta$, $\sin^n\theta$, in a series of cosines and sines of multiples of θ – Expansions of $\cos n\theta$ and $\sin n\theta$ in powers of sines and cosines - Hyperbolic functions and inverse hyperbolic functions.

UNIT IV - LAPLACE TRANSFORMS **15**

Definition – Laplace Transform of Standard functions – Linearity property – First shifting theorem – Transform of tf(t), f(t) / t and derivatives – Inverse Laplace transforms of standard functions.

UNIT V - APPLICATIONS OF LAPLACE TRANSFORMS AND FOURIER SERIES **15**

Applications of Laplace transforms of differential equations of first and second order – Finding the Fourier series of functions.

	LECTURE	TUTORIAL	PRACTICAL	SELF STUDY	TOTAL
HOURS	45	30	0	0	75

TEXT BOOKS

1. Kandasamy. P, Thilagavathi. K, Allied Mathematics, Volume I and II, S.Chand and Company Ltd, New Delhi, 2004.

REFERENCES

1. T.K. Manichavasagam Pillai and S.Narayanan, Trigonometry, Viswanathan Publishers and Printers Pvt. Ltd.
2. S. Narayan and T.K. Manicavachagam Pillay, Ancillary Mathematics, Viswanathan Publishers and Printers Pvt. Ltd.

WEBSITE:

1. **WWW. NPTEL .ac.in**

Mapping of COs with POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO1	2	0	0	0	2	1	1	0	1	0	0
CO2	2	0	0	0	2	1	1	0	1	0	0
CO3	2	0	0	0	2	1	1	0	1	0	0
CO4	2	0	0	0	2	1	1	0	1	0	0
CO5	2	0	0	0	2	1	1	0	1	0	0
Total	10	0	0	0	10	5	5	0	5	0	0
Scaled Value	2	0	0	0	2	1	1	0	1	0	0

1 – 5 →1, 6 – 10→ 2, 11 – 15→ 3

0-No Relation, 1- Low Relation, 2-Medium Relation, 3-High Relation

COURSE CODE	XCY106	L	T	P	SS	C
COURSE NAME	COSMETICS AND PERSONAL GROOMING	2	0	0	0	2
C: P: A	1.2:0.4:0.4	L	T	P	SS	H
		2	0	0	0	2

COURSE OUTCOMES:		Domain	Level
CO1	***Define*** the composition of various cosmetic products	Cognitive	Remember
CO2	***Explain*** the chemical aspects and applications of hair care and dental care products	Cognitive Affective	Understand Receive
CO3	***Discuss*** the chemical aspects and applications of perfumes and skin care products.	Cognitive	Understand
CO4	***Identify*** the methods of beauty treatments their advantages and disadvantage.	Cognitive Affective	Understand Respond
CO5	***Predict*** the hazards of cosmetic products.	Cognitive	Understand Analyze

UNIT - I SKIN CARE **7**

Nutrition of the skin, skin care and cleansing of the skin; face powder – ingredients; creams and lotions – cleansing, moisturizing all purpose, shaving and sunscreen (formulation only); Gels – formulation and advantages; astringent and skin tonics – key ingredients, skin lightness, depilatories.

UNIT - II HAIR CARE AND DENTAL CARE **6**

Hair Care

Shampoos – types – powder, cream, liquid, gel – ingredients; conditioner –types – ingredients

Dental Care

Tooth pastes – ingredients – mouth wash

UNIT – III MAKE UP **3**

Base – foundation – types – ingredients; lipstick, eyeliner, mascara, eyeshadow, concealers, rouge.

UNIT –IV PERFUMES **6**

Classification - Natural – plant origin – parts of the plant used, chief constituents; animal origin – amber gries from whale, civetone from civet cat, musk from musk deer; synthetic – classification emphasizing characteristics –esters – alcohols – aldehydes – ketones.

UNIT –V BEAUTY TREATMENTS **8**

Facials - types – advantages – disadvantages; face masks – types; bleach - types – advantages– disadvantages; shaping the brows; eyelash tinting; perming-types; hair colouring and dyeing ; permanent waving – hair straightening; wax types – waxing; pedicure, manicure - advantages – disadvantages.

LECTURE	TUTORIALS	PRACTICALS	SELF STUDY	TOTAL
30	0	0	0	30

TEXT BOOKS

1. Thankamma Jacob, (1997) Foods, drugs and cometics – A consumer guide,Macmillan publication, London.

REFERENCES

1. Wilkinson J B E and Moore R J, (1997) Harry's cosmeticology, 7th ed.,Chemical Publishers, London.
2. George Howard, (1987) Principles and practiceof perfumes and cosmetics, Stanley Therones, Chettenham..

E RESOURCES

1. http://www.khake.com/page75.html
2. Net.foxsm/list/284

Mapping of COs with POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO1	2	0	0	3	0	2	0	3	1	0	1
CO2	2	0	0	3	0	2	0	3	1	0	1
CO3	2	0	0	3	0	2	0	3	1	0	1
CO4	2	0	0	3	0	3	0	3	1	0	1
CO5	2	0	0	3	0	3	0	3	1	0	1
Total	10	0	0	15	0	12	0	15	5	0	5
Scaled Value	3	0	0	3	0	3	0	3	1	0	1

1 – 5 →1, 6 – 10→ 2, 11 – 15→ 3

0-No Relation, 1- Low Relation, 2-Medium Relation, 3-High Relation

COURSECODE	XUM001	L	T	P	SS	C
COURSENAME	HUMAN ETHICS, VALUES, RIGHTS AND GENDER EQUALITY	1	0	0	1	1
C:P:A	0.7:0:0.3	L	T	P	SS	H
		1	0	0	1	2

COURSEOUTCOMES		Domain	Level
CO1	***Relate***and***Interpret***thehumanethicsandhuman relationships	Cognitive	Remember, Understand
CO2	***Explain***and***Apply***genderissues,equalityand violenceagainstwomen	Cognitive	Understand, Apply
CO3	***Classify***and***Develop***theidentifyofwomenissues andchallenges	Cognitive & Affective	Analyze Receive
CO4	***Classify***and***Dissect***humanrightsandreporton violations.	Cognitive	Understand,Analyze
CO5	***List***and **respond** to family values, universal brotherhood,fightagainstcorruptionbycommonmanan d good governance.	Cognitive &Affective	Remember,Respond

UNITI-HUMANETHICSAND VALUES **7**

Human Ethics and values - Understanding of oneself and others- motives and needs- Social service, SocialJustice,Dignityandworth,Harmonyinhumanrelationship:FamilyandSociety,IntegrityandCompetence, Caring and Sharing, Honesty and Courage, WHO's holistic development - Valuing Time,Co-operation,Commitment,SympathyandEmpathy,Selfrespect,Self-Confidence,characterbuilding andPersonality.

UNITII-GENDEREQUALITY **9**

Gender Equality - GenderVs Sex,Concepts,definition,Gender equity,equality,andempowerment.Status ofWomeninIndiaSocial,Economical,Education,Health,Employment,HDI,GDI,GEM.ContributionsofDr.B. R. Ambethkar, Thanthai Periyar and Phule to WomenEmpowerment.

UNITIII -WOMEN ISSUESAND CHALLENGES **9**

Women Issues and Challenges- Female Infanticide, Female feticide, Violence against women, Domesticviolence, Sexual Harassment, Trafficking, Access to education, Marriage. Remedial Measures– Actsrelated to women: Political Right, Property Rights, and Rights to Education, Medical Termination ofPregnancyAct, and DowryProhibition Act.

UNITIV-HUMAN RIGHTS **9**

HumanRightsMovementinIndia–ThepreambletotheConstitutionofIndia,HumanRightsandDuties, Universal Declaration of Human Rights (UDHR), Civil, Political, Economical, Social and Cultural Rights,Rights against torture, Discrimination and forced Labour, Rights and protection ofchildren and elderly.National Human Rights Commission and other statutory Commissions, Creation of Human Rights Literacyand Awareness. - Intellectual Property Rights (IPR). National Policy on occupational safety, occupationalhealthand working environment.

UNITV-GOOD GOVERNANCEAND ADDRESSINGSOCIALISSUES **11**

GoodGovernance- Democracy,People'sParticipation,Transparencyingovernance andaudit, Corruption, Impact of corruption on society, whom to make corruption complaints, fight against corruption and relatedissues, Fairness in criminal justice administration, Government system of Redressal. Creation of Peoplefriendlyenvironment anduniversal brotherhood.

	LECTURE	SELFSTUDY	TOTAL
	15	30	45

REFERENCES

1. AftabA,(Ed.),HumanRightsinIndia:IssuesandChallenges,(NewDelhi:RajPublications, 2012).
2. Bajwa,G.S.andBajwa,D.K.HumanRightsinIndia:ImplementationandViolations(NewDelhi: D.K.Publications,1996).
3. Chatrath,K.J.S.,(ed.),EducationforHumanRightsandDemocracy(Shimala:IndianInstituteofAdvanced Studies, 1998).
4. Jagadeesan.P.MarriageandSociallegislationsinTamilNadu,Chennai:ElachiapenPublications,1990).
5. Kaushal,Rachna,WomenandHumanRightsinIndia(New Delhi:KaveriBooks,2000)
6. Mani. V. S., HumanRights inIndia: An Overview (NewDelhi:InstitutefortheWorld Congress onHumanRights, 1998).
7. Singh, B.P.Sehgal, (ed)HumanRights inIndia:ProblemsandPerspectives (New Delhi:DeepandDeep,1999).
8. Veeramani,K.(ed)Periyar onWomenRight,(Chennai:EmeraldPublishers,1996)
9. Veeramani,K.(ed)PeriyarFeminism,(PeriyarManiammaiUniversity,Vallam,Thanjavur:2010).
10. PlanningCommissionreport onOccupationalHealth andSafety

ERESOURCES

1. http://planningcommission.nic.in/aboutus/committee/wrkgrp12/wg_occup_safety.p
2. CentralVigilanceCommission(Gov.ofIndia)website:http://cvc.nic.in/welcome.html.
3. WeblinkofTransparencyInternational:https://www.transparency.org/
4. WeblinkStatusreport:https://www.hrw.org/world-report/2015/country-chapters/india

Mapping of COs with POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO1	0	0	3	3	0	0	0	0	3	0	0
CO2	0	0	3	3	0	0	0	0	3	0	0
CO3	0	0	3	3	0	0	0	0	3	0	0
CO4	0	0	3	3	0	0	0	0	3	0	0
CO5	0	0	3	3	0	0	0	0	3	0	0
Total	0	0	15	15	0	0	0	0	15	0	0
Scaled Value	0	0	3	3	0	0	0	0	3	0	0

1 – 5 →1, 6 – 10→ 2, 11 – 15→ 3

0-No Relation, 1- Low Relation, 2-Medium Relation, 3-High Relation

SEMESTER II

பாடக்குறியீடு/ Course Code	பாடப்பெயர்/ Course Name	L	T	P	SS	H	C
XGT201	**பொதுத்தமிழ் - 2**	3	0	0	0	3	3
Pre-requisite	பன்னிரெண்டாம்வகுப்பில்தமிழைஒருபாடமாகப்பயின்றிருக்கவேண்டும்.						
பாடப்பயன்கள் / Course outcomes							
இப்பாடத்தைக் கற்பதால் பின்வரும் பயன்களை மாணவர்கள் அடைவர்.							
CO1	நீதி இலக்கியங்களைக் கற்பதன் மூலம் நீதிநெறியினையும் வாழ்வியல் மற்றும் மேலாண்மைச் சிந்தனைகளையும் தெரிந்து பின்பற்றுவர்	புரிந்துகொள்ளல் (Understand)					
CO2	சிற்றிலக்கியங்களின்வழி இலக்கியச் சுவையினையும் பண்பாட்டு அறிவினையும் பெறுவர்	புரிந்துகொள்ளல் (Understand)					
CO3	பட்டப்படிப்பினைப் படிக்கும் போதே பெரும்பான்மையான தமிழ் இலக்கியங்கள் குறித்த அறிவினைப் பெறுவர்	பகுப்பாய்வுசெய்தல் Analyze					
CO4	தமிழ்ச்சமூகப் பண்பாட்டு வரலாற்றினை இலக்கியங்கள் வாயிலாக அறிவர்	தெரிந்துகொள்ளல் (Apply)					
CO5	போட்டித் தேர்வுகளில் வெற்றிபெறுவதற்குத் தமிழ்ப் பாடத்தினைப் பயன்கொள்ளும் வகையில் ஏற்ற பயிற்சி பெறுவர்	புரிந்துகொள்ளல் (Understand)					
K1- Remember; K2 – Understand; K3 –Apply; K4 Analyze; K5 Evaluate; K6 – Create.							

அலகு - I	**நீதிஇலக்கியம்**	**9மணிகள்**
	திருக்குறளில் வாழ்வியல் – திருக்குறளில் மேலாண்மைச் சிந்தனைகள்	
அலகு - II	**பிறஇலக்கியங்கள்**	**9மணிகள்**
	வள்ளலார் – அருள் விளக்க மாலை (முதல் 10 பாடல்கள்) – எச்.ஏ.கிருட்டிணப்பிள்ளை – இரட்சணிய மனோகரம் – பால்ய பிரார்த்தனை – குணங்குடிமஸ்தான் சாகிபு – பராபரக் கண்ணி (முதல் 10 கண்ணி)	
அலகு - III	**சிற்றிலக்கியங்கள்**	**9மணிகள்**

	தமிழ்விடு தூது (முதல் 20 கண்ணி) – திருக்குற்றாலக் குறவஞ்சி – குறத்தி மலைவளம் கூறல் – முக்கூடல் பள்ளு – நாட்டுவளம்	
அலகு -IV	**இலக்கியவரலாறு**	**9மணிகள்**
	பாடம் தழுவிய இலக்கிய வரலாறு (பல்லவர் காலம், நாயக்கர் காலம்)	
அலகு - V	**மொழித் திறன்/ போட்டித் தேர்வுத் திறன்**	**9மணிகள்**
	தொடர் வகைகள் மரபுத்தொடர், பழமொழிகள் பிறமொழிச் சொற்களைக் களைதல் வழுச்சொற்கள் நீக்குதல் இலக்கணக் குறிப்பு அறிதல்	
	(குறிப்பு : அலகு 4, 5 ஆகிய பகுதிகள் போட்டித் தேர்வு நோக்கில் நடத்தப்பட வேண்டும்)	**45 மணிகள்**

பாடநூல்கள்	
1	திருக்குறள், மணிவாசகர் பதிப்பகம், சென்னை
2	இலக்கியத்தல் மனித வள மேம்பாடு, சி. சரவண ஜோதி, பாவை பப்ளிகேசன்ஸ்,
3	தமிழ் விடுதூது
4	திருக்குற்றாலக் குறவஞ்சி
5	எச்.ஏ.கிருட்டிணப்பிள்ளை – இரட்சணியமனோகரம்
பார்வைநூல்கள்	
1	தமிழ்இலக்கிய வரலாறு – சிற்பிபாலசுப்பிரமணியன்.
2	புதியநோக்கில் தமிழ்இலக்கிய வரலாறு - தமிழண்ணல்
3	வகைமைநோக்கில் தமிழ்இலக்கிய வரலாறு – எஃப்.பாக்கியமேரி.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
Web Sources	
1	Tamil Heritage Foundation - www.tamilheritage.org<http://www.tamilheritage.org>
2	Tamil virtual University Library - www.tamilvu.org/library http://www.virtualvu.org/library
3	Project Madurai - www.projectmadurai.org.
4	Chennai Library - www.chennailibrary.com<http://www.chennailibrary.com>.
5	Tamil Universal Digital Library-www.ulib.prg<http://www.ulib.prg>.
6	Tamil E-Books Downloads – tamilebooksdownloads.blogspot.com
7	Tamil Books online - books.tamilcube.com
8	Catalogue of the Tamil books in the Library of British Congress archive.org
9	Tamil novels online - books.tamilcube.com
Strong-3, Medium-2, Low-1	

Mapping of COs with POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO1	0	0	3	3	3	0	0	0	0	0	0
CO2	0	0	3	3	3	0	0	0	0	0	0
CO3	0	0	3	3	3	0	0	0	0	0	0
CO4	0	0	3	3	3	0	0	0	0	0	0
CO5	0	0	3	3	3	0	0	0	0	0	0
Total	0	0	15	15	15	0	0	0	0	0	0
Scaled Value	0	0	3	3	3	0	0	0	0	0	0

1 – 5 →1, 6 – 10→ 2, 11 – 15→ 3

0-No Relation, 1- Low Relation, 2-Medium Relation, 3-High Relation

COURSE CODE	XGE202	L	T	P	SS	H	C
COURSENAME	ENGLISH II	3	0	0	0	3	3
C:P:A	3:0:0						

COURSE OUTCOMES: After the completion of course, the learners will be able to get comprehensive skills like:		Domain	Level
CO1	***Learn*** to introduce themselves and talk about everyday activities confidently	Cognitive	Understand
CO2	A***ble*** to write short paragraphs on people, places and events	Cognitive	Apply
CO3	***Identify*** the purpose of using various tenses and effectively employ them in speaking and writing	Cognitive	Understand
CO4	***Gain*** knowledge to write subjective and objective descriptions	Cognitive	Understand
CO5	***Identify*** and use their skills effectively in formal contexts.	Cognitive	Understand

SYLLABUS		HOURS
UNIT-I	**POETRY**	**6+3+0=9**
1.1Very Indian Poem in Indian English - Nissim Ezekiel 1.2 Still I Rise - Maya Angelou 1.3 The Flower -Tennyson 1.4 On Killing a Tree - Gieve Patel		
UNIT-II	**PROSE**	**6+3+0=9**
2.1 If You Are Wrong Admit it- Dale Carnegie 2.2 Kindly Adjust Please - Shashi Tharoor 2.3 The Spoon-fed Age- W.R. Inge		
UNIT-III	**FICTION**	**6+3+0=9**
Alchemist - Paulo Coelho		
UNIT-IV	**LANGUAGE COMPETENCY**	**6+3+0=9**
4.1 Homonyms, Homophones, Homographs Portmanteau words 4.2 Verbs and Tenses, Subject Verb Agreement 4.3 Error correction		
UNIT - V	**ENGLISH FOR WORKPLACE**	**6+3+0=9**
5.1 Reading for General and Specific Information [charts, tables, schedules, graphs etc] 5.2 Reading news and weather reports 5.3 Writing paragraphs 5.4 Taking and making notes		
L=30 / T=15	**Total Hours**	**45**
TUTORIAL ACTIVITIES 5) Reading and understanding incomplete texts 6) Summarize a piece of prose or poetry 7) Communication Practice 8) Role play		

TEXTBOOKS

- Coelho, Paulo. *The Alchemist.* Harper ,2016
- Chambers, Pearson. *Brilliant Speed Reading: Whatever you need to read, however* ...Phil, 2013
- Hewings, Martin. *Advanced English Grammar.* Cambridge University Press, 2000
- Sharma, Richa *Descriptive English*. Arihant Publications (India) Ltd, 2019

E- Resources:

- Very Indian poem by Nissim Ezekiel
- http://econtent.in/pacc.in/admin/contents/40_%20_2020103001102714.pdf
- Still I Rise by Maya Angelou https://www.poetryfoundation.org/poems/46446/still-i-rise
- Kindly Adjust please - Shashi Tharoor
- https://www.theweek.in/columns/shashi-tharoor/2018/05/25/kindly-adjust-to-our-english.html?fbclid=IwAR3IhtdXqvuV4ySECn9S7SA6HmCEYISyd1QHd3BlwKgiNKKwdkeSg3qWp-U/
- The Alchemist: https://www.youtube.com/watch?v=lxBYpmxjeDU

Mapping of COs with POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO1	0	0	3	3	3	1	0	0	2	0	0
CO2	0	0	3	3	3	1	0	0	2	0	0
CO3	0	0	3	3	3	1	0	0	2	0	0
CO4	0	0	3	3	3	1	0	0	2	0	0
CO5	0	0	3	3	3	1	0	0	2	0	0
Total	0	0	15	15	15	5	0	0	10	0	0
Scaled Value	0	0	3	3	3	1	0	0	2	0	0

1 – 5 →1, 6 – 10→ 2, 11 – 15→ 3

0-No Relation, 1- Low Relation, 2-Medium Relation, 3-High Relation

COURSECODE	XCY203	L	T	P	SS	C
COURSENAME	GENERAL CHEMISTRY II	3	1	0	2	4
C:P:A	3.2:0:0.8	L	T	P	SS	H
		3	1	0	2	6

COURSEOUTCOMES		DOMAIN	LEVEL
CO1	***Explain*** the preparation, properties and applications of Alkenes, alkynes, cycloalkanes and their derivatives.	Cognitive	Understand
CO2	***Describe*** the synthesis, reactions, stability and significance of alicyclic compounds.	Cognitive	Remember
CO3	***Recall*** and ***explain*** the chemistry of S&P- block elements and their complexes	Cognitive Psychomotor	Remember Understand Set
CO4	***Illustrate*** the kinetic properties of gases by using mathematical concepts	Cognitive	Remember Receiving
CO5	***Explain*** the concept of acids, bases and ionic equilibria;	Cognitive	Understanding

UNIT-I ALIPHATIC COMPOUNDS **9+3**

Alkanes - preparations, physical properties, reactions, reactions with radical mechanism for substitution reaction - cracking - Alkenes: Preparation from alcohol, haloalkane, dihaloalkanes and alkynes - reactions of alkenes - mechanisms involved in addition of hydrogen, halogen, hydrogen halide, hypohalous acid, water, hydroboration, hydroxylation, ozonolysis and epoxidation - peroxide effect - allylic substitution, oxidation by KMnO4 and polymerization - Application in the synthesis of following molecules - Dibenzyl (from toluene), cis and trans 2-butene, propanal and 1-methyl cyclohexanol. Akynes: preparation, reactions - addition of hydrogen, halogen, hydrogen halide, water, HCN, CH_3COOH, hydroboration - dimerisation and cyclisation - acidity of terminal alkynes.

UNIT-II ALICYCLIC COMPOUNDS **9+3**

Cycloalkanes: Preparation (small, medium & large ring compounds) - reactions - cycloaddition, dehalogenation, pyrolysis of calcium salt of dicarboxylic acid - Wurtz reaction - stability of cycloalkanes - Baeyer's strain theory. Cycloalkenes: Preparation and reactions of cycloalkenes - Preparation of conjugate dienes - reactions - 1,2 and 1,4 addition, polymerization and Diels-Alder reaction - Application in the synthesis of following molecules - trans 2-chlorocyclopentanol, trans-2 methylcyclopentanol, cis and trans 1,2 cyclohexanediol, cyclohexene, 2,3-butanedione and adipic acid.

UNIT- III S & P BLOCK ELEMENTS **10+3**

General characteristics of s – block elements – Compounds of s-block metals – oxides, peroxides, superoxide's-preparation and properties –Anomalous behavior of Li and Be- General characteristics of p – block elements General characteristics of boron family –Physical and chemical properties of Boron, uses – compounds of boron – Borax and Diborane,. General characteristics of carbon family, uses – Allotropic forms of carbon – Chemistry of charcoal. General characteristics of nitrogen – uses – Chemistry of some compounds of nitrogen – hydrazine and hydroxylamine. General characteristics of oxygen. – Structure and allotropy of elements, ozone. Types of oxides, peroxides, suboxides, basic oxides, amphoteric oxides, acidic oxides, neutral oxides. Oxoacids of nitrogen, phosphorus and sulphur.

UNIT-IV GASEOUS STATE **9+3**

Kinetic molecular model of a gas: postulates and derivation from the kinetic gas equation; The Maxwell – Boltzmann distribution of speed of moleculesaverage, root mean square and most probable velocity and average kinetic energy, law of equipartition of energy, degrees of freedom and molecular basis of heat capacities. Collision frequency; collision diameter; mean free path and viscosity of gases. Real gases: Deviations from ideal gas behaviour, (Andrew's and Amagat's plots); compressibility factor, Z, and its variation with pressure for different gases. equations of states for real gases-van der Waal's equation; Virial equation; Boyle temperature; Numerical problems based on equations of states for real gases, isotherms of real gases – critical phenomena – isotherms of

CO2- continuity of state–Van der waal's equation and the critical state; law of corresponding states-liquefaction of gases; numerical problems involving the core concepts.

UNIT- V ACIDS, BASES AND IONIC EQUILIBRIA	**8 + 3**

Concepts of Acids and Bases - Arrhenius concept, Bronsted-Lowry concept, Lewis concept; Relative strengths of acids, bases and dissociation constant; dissociation of poly basic acids, ionic product of water, pH scale, pH of solutions; Degree of dissociation, common ion effect, factors affecting degree of dissociation; acid base indicators, theory of acid base indicators – action of phenolphthalein and methyl orange, titration curves - use of acid base indicators; Buffer solutions – types, mechanism of buffer action in acid and basic buffer, Henderson-Hasselbalch equation; Salt hydrolysis - salts of weak acids and strong bases, weak bases and strong acids, weak acids and weak bases - hydrolysis constant, degree of hydrolysis and relation between hydrolysis constant and degree of hydrolysis; Solubility product - determination and applications; numerical problems involving the core concepts.

	LECTURE	**TUTORIAL**	**PRACTICAL**	**SELFSTUDY**	**TOTAL**
HOURS	**45**	**15**	**0**	**0**	**60**

TEXTBOOKS

1. MorrisonR.T.andBoydR.N.,OrganicChemistry(6th edition),NewYork,Allyn&BaconLtd., (1976).
2. Bahl B.S. and ArunBahl, Advanced Organic Chemistry, (12th edition), New Delhi, Sultan Chand &Co., (1997).
3. B.R.Puri, L.R.Sharma and M.S.Pathania, Principles of Physical Chemistry, 47th edition, Vishal PublishingCo, 2016.
4. Glasstone S. and Lewis. D., Elements of Physical Chemistry. Macmillan.
5. B.R. Puri and L.R. Sharma and K.C. Kalia, Principles of Inorganic Chemistry, ShobanLalNagin Chand and Co,1990

REFERENCES

1. I. L. Finar, Organic Chemistry Vol-1& 2, 6thedn, Pearson Education Asia, 2004
2. G.M.Barrow, Physical Chemistry, 6th edn, McGraw-Hill Inc., US, 1996.
3. R.D.Madan, "Advanced Inorganic Chemistry"
4. P. Y.Bruice, Organic Chemistry, Vol-1 & 2, 7thedn, Pearson Education Asia, 2012.
5. J.Clayden, N. Greeves, S. Warren, Organic Chemistry, 2ndedn, Oxford, 2012.

ERESOURCES

1. https://onlinecourses.nptel.ac.inhttp://cactus.dixie.edu/smblack/chem1010/lecture_notes/4B.html
2. http://www.auburn.edu/~deruija/pdareson.pdfhttps://swayam.gov.in/course/64atomic-structure-and-chemical-bonding
3. http://nptel.ac.in/courses/104101090/
3. http://nptel.ac.in/courses/104101090/

Mapping of COs with POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO1	3	3	0	1	2	2	0	0	3	3	3
CO2	3	3	0	1	2	2	0	0	3	3	3
CO3	3	3	0	1	2	2	0	0	3	3	3
CO4	3	3	0	1	2	3	0	0	3	3	3
CO5	3	3	0	1	2	3	0	0	3	3	3
Total	15	15	0	5	10	12	0	0	15	15	15
Scaled Value	3	3	0	1	2	3	0	0	3	3	3

1 – 5 →1, 6 – 10→ 2, 11 – 15→ 3

0-No Relation, 1- Low Relation, 2-Medium Relation, 3-High Relation

COURSE CODE	XCY204	L	T	P	SS	C
COURSE NAME	QUALITATIVE ORGANIC ANALYSIS AND PREPARATION OF ORGANIC COMPOUNDS	0	0	3	0	2
C:P:A	1: 0.8:0.2	L	T	P	SS	H
		0	0	3	0	3

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	***Recognize*** the physical state, odour, colour and solubility of the given organic compound.	Cognitive Psychomotor	Remember Perception
CO2	***Identify*** the presence of special elements and functional group in an unknown organic compound performing a systematic analysis.	Cognitive Psychomotor	Understand Set
CO3	***Analyze*** the samples for amines, phenols, aldehyde , ketone, sugars and explain the reactions behind it. ***Exhibit*** a solid derivative with respect to the identified functional group.	Cognitive Psychomotor Affective	Apply Set Receiving
			2 hours each exp

Qualitative Organic Analysis

Preliminary examination, detection of special elements - nitrogen, sulphur andhalogens

Aromatic and aliphatic nature, Test for saturation and unsaturation,identification of functional groups using solubility tests

Confirmation of functional groups

- monocarboxylic acid, dicarboxylic acid
- monohydric phenol, polyhydric phenol
- aldehyde, ketone, ester
- carbohydrate (reducing and non-reducing sugars)
- primary, secondary, tertiary amine
- monoamide, diamide, thioamide
- anilide, nitro compound
- Preparation of derivatives for functional groups

Preparation of Organic Compounds

i. Nitration - picric acid from Phenol
ii. Halogenation - p-bromo acetanilide from acetanilide
iii. Oxidation - benzoic acid from Benzaldehyde
iv. Microwave assisted reactions in water:
v. Methyl benzoate to Benzoic acid
vi. Salicylic acid from Methyl Salicylate
vii. Rearrangement - Benzil to Benzilic Acid

Hydrolysis of benzamide to Benzoic Acid

Separation and Purification Techniques (Not for Examination)

1. Purificationof organic compounds by crystallization (from water / alcohol)and distillation

2. Determination of melting and boiling points of organic compounds.

3.**Steam distillation** - Extraction of essential oil from citrus fruits/eucalyptusleaves.

4. Chromatography (any one) (Group experiment)

(i) Separation of amino acids by Paper Chromatography

(ii)Thin Layer Chromatography - mixture of sugars / plant pigments /permanganatedichromate.

(iii) Column Chromatography - extraction of carotene, chlorophyll and xanthophyll from leaves / separation of anthracene - anthracene picrate.

5. **Electrophoresis –** Separation of amino acids and proteins.

(Demonstration)

Isolation of casein from milk/Determination of saponification value of oil orfat/Estimation of acetic acid from commercial vinegar. (Any one Group experiment) (4,5& 6–not for ESE)

	LECTURE	TUTORIAL	PRACTICAL	SELF STUDY	TOTAL
	0	0	30	0	30

TEXT BOOKS

1. Venkateswaran, V.; Veeraswamy, R.; Kulandaivelu, A.R. *Basic Principlesof Practical Chemistry*, 2nd ed.; Sultan Chand: New Delhi, 2012.

REFERENCES

1 Manna, A.K. *Practical Organic Chemistry*, Books and Allied: India,2018.

2. Gurtu, J. N; Kapoor, R. *Advanced Experimental Chemistry (Organic)*,Sultan Chand: New Delhi, 1987.

3. Furniss,B. S.; Hannaford, A. J.; Smith, P. W. G.; Tatchell, A.R. *Vogel'sTextbook of Practical Organic Chemistry*, 5th ed.; Pearson: India,1989.

E RESOURCES

1. https://www.vlab.co.in/broad-area-chemical-sciences

Mapping of COs with POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO1	3	3	2	2	2	3	3	3	3	3	3
CO2	3	3	2	2	2	3	3	3	3	3	3
CO3	3	3	2	2	2	3	3	3	3	3	3
Total	9	9	6	6	6	9	9	9	9	9	9
Scaled Value	2	2	2	2	2	2	2	2	2	2	2

1 – 5 →1, 6 – 10→ 2, 11 – 15→ 3

0-No Relation, 1- Low Relation, 2-Medium Relation, 3-High Relation

COURSE CODE	XMG205	L	T	P	C
COURSE NAME	ALLIED MATHEMATICS -II	3	1	2	4
PREREQUISITE	BASIC CONCEPTS OF MATRICES, NUMBERS, DIFFERENTIATION AND INTEGRATION	L	T	P	H
C:P:A	4:0:0	3	1	2	6

COURSE OUTCOMES	Domain	Level
After the completion of the course, students will be able to		
CO1: Compute radius of curvature, centre of curvature and circle of curvature. Change the order of integration and to compute the double integral. Apply double to find the area between curves.	Cognitive	Understanding Applying
CO2. Use Beta and Gamma function computing the multiple integrals and explain the relation between them.	Cognitive	Understanding Applying
CO3.Solve the linear homogeneous and non-homogeneous differential equation with constant and variable coefficients.	Cognitive	Applying
CO4: Define general, complete and particular solutions and to solve standard forms of partial differential equations.	Cognitive	Understanding Applying
CO5: Compute gradient, divergence and curl of vectors. Apply theorem to evaluate line, surface and volume integral.	Cognitive	Remembering Understanding Applying

UNIT I	**15**
Curvature – Radius of curvature – center of curvature – circle of curvature – Evaluation of double integrals - change of order of integration in double integrals- Application of double integral to find the area between curves.	
UNIT II	**15**
Evaluation of triple integrals – Beta and Gamma functions – relations between them – Evaluation of multiple integrals using Beta and Gamma functions.	
UNIT III	**15**
Solving second order linear differential equations with constant coefficients whose R.H.S is of the form ve^{mx}, where v is any function of x - Linear equations with variable coefficients.	
UNIT IV	**15**
Formation of partial differential equations by elimination of arbitrary constants and functions -Definitions of general, particular and complete solutions-solving standard forms f(p,q) = 0,f(x,p,q) = 0, f(y,p,q) = 0, f(z, p, q) = 0, f(x,p) = f(y,q), z = px +qy + f(p,q) - Lagrange's Differential equations Pp+Qq = R.	
UNIT V	**15**
Scalar and vector fields –Differentiation of vectors – Gradient, Divergence and Curl – Integration of vectors – line integral – surface integral – Green's theorem in the plane – Gauss divergence theorem – Stokes theorem – (Statements only).	

	LECTURE	TUTORIAL	PRACTICAL	SELF STUDY	TOTAL
HOURS	**45**	**30**	**0**	**0**	**75**

TEXT BOOKS

1. Kandasamy. P, Thilagavathi. K "Mathematics for B.Sc. Branch I", Volume II, III and IV, S.Chand and Company Ltd, New Delhi, 2004.

REFERENCE

1. Narayan .S and Manicavachagam Pillay T.K. "Ancillary Mathematics", Viswanathan Publishers and Printers, 2004.

E REFERENCES

www.nptel.ac.in

1. Advanced Engineering Mathematics Prof. Jitendra Kumar
   Department of Mathematics Indian Institute of Technology, Kharagpur

Mapping of COs with POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO1	2	0	0	0	2	1	1	0	1	0	0
CO2	2	0	0	0	2	1	1	0	1	0	0
CO3	2	0	0	0	2	1	1	0	1	0	0
CO4	2	0	0	0	2	1	1	0	1	0	0
CO5	2	0	0	0	2	1	1	0	1	0	0
Total	10	0	0	0	10	5	5	0	5	0	0
Scaled Value	2	0	0	0	2	1	1	0	1	0	0

1 – 5 →1, 6 – 10→ 2, 11 – 15→ 3

0-No Relation, 1- Low Relation, 2-Medium Relation, 3-High Relation

COURSE CODE	XCY206	L	T	P	SS	C
COURSE NAME	DAIRY CHEMISTRY	2	0	0	0	2
C: P: A	1.5:0.2:0.3	L	T	P	SS	H
		2	0	0	0	2

COURSE OUTCOMES:		Domain	Level
CO1	***Identify the*** composition of milk – constituents and its physical properties.	Cognitive	Remember
CO2	***Illustrate*** about pasteurization of Milk and various types of pasteurization -Bottle, Batch and HTST Ultra High Temperature Pasteurization.	Cognitive Affective	Understand Receive
CO3	***Analyze*** the Cream and Butter their composition and how to estimate fat in cream andGhee	Cognitive	Analyze
CO4	***Explain*** about Homogenized milk, flavoured milk, vitaminised milk and toned milk..	Cognitive	Understand
CO5	***Demonstrate*** how to make milk powder and its drying process - types of drying process.	Cognitive Psychomotor Affective	Apply Set Receiving

UNIT - I COMPOSITION OF MILK **7**

Milk-definition-general composition of milk- constituents of milk - lipids, proteins, carbohydrates, vitamins and minerals - physical properties of milk - colour, odour, acidity, specific gravity, viscosity and conductivity -Factors affecting the composition of milk - adulterants, preservatives with neutralizer-examples and their detection-estimation of fat, acidity and total solids in milk.

UNIT - II PROCESSING OF MILK **6**

Microbiology of milk - destruction of micro - organisms in milk, physico – chemical changes taking place in milk due to processing - boiling, pasteurization – types of pasteurization -Bottle, Batch and HTST (High Temperature Short Time) – Vacuum pasteurization – Ultra High Temperature Pasteurization.

UNIT – III MAJOR MILK PRODUCTS **3**

Cream - definition - composition - chemistry of creaming process - gravitational and centrifugal methods of separation of cream - estimation of fatin cream. Butter - definition -composition - theory of churning – desi butter - salted butter, estimation of acidity and moisture content in butter. Ghee - major constituents - common adulterants added to ghee and their detection - rancidity- definition - prevention - antioxidants and synergists - natural and synthetic.

UNIT –IV SPECIAL MILK **6**

Standardised milk - definition - merits - reconstituted milk - definition - flowdiagram of manufacture - Homogenised milk - flavoured milk – vitaminised milk - toned milk -Incitation milk - Vegetable toned milk - humanized milk - condensed milk - definition, composition and nutritive value.

UNIT –V FERMENTED AND OTHER MILK PRODUCTS **8**

Fermented milk products – fermentation of milk - definition, conditions,cultured milk - definition of culture - example, conditions - cultured cream,butter milk - Bulgarious milk -acidophilous milk – Yoheer Indigeneous products- khoa and chhena definition - Ice cream -definition-percentage composition-types-ingredients-manufacture of ice–cream, stabilizers - emulsifiers and the irrole-milk powder-definition-need form a king milk powder- drying process-types of drying.

LECTURE	TUTORIALS	PRACTICALS	SELF STUDY	TOTAL
30	0	0	0	30

TEXT BOOKS

1. K. Bagavathi Sundari, Applied Chemistry, MJP Publishers, first edition,2006.
2 K. S. Rangappa and K.T. Acharya, Indian Dairy Products, Asia PublishingHouse New Delhi, 1974.
3 Text book of dairy chemistry, M.P. Mathur, D. Datta Roy, P. Dinakar, IndianCouncil of Agricultural Research, 1 st edition, 2008.
4 A Text book of dairy chemistry, Saurav Singh, Daya Publishing house, 1 stedition,2013.
5 Text book of dairy chemistry, P. L. Choudhary, Bio-Green book publishers,2021.

REFERENCES

1. Robert Jenness and S. Patom, Principles of Dairy Chemistry, S.Wiley, NewYork, 2005.
2. F.P.Wond, Fundamentals of Dairy Chemistry,Springer,Singapore,2006.
3. Sukumar De, Outlines of Dairy Technology, Oxford University Press, NewDelhi, 1980.
4. P.F.Fox and P.L.H. Mcsweeney, Dairy Chemistry and Biochemistry,Springer, Second edition, 2016.
5. Dairy chemistry and biochemistry, P. F. Fox, T. Uniacke-Lowe, P.L.H.
6. McSweeney, J.A. OMahony, Springer, Second edition, 2015.

E RESOURCES

Mapping of COs with POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO1	2	0	0	3	0	2	0	1	1	0	1
CO2	2	0	0	3	0	2	0	1	1	0	1
CO3	2	0	0	3	0	2	0	1	1	0	1
CO4	2	0	0	3	0	3	0	1	1	0	1
CO5	2	0	0	3	0	3	0	1	1	0	1
Total	10	0	0	15	0	12	0	5	5	0	5
Scaled Value	3	0	0	3	0	3	0	1	1	0	1

1 – 5 →1, 6 – 10→ 2, 11 – 15→ 3

0-No Relation, 1- Low Relation, 2-Medium Relation, 3-High Relation

COURSE CODE	XCY207A	L	T	P	SS	C
COURSE NAME	FOOD CHEMISTRY	2	0	0	0	2
C: P: A	1.2:0.4:0.4	L	T	P	SS	H
		2	0	0	0	2

COURSE OUTCOMES:		Domain	Level
CO1	***Explain*** about Food adulteration - contamination of Wheat, Rice, Milk, Butter.	Cognitive	Understand
CO2	***Express*** the awareness about food poisons like natural poisons (alkaloids - nephrotoxin) pesticides, DDT, BHC, Malathion	Cognitive	Understand
CO3	***Outline*** the level of exposure on food additives, artificial sweeteners, Saccharin, Cyclomate and Aspartate in the food industries.	Cognitive Affective	Understand Receive
CO4	***Analyze*** beverages, soft drinks, soda, fruit juices and alcoholic beverages examples.	Cognitive Affective	Analyze Receive
CO5	***Describe*** about fats and oils - Sources of oils - production of refined vegetable oils - preservation. Saturated and unsaturated fats –MUFA and PUFA	Cognitive	Understand

UNIT - I FOOD ADULTERATION **7**

Sources of food, types, advantages and disadvantages. Food adulteration - contamination of wheat, rice, milk, butter etc. with clay stones, water and toxic chemicals -Common adulterants, Ghee adulterants and their detection. Detection of adulterated foods by simple analytical techniques.

UNIT - II FOOD POISON **6**

Food poisons - natural poisons (alkaloids - nephrotoxin) - pesticides, (DDT, BHC, Malathion) -Chemical poisons - First aid for poison consumed victims.

UNIT – III FOOD ADDITIVES **3**

Food additives -artificial sweeteners – Saccharin - Cyclomate a n d AspartateFood flavours -esters, aldehydes and heterocyclic compounds – Food colours– Emulsifying agents – preservatives -leavening agents. Baking powder – yeast – tastemakers – MSG - vinegar.

UNIT –IV BEVERAGES **6**

Beverages-softdrinks-soda-fruitjuices-alcoholicbeverages-examples. Carbonation-addictionto alcohol– diseases ofliver andsocial problems.

UNIT –V EDIBLE OILS **8**

Fats and oils - Sources of oils - production of refined vegetable oils - preservation.Saturated and unsaturated fats - iodine value - role of MUFA and PUFA in preventing heartdiseases-determination of iodine value,RM value,saponification values and their significance

LECTURE	TUTORIALS	PRACTICALS	SELF STUDY	TOTAL
30	0	0	0	30

TEXT BOOKS

1.Food chemistry, H. K. Chopra, P. S. Panesar, Narosa publishing house, 2010.
2.Jayashree Ghosh, Fundamental Concepts of Applied Chemistry, S. Chand & Co.Publishers, second edition, 2006.
3. Food chemistry, H. K. Chopra, P. S. Panesar, Narosa publishning house,2010.
4. Food Chemistry, Dr. L. Rakesh Sharma, Evincepub publishing, 2022.
5. Food processing and preservation, G. Subbulakshmi, Shobha A Udipi,Pdmini S Ghugre, New age international publishers, second edition, 2021.

REFERENCES
1. H.-D. Belitz, Werner Grosch, Food Chemistry Springer Science & Business Media, 4th Edition, 2009. 2. M.Swaminathan, Food Science and Experimental Foods, Ganesh and Company,1979. 3. Hasenhuettl, Gerard. L.; Hartel, Richard. W. Food Emulsifiers and their applications Springer New York 2nd ed. 2008. 4. Food Chemistry, H.-D. Belitz, W. Grosch, P. Schieberle, Springer, fourth revised and extended edition, 2009. 5. Principles of food chemistry, John M. deMan, John W. Finley, W. Jefferey Hurst, Chang Yong Lee, Springer, Fourth edition, 2018.
E RESOURCES
2. http://www.khake.com/page75.html 2. Net.foxsm/list/284

Mapping of COs with POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO1	2	0	0	3	0	2	0	1	1	0	1
CO2	2	0	0	3	0	2	0	1	1	0	1
CO3	2	0	0	3	0	2	0	1	1	0	1
CO4	2	0	0	3	0	3	0	1	1	0	1
CO5	2	0	0	3	0	3	0	1	1	0	1
Total	10	0	0	15	0	12	0	5	5	0	5
Scaled Value	3	0	0	3	0	3	0	1	1	0	1

1 – 5 →1, 6 – 10→ 2, 11 – 15→ 3

0-No Relation, 1- Low Relation, 2-Medium Relation, 3-High Relation

COURSE CODE	XCY207B	L	T	P	SS	C
COURSE NAME	ROLE OF CHEMISTRY IN DAILY LIFE	2	0	0	0	2
C: P: A	1.5:0:0.5	L	T	P	SS	H
		2	0	0	0	2

COURSE OUTCOMES:		Domain	Level
CO1	***Recall*** about the chemicals used in everyday life as well as air pollution and water pollution.	Cognitive	Remember
CO2	***Classify*** building materials cement, ceramics, glass and plastics, polythene,PVC bakelite, polyesters	Cognitive	Understand
CO3	***Acquire*** information about Food and Nutrition. Carbohydrates, Proteins, Fats Alsohave an awareness about Cosmetics Tooth pastes, face powder, soaps and detergents.	Cognitive Affective	Understand Receive
CO4	***Discuss*** about the fertilizers like urea, NPK fertilizers and super phosphate. Fuelclassification solid, liquid and gaseous; nuclear fuel - examples and uses	Cognitive Affective	Understand Receive
CO5	***Illustrate*** about the pharmaceutical drugs analgesics and antipyretics likeparacetamol and aspirin and also about pigments and dyes and its applications.	Cognitive Affective	Understand Receive

UNIT - I AIR POLLUTION AND QUALITY OF WATER **7**

General survey of chemicals used in everyday life. Air - components and their importance; photosynthetic reaction, air pollution, green - house effect and the impact on our life style. Water - Sources of water, qualities of potable water, soft and hard water, methods of removal of hardness-water pollution

UNIT - II BUILDING MATERIALS **6**

Building materials - cement, ceramics, glass and refractories - definition, composition and application only. Plastics - polythene, PVC, bakelite, polyesters, melamine-formaldehyde resins -preparation and uses only.

UNIT – III FOOD AND NUTRITION **3**

Food and Nutrition - Carbohydrates, Proteins, Fats - definition and their importance as food constituents – balanced diet – Calories minerals and vitamins (sources and their physiological importance). Cosmetics – tooth paste, face powder, soaps and detergents, shampoos, nail polish, perfumes - general formulation and preparations - possible hazards of cosmetic use.

UNIT –IV FERTILIZERS AND FUELS **6**

Chemicals in food production – fertilizers - need, natural sources; urea,NPK fertilizers and super phosphate. Fuel – classification - solid, liquid and gaseous; nuclear fuel examples and uses.

UNIT –V PHARMACEUTICAL DRUGS AND EXPLOSIVES **8**

Pharmaceutical drugs - analgesics and antipyretics - paracetamol and aspirin. Colour chemicals - pigments and dyes - examples and applications. Explosives - classification and examples.

LECTURE	TUTORIALS	PRACTICALS	SELF STUDY	TOTAL
30	0	0	0	30

TEXT BOOKS

1. Food chemistry, H. K. Chopra, P. S. Panesar, Narosa publishing house, 2010.
2. A textbook of pharmaceutical chemistry by Jayashree Ghosh, S Chand publishing, 2012.
2. S. Vaithyanathan, Text book of Ancillary Chemistry; Priya Publications, Karur, 2006.
3. B. K, Sharma, Industrial Chemistry; GOEL publishing house, Meerut, sixteenth edition, 2014.Introduction to forensic chemistry, Kelly M. Elkins, CRC Press Taylor & Francis Group, 2019.
4 Jayashree Ghosh, Fundamental Concepts of Applied Chemistry, S. Chand & Co.Publishers, second edition,

2006.

REFERENCES

1. Wilkinson J B E and Moore R J, (1997) Harry's cosmeticology, 7th ed.,Chemical Publishers, London.
2. George Howard, (1987) Principles and practiceof perfumes and cosmetics, Stanley Therones, Chettenham..

E RESOURCES

1. http://www.khake.com/page75.html
2. net.foxsm/list/284

Mapping of COs with POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO1	2	0	0	3	0	2	0	1	1	0	1
CO2	2	0	0	3	0	2	0	1	1	0	1
CO3	2	0	0	3	0	2	0	1	1	0	1
CO4	2	0	0	3	0	3	0	1	1	0	1
CO5	2	0	0	3	0	3	0	1	1	0	1
Total	10	0	0	15	0	12	0	5	5	0	5
Scaled Value	3	0	0	3	0	3	0	1	1	0	1

1 – 5 →1, 6 – 10→ 2, 11 – 15→ 3

0-No Relation, 1- Low Relation, 2-Medium Relation, 3-High Relation

COURSE CODE	XUM002	L	T	SS	P	C
COURSE NAME	ENVIRONMENTAL STUDIES	1	0	1	0	1
C:P:A	0.8: 0 : 0.2	L	T	SS	P	H
		1	0	1	0	2

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	***Describe*** the significance of natural resources and ***explain*** anthropogenic impacts.	Cognitive	Remember Understand
CO2	***Illustrate*** the significance of ecosystem, biodiversity and natural geo bio chemical cycles for maintaining ecological balance.	Cognitive	Understand
CO3	***Identify*** the facts, consequences, preventive measures of major pollutions and ***recognize*** the disaster phenomenon	Cognitive Affective	Remember Receive
CO4	***Explain*** the socio-economic, policy dynamics and *practice* the control measures of global issues for sustainable development.	Cognitive	Understand Apply
CO5	***Recognize*** the impact of population and the concept of various welfare programs, and ***apply*** the modern technology towards environmental protection.	Cognitive	Understand Analysis

UNIT - I INTRODUCTION TO ENVIRONMENTAL STUDIES AND ENERGY **12**

Definition, scope and importance – Need for public awareness – Forest resources: Use and over-exploitation, deforestation, case studies – Water resources: Use and over-utilization of surface and ground water, conflicts over water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: renewable and non-renewable energy sources – Land resources: Land as a resource, land degradation, soil erosion and desertification – Role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles.

UNIT – II ECOSYSTEMS AND BIODIVERSITY **7**

Concept of an ecosystem – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the (a) Forest ecosystem (b) Grassland ecosystem (c) Desert ecosystem (d) Aquatic ecosystem – Introduction to Biodiversity – Definition: genetic, species and ecosystem diversity - Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT – III ENVIRONMENTAL POLLUTION **10**

Definition – Causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – Solid waste management – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: flood, earthquake, cyclone and landslide.

UNIT –IV SOCIAL ISSUES AND THE ENVIRONMENT **10**

Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns, climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, Wasteland reclamation – Consumerism and waste products – Environment Protection Act – Air (Prevention and Control of Pollution) Act – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Public awareness.

UNIT –V HUMAN POPULATION AND THE ENVIRONMENT | **6**

Population growth, variation among nations – Population explosion– Environment and human health – HIV / AIDS– Role of Information Technology in Environment and human health. Population growth, variation among nations – Population explosion – Family welfare programme – Environment and human health – Human rights – Value education - HIV / AIDS – Women and Child welfare programme– Role of Information Technology in Environment and human health – Case studies.

	LECTURE	TUTORIAL	PRACTICAL	SELF STUDY	TOTAL
HOURS	**30**	**0**	**0**	**15**	**45**

TEXT BOOKS

1. Miller T.G. Jr., Environmental Science, Wadsworth Publishing Co, USA, 2000.
1. Townsend C., Harper J and Michael Begon, Essentials of Ecology, Blackwell Science, UK, 2003
2. Trivedi R.K and P.K.Goel, Introduction to Air pollution, Techno Science Publications, India, 2003.
3. Disaster mitigation, Preparedness, Recovery and Response, SBS Publishers & Distributors Pvt. Ltd, New Delhi, 2006.
4. Introduction to International disaster management, Butterworth Heinemann, 2006.
5. Gilbert M.Masters, Introduction to Environmental Engineering and Science, Pearson Education Pvt., Ltd., Second Edition, New Delhi, 2004.

REFERENCE BOOKS

1. Trivedi R.K., Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, Vol. I and II, Enviro Media, India, 2009.
2. Cunningham, W.P.Cooper, T.H.Gorhani, Environmental Encyclopedia, Jaico Publ., House, Mumbai, 2001.
3. S.K.Dhameja, Environmental Engineering and Management, S.K.Kataria and Sons, New Delhi, 2012.
4. Sahni, Disaster Risk Reduction in South Asia, PHI Learning, New Delhi, 2003.
5. Sundar, Disaster Management, Sarup & Sons, New Delhi, 2007.
6. G.K.Ghosh, Disaster Management, A.P.H.Publishers, New Delhi, 2006.

E RESOURCES

1. http://www.e-booksdirectory.com/details.php?ebook=10526

Mapping of COs with POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO1	2	0	0	3	1	1	0	0	3	2	1
CO2	2	0	0	3	1	1	0	0	3	2	1
CO3	2	0	0	3	1	1	0	0	3	2	1
CO4	2	0	0	3	1	1	0	0	3	2	1
CO5	10	0	0	15	5	5	0	0	15	10	5
Total	2	0	0	2	1	1	0	0	2	2	1
Scaled Value	0	0	0	0	0	0	0	0	0	0	0

1 – 5 →1, 6 – 10→ 2, 11 – 15→ 3

0-No Relation, 1- Low Relation, 2-Medium Relation, 3-High Relation

SEMESTER III

பாடக்குறியீடு/ Course Code	பாடப்பெயர்/ Course Name	L	T	P	SS	H	C
XGT301	**பொதுத்தமிழ் - 3**	**3**	**0**	**0**	**0**	**3**	**3**
Pre-requisite	பன்னிரெண்டாம் வகுப்பில் தமிழை ஒருபாடமாகப் பயின்றிருக்க வேண்டும்.						
பாடப்பயன்கள் Course outcomes	இப்பாடத்தைக் கற்பதால் பின்வரும் பயன்களை மாணவர்கள் அடைவர்.						
CO1	தமிழ்க் காப்பியங்களின்வழி வாழ்வியல் சிந்தனையைப் பெறுவர்.				புரிந்துகொள்ளல் (Understand)		
CO2	காப்பியங்கள் அறிமுகப்படுத்தப்படுவதால் தமிழ்மொழியின் உயர்வையும் சிறப்பையும் உணர்தல்				புரிந்துகொள்ளல் (Understand)		
CO3	தமிழ்ப் புதினங்களின்வழிச் சமகாலப் படைப்புகளின் வாழ்வியல் சிந்தனைகளை அறிந்து கொள்வர்.				பகுப்பாய்வுசெய்தல் Analyze		
CO4	நாவல்இலக்கியம் அறிமுகப்படுத்தப்படுவதால் சிந்தனை ஆற்றல், படைப்பாற்றல், கற்பனைத் திறன் வளர்தல்				தெரிந்துகொள்ளல் (Apply)		
CO5	யாப்பு, அணி இலக்கணங்கள், மொழிபெயர்ப்புத் திறன் ஆகியவற்றைக் கற்பதன் மூலம் போட்டித் தேர்வுகளை எதிர்கொள்ளுதல்				புரிந்துகொள்ளல் (Understand)		
K1- Remember; K2 – Understand; K3 –Apply; K4 Analyze; K5 Evaluate; K6 – Create.							

அலகு - I	**பெருங்காப்பியங்கள்**	**9 மணிகள்**
	சிலப்பதிகாரம் - வழக்குரைகாதை – இளங்கோவடிகள் மணிமேகலை - ஆதிரைபிச்சையிட்டகாதை – சீத்தலைச்சாத்தனார் சீவகசிந்தாமணி - பூமகள்இலம்பகம் – திருத்தக்கதேவர் வளையாபதி - நாதகுத்தனார்	
அலகு - II	**சித்தர்பாடல்கள்**	**9 மணிகள்**
	திருமூலர் பாடல்கள் (10 பாடல்கள்) கரூர் சித்தர்பாடல்கள் (10 பாடல்கள்) – பாம்பாட்டிச் சித்தர்கள் - (10 பாடல்கள்) குதம்பைச் சித்தர்கள் - (10 பாடல்கள்)	
அலகு - III	**புதினம்**	**9மணிகள்**
	வஞ்சிமா நகரம் (வரலாற்றுப் புதினம்) - நா.பார்த்தசாரதி	
அலகு - IV	**பாடம் தழுவிய இலக்கிய வரலாறு**	**9மணிகள்**

அலகு - V	மொழித் திறன்	9மணிகள்
	1. நூல் மதிப்புரை 2. திறனாய்வு செய்தல் 3. கடிதம் வரைதல் 4. விண்ணப்பம் எழுதுதல்	
	Total Lecture Hours	45மணிகள்

பாடநூல்கள்	
1.	சிலப்பதிகாரம், கழக வெளியீடு, சென்னை
2.	மணிமேகலை, கழக வெளியீடு, சென்னை
3.	சீவகசிந்தாமணி, கழக வெளியீடு, சென்னை
4.	சித்தர் பாடல்கள், பாரி நிலையம், சென்னை

பார்வைநூல்கள்	
1.	தமிழ் இலக்கிய வரலாறு – சிற்பிபாலசுப்பிரமணியன்.
2.	புதிய நோக்கில் தமிழ்இலக்கிய வரலாறு - தமிழண்ணல்
3.	வகைமை நோக்கில் தமிழ்இலக்கிய வரலாறு – எஃப்.பாக்கியமேரி.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

Web Sources

1 Tamil Heritage Foundation - www.tamilheritage.org<http://www.tamilheritage.org>
2 Tamil virtual University Library - www.tamilvu.org/library http://www.virtualvu.org/library
3 Project Madurai - www.projectmadurai.org.
4 Chennai Library - www.chennailibrary.com<http://www.chennailibrary.com>.
5 Tamil Universal Digital Library-www.ulib.prg<http://www.ulib.prg>.
6 Tamil E-Books Downloads – tamilebooksdownloads.blogspot.com
7 Tamil Books online - books.tamilcube.com
8 Catalogue of the Tamil books in the Library of British Congress archive.org
9 Tamil novels online - books.tamilcube.com

Strong-3, Medium-2, Low-1

Mapping of COs with POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO1	0	0	3	3	3	0	0	0	0	0	0
CO2	0	0	3	3	3	0	0	0	0	0	0
CO3	0	0	3	3	3	0	0	0	0	0	0
CO4	0	0	3	3	3	0	0	0	0	0	0
CO5	0	0	3	3	3	0	0	0	0	0	0
Total	0	0	15	15	15	0	0	0	0	0	0
Scaled Value	0	0	3	3	3	0	0	0	0	0	0

1 – 5 →1, 6 – 10→ 2, 11 – 15→ 3

0-No Relation, 1- Low Relation, 2-Medium Relation, 3-High Relation

COURSE CODE	XGE302	L	T	P	SS	H	C
COURSENAME	ENGLISH III	3	0	0	0	3	3
C:P:A	3:0:0						

COURSE OUTCOMES: After the completion of course, the learners will be able to get comprehensive skills like:		Domain	Level
CO1	***Broaden*** their outlook and sensibility and be acquainted with cultural diversity and divergence in perspectives.	Cognitive	Understand
CO2	Be ***updated*** with basic informatics skills and attitudes relevant to the emerging knowledge society	Cognitive	Apply
CO3	***Produce*** grammatically and idiomatically correct language.	Cognitive	Understand
CO4	***Gain*** knowledge in writing techniques to meet academic and professional needs.	Cognitive	Understand
CO5	Be ***equipped*** with sufficient practice in Vocabulary, Grammar, Comprehension and Remedial English from the perspective of career oriented tests.	Cognitive	Understand

SYLLABUS		HOURS
UNIT-I	**POETRY**	**6+3+0=9**
1.1 The Voice of the Mountains - Mamang Dai 1.2 Sita - Toru Dutt 1.3 A Song of Hope - Oodgeroo Noonuccal 1.4 In an Artist's Studio - Christina Rossetti		
UNIT-II	**SCENES FROM SHAKESPEARE**	**6+3+0=9**
2.1 Romeo & Juliet -The Balcony Scene 2.2 Macbeth-Banquet Scene 2.3 Julius Caesar - Murder Scene		
UNIT-III	**SPEECHES OF FAMOUS PERSONALITIES**	**6+3+0=9**
3.1 Tryst with Destiny- Jawaharlal Nehru 3.2 Yes, We Can-Barack Obama 3.3 You've Got to Find What You Love-Steve Jobs		
UNIT-IV	**LANGUAGE COMPETENCY**	**6+3+0=9**
4.1 Writing letters and emails 4.2 Writing and messaging in social media platforms [blogs, twitter, instagram. facebook] 4.3 Learning netiquette, email etiquette		
UNIT - V	**ENGLISH FOR WORKPLACE**	**6+3+0=9**
5.1 Data Interpretation and Reporting 5.2 Data Presentation and analysis 5.3 Meeting Etiquettes - language, dress code, voice modulation. Online Meetings - Terms and expressions used 5.4 Conducting and participating in a meeting		
L=30 / T=15	**Total Hours**	**45**
Tutorial Activities 9) Reading and understanding incomplete texts 10) Summarize a piece of prose or poetry 11) Communication Practice		

12) Role play	
• Stanley Wells et al. *The Shakespeare Book: Big Ideas Simply Explained*, DK Publishing, 2015 • Jeanne Kelly. *How to Build a Professional Digital Profile*. Kindle Edition, 2014 • Bernish, Bernish *Communications Associates, LLC*; 1st edition, 2012 • Keith S Folse, *Keys to Teaching Grammar to English Language Learners*, Second Ed.: A Practical Handbook by Michigan Teacher Training, 2016 • Practice Krysia. *Role Play-Theory and M Yardley-Matwiejczuk*, SAGE publications ltd, 2000 • In an artist's studio by Christina Rossetti: https://www.poetryfoundation.org/poems/146804/in-an-artist39s-studio	

Mapping of COs with POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO1	0	0	3	3	3	1	0	0	2	0	0
CO2	0	0	3	3	3	1	0	0	2	0	0
CO3	0	0	3	3	3	1	0	0	2	0	0
CO4	0	0	3	3	3	1	0	0	2	0	0
CO5	0	0	3	3	3	1	0	0	2	0	0
Total	0	0	15	15	15	5	0	0	10	0	0
Scaled Value	0	0	3	3	3	1	0	0	2	0	0

1 – 5 →1, 6 – 10→ 2, 11 – 15→ 3
0-No Relation, 1- Low Relation, 2-Medium Relation, 3-High Relation

COURSECODE	XCY303	L	T	P	SS	C
COURSENAME	GENERAL CHEMISTRY III	3	1	0	0	4
C:P:A	3.2:0:0.8	L	T	P	SS	H
		3	1	0	0	4

COURSEOUTCOMES		DOMAIN	LEVEL
CO1	***Write*** the nomenclature, physical & chemical properties and basic mechanisms of halo organic compounds.	Cognitive	Understand
CO2	***Identify*** the named organic reactions related to phenol and ***explain*** the preparation and properties of aromatic alcohols	Cognitive Affective	Understand Receiving
CO3	***Describe*** the physical properties of liquid and applications of liquid crystals.	Cognitive Affective	Understand Receiving
CO4	***Identify*** the various radioactive process and their consequences	Cognitive	Remember
CO5	***Explain*** the terms and processes in thermodynamics and ***discuss*** the various laws of thermodynamics and thermo chemical calculations	Cognitive Affective	Remember Receiving

UNITI–ALIPHATIC AND AROMATIC HALOGEN DERIVATIVES **9+3**

Aliphatic halogen derivatives: Nomenclature and classes of alkyl halides – isomerism, physical properties,Chemical reactions. Nucleophilic substitution reactions – S_N1, S_N2 and $S_Ni$mechanisms with stereochemical aspects and effect of solvent. Di, Tri & Tetra Halogen derivatives: Nomenclature, classification,preparation, properties and applications. Aromatic halogen compounds-Nomenclature, preparation, properties and usesMechanism of nucleophilic aromatic substitution – benzyne intermediate. Aryl alkyl halides-Nomenclature, benzyl chloride – preparation – preparation properties and uses.

UNIT II- PHENOLS AND AROMATIC ALCOHOLS **9+3**

Nomenclature; classification, Preparation from diazonium salts, cumene, Dow's process, Raching process; properties – acidic character and effect of substitution on acidity. Reactions – Fries, claisen rearrangement, Electrophilic substitution reactions, Reimer - Teimen, Kolbe, Schmidt, Gatermann synthesis, Libermann, nitro reaction, phthalein reaction. Resorcinol, quinol, picric acid – preparation, properties and uses. Aromatic alcohols-Nomenclature, benzyl alcohol – methods of preparation – hydrolysis, reduction of benzaldehyde, Cannizzaro reaction, Grignard synthesis, physical properties, reactions – reaction with sodium, phosphorus pentachloride, thionyl chloride, acetic anhydride, hydrogen iodide, oxidation – substitution on the benzene nucleus, uses.Thiols: Nomenclature, structure, preparation and properties

UNITIII–LIQUID STATE **8+3**

Liquid state: Physical properties – vapour pressure – Trouton's rule – surface tension – Effect of temperature on surface tension – viscocity – effect of pressure and temperature – refraction – refractive index – specific and molar refraction. Liquid crystals: Vapour pressure temperature diagram – thermography – classification of thermotropic liquid crystals – nematic, smetic and cholesteric liquid crystals with examples

UNITIV–NUCLEAR CHEMISTRY **9+3**

Natural radioactivity – α,β, and ϒ rays; half-life period; Fajan–Soddy group displacement law; Geiger–Nattal rule; isotopes, isobars, isotones, mirror nuclei, isodiaphers; nuclear isomerism; radioactive decay series; magic numbers; units – Curie, Rutherford, Roentgen; nuclear stability – neutronproton ratio; binding energy; packing fraction; mass defect. Simple calculations involving mass defect and B.E., decay constant and $t_{1/2}$ andradioactive series.Isotopes – uses – tracers – determination of age of rocks by radiocarbon dating. (Problems to be worked out) Nuclear energy; nuclear fission and fusion – major

nuclear reactors in India; radiation hazards, disposal of radioactive waste and safety measures.

UNIT V -THERMODYNAMICS I	**10+ 3**

Terminology – Intensive, extensive variables, state, path functions; isolated, closed and open systems; isothermal, adiabatic, isobaric, isochoric, cyclic, reversible and irreversible processes; First law of thermodynamics – Concept and significance of heat (q), work (w), internal energy (E),enthalpy (H); calculations of q, w, E and H for reversible, irreversible expansion of ideal and real gases under isothermal and adiabatic conditions; relation between heat capacities (Cp&Cv); Joule Thomson effect- inversion temperature. Thermochemistry - heats of reactions, standard states; types of heats of reactions and their applications; effect of temperature (Kirchhoff's equations) and pressure on enthalpy of reactions; Hess's law and its applications; determination of bond energy; Measurement of heat of reaction – determination of calorific value of food and fuels. Zeroth law of thermodynamics-Absolute Temperature scale.

	LECTURE	**TUTORIAL**	**PRACTICAL**	**SELFSTUDY**	**TOTAL**
HOURS	**45**	**15**	**0**	**0**	**60**

TEXTBOOKS

1.MorrisonR.T.andBoydR.N.,OrganicChemistry(6th edition),NewYork,Allyn&BaconLtd., (1976).

2.Bahl B.S. and ArunBahl, Advanced Organic Chemistry, (12th edition), New Delhi, Sultan Chand&Co., (1997).

3. B.R.Puri, L.R.Sharma and M.S.Pathania, Principles of Physical Chemistry, 47th edition, Vishal Publishing Co, 2016.

4. B.R. Puri and L.R. Sharma and K.C. Kalia, Principles of Inorganic Chemistry, ShobanLalNagin Chand and Co,1990

5. Sharma .K.K, Sharma.L.K. A Text book on physical Chemistry, 6thed., Sultan Chand, 2016.

6. MaronS.H.andLando J.B. Fundamentals of Physical Chemistry, Macmillan.

REFERENCES

1. I. L. Finar, Organic Chemistry Vol-1& 2, 6thedn, Pearson Education Asia, 2004
2. G.M.Barrow, Physical Chemistry, 6th edn, McGraw-Hill Inc., US, 1996.
3. R.D.Madan, "Advanced Inorganic Chemistry"
4. J.Clayden, N. Greeves, S. Warren, Organic Chemistry, 2ndedn, Oxford, 2012.

ERESOURCES

https://www.mooc-list.com/course/organic-chemistry-i-saylororg
https://www.canvas.net/courses/exploring-chemistry
http://freevideolectures.com/Course/3001/Chemistry-I/3https://ocw.mit.edu/courses/chemistry/5-12-organic-chemistry-i-spring-2005/http://freevideolectures.com/Course/3001/Chemistry-I
https://nptel.ac.in/courses/104106119s

Mapping of COs with POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO1	3	3	0	1	2	2	0	0	3	3	3
CO2	3	3	0	1	2	2	0	0	3	3	3
CO3	3	3	0	1	2	2	0	0	3	3	3
CO4	3	3	0	1	2	3	0	0	3	3	3
CO5	3	3	0	1	2	3	0	0	3	3	3
Total	15	15	0	5	10	12	0	0	15	15	15
Scaled Value	3	3	0	1	2	3	0	0	3	3	3

1 – 5 →1, 6 – 10→ 2, 11 – 15→ 3

0-No Relation, 1- Low Relation, 2-Medium Relation, 3-High Relation

COURSE CODE	XCY304	L	T	P	SS	C
COURSE NAME	QUALITATIVE INORGANIC ANALYSIS	0	0	3	0	2
C:P:A	1: 0.8:0.2	L	T	P	SS	H
		0	0	3	0	3

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	***Demonstrate*** the systematic analysis of mixture of salts..	Cognitive Psychomotor	Remember Perception
CO2	***Analyze*** the cations and anions in the unknown substance.	Cognitive Psychomotor	Understand Analyze Set
CO3	***Identify*** the cations and anions in the soil and water and to test the quality of water.	Cognitive Psychomotor Affective	Apply Set Receiving
CO4	***Predict*** the role of common ion effect and solubility product	Cognitive Affective	Understand Receiving

2 hours each exp

Semi - Micro Qualitative Analysis

1. Analysis of simple acid radicals: Carbonate, sulphide, sulphate, thiosulphite, chloride, bromide, iodide, nitrate
2. Analysis of interfering acid radicals: Fluoride, oxalate, borate, phosphate,arsenate, arsenite.
3. Elimination of interfering acid radicals and Identifying the group of basic radicals
4. Analysis of basic radicals (group wise): Lead, copper, bismuth, cadmium, tin, antimony, iron, aluminium, arsenic, zinc,manganese, nickel, cobalt, calcium, strontium, barium, magnesium, ammonium
5. Analysis of a mixture - I to VIII containing two cations and two anions (of which one is interfering type)Separation of amino acids by Paper Chromatography

	LECTURE	TUTORIAL	PRACTICAL	SELF STUDY	TOTAL
	0	0	30	0	30

TEXT BOOKS

1. V. Venkateswaran, R. Veeraswamy and A. R. Kulandivelu, Basic Principles ofPractical Chemistry, Sultan Chand & Sons, New Delhi, second edition, 1997

REFERENCES

1. Manna, A.K. *Practical Organic Chemistry*, Books and Allied: India,2018.
2. Gurtu, J. N; Kapoor, R. *Advanced Experimental Chemistry (Organic)*,Sultan Chand: New Delhi, 1987.
3. Furniss,B. S.; Hannaford, A. J.; Smith, P. W. G.; Tatchell, A.R. *Vogel'sTextbook of Practical Organic Chemistry*, 5th ed.; Pearson: India,1989.

E RESOURCES

1. https://www.vlab.co.in/broad-area-chemical-sciences

Mapping of COs with POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO1	3	3	2	2	2	3	3	3	3	3	3
CO2	3	3	2	2	2	3	3	3	3	3	3
CO3	3	3	2	2	2	3	3	3	3	3	3
Total	9	9	6	6	6	9	9	9	9	9	9
Scaled Value	2	2	2	2	2	2	2	2	2	2	2

1 – 5 →1, 6 – 10→ 2, 11 – 15→ 3

0-No Relation, 1- Low Relation, 2-Medium Relation, 3-High Relation

COURSE CODE	XPH305	L	T	P	C
COURSE NAME	ALLIED PHYSICS – I	3	0	0	3
C:P:A	3.0:0:0	L	T	P	H
		3	0	0	3

COURSE OUTCOMES : At the end of the course, the student will be able to

OBJECTIVES : To impart basic principles of Physics that which would be helpful for students who have taken programme other than Physics.		**DOMAIN**	**LEVEL**
CO1	***Explain*** types of motion and extend their knowledge in the study of various dynamic motions analyze and demonstrate mathematically. ***Relate*** theory with practical applications in medical field.	Cognitive	Remember, Understand Apply
CO2	***Explain*** their knowledge of understanding about materials and ***apply*** it to various situations in laboratory and real life.	Cognitive	Understand Apply
CO3	***Comprehend*** basic concept of thermodynamics concept of entropy and ***interpret*** the process of flow temperature.	Cognitive	Remember Understand
CO4	***Articulate*** the knowledge about electric current resistance, capacitance in terms of potential electric field and ***analyze*** them mathematically verify circuits.	Cognitive	Understand Analyze
CO5	***Interpret*** the real life solutions using AND, OR, NOT basic logic gates and ***Infer*** operations using Boolean algebra and acquire elementary ideas of IC circuits.	Cognitive	Remember Analyze

UNIT – I **WAVES, OSCILLATIONS AND ULTRASONICS** **9**

Simple harmonic motion (SHM) – composition of two SHMs at right angles (periods in the ratio 1:1) – Lissajous figures – uses – laws of transverse vibrations of strings – determination of AC frequency using sonometer (steel and brass wires) – ultrasound – production – piezoelectric method – application of ultrasonics: medical field – lithotripsy, ultrasonography – ultrasonic imaging- ultrasonics in dentistry – physiotheraphy, opthalmology – advantages of noninvasive surgery – ultrasonics in green chemistry

UNIT – II **PROPERTIES OF MATTER** **9**

Elasticity: elastic constants – bending of beam – theory of non- uniform bending – determination of Young's modulus by non-uniform bending – energy stored in a stretched wire – torsion of a wire – determination of rigidity modulus by torsional pendulum

Viscosity: streamline and turbulent motion – critical velocity – coefficient of viscosity – Poiseuille's formula – comparison of viscosities – burette method,

Surface tension: definition – molecular theory – droplets formation–shape, size and lifetime – COVID transmission through droplets, saliva – drop weight method – interfacial surface tension.

UNIT – III **HEAT AND THERMODYNAMICS** **9**

: Joule-Kelvin effect – Joule-Thomson porous plug experiment – theory – temperature of inversion – liquefaction of Oxygen– Linde's process of liquefaction of air– liquid Oxygen for medical purpose– importance of cryocoolers – thermodynamic system – thermodynamic equilibrium – laws of thermodynamics – heat engine – Carnot's cycle – efficiency – entropy – change of entropy in reversible and irreversible process.

UNIT – IV **ELECTRICITY AND MAGNETISM** **9**

Potentiometer – principle – measurement of thermo emf using potentiometer –magnetic field due to a current carrying conductor – Biot-Savart's law – field along the axis of the coil carrying current – peak, average and RMS values of ac current and voltage – power factor and current values in an AC circuit –

types of switches in household and factories– Smart wifi switches- fuses and circuit breakers in houses.

UNIT – V	DIGITAL ELECTRONICS AND DIGITAL INDIA	9

Logic gates, OR, AND, NOT, NAND, NOR , EXOR logic gates – universal building blocks – Boolean algebra – De Morgan's theorem – verification – overview of Government initiatives: software technological parks under MeitY, NIELIT- semiconductor laboratories under Dept. of Space – an introduction to Digital India.

HOURS	LECTURE	TUTORIAL	TOTAL
	45	0	45

TEXT BOOKS

1. Murugeshan R , "Properties of Matter For B. Sc. Students", S Chand & Company Limited, Mohan Co-Operative Industrial Estate, New Delhi - 110 044, First edition 1994, Reprint 2022.
2. R. Murugeshan, Er. Kiruthiga Siva Prasath, "Properties of Matter and Acoustics", S.Chand & Company Ltd, Ram Nagar, New Delhi - 110 055, First edition 2005, Second Edition 2012.
3. Brijlal and N.Subramanyam (1994), Waves and Oscillations, Vikas Publishing House, New Delhi
4. V.K.Metha(2004). Principles of electronics 6th Edn. S. Chand and company.
5. J.B.Rajam and C.L.Arora (1976). Heat and Thermodynamics (8th edition), S.Chand&Co.,New Delhi.

REFERENCE BOOKS

1. DS Mathur, "Elements of Properties of Matter", S. Chand Limited, S. Chand & Company Pvt. Ltd., Ram Nagar, New Delhi - 110 055, First edition 1949, Reprint 2016.

2. Brij Lal, N Subrahmanyam, "*A Textbook of Sound* " 2nd Edition, Vikas Publishing House Pvt. Ltd.A–27, 2nd Floor, Mohan Co–operative Industrial Estate, New Delhi–110044, 2018.

3. ResnickHallidayandWalker(2018).FundamentalsofPhysics(11thedition),JohnWilleyand Sons, Asia Pvt.Ltd., Singapore.

4. R. Murugesan (2001), Allied Physics, S. Chand & Co, New Delhi

5. V.R. Khannaand R.S. Bedi (1998), Text book of Sound 1stEdn. Kedharnaath Publish &Co, Meerut.

6. N.S. Khare and S.S.Srivastava (1983), Electricity and Magnetism10thEdn., Atma Ram &Sons, New Delhi.

E REFERENCES

1. https://youtu.be/M_5KYncYNyc
2. https://youtu.be/ljJLJgIvaHY
3. https://youtu.be/7mGqd9HQ_AU
4. https://youtu.be/h5jOAw57OXM
5. https://learningtechnologyofficial.com/category/fluid-mechanics-lab/
6. http://hyperphysics.phy-astr.gsu.edu/hbase/permot2.html
7. https://www.youtube.com/watch?v=gT8Nth9NWPM
8. https://www.youtube.com/watch?v=9mXOMzUruMQ&t=1s
9. https://www.youtube.com/watch?v=m4u-SuaSu1s&t=3s

10. https://www.biolinscientific.com/blog/what-are-surfactants-and-how-do-they-work

Mapping of COs with POs:

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO1	0	0	0	1	2	2	0	0	3	0	0
CO2	0	2	0	1	2	2	0	0	3	0	0
CO3	0	3	0	1	2	2	0	0	3	0	0
CO4	0	1	0	1	2	2	0	0	3	0	0
CO5	0	0	0	1	2	2	0	0	3	0	0
Total	0	6	0	5	10	10	0	0	15	0	0
Scaled to 1, 2, 3	0	2	0	1	2	2	0	0	3	0	0

1 – 5 →1, 6 – 10→ 2, 11 – 15→ 3

0 – No relation 1 – Low relation 2 – Medium relation 3 – High relation

COURSE CODE	XPH306	L	T	P	C
COURSE NAME	ALLIED PHYSICS PRACTICALS – I	0	0	3	2
C:P:A	0.8:1:0.2	L	T	P	H
		0	0	3	3

COURSE OUTCOMES On the successful completion of this course students would able to		Domain	Level
CO1	***Develop*** *Knowledge* on bending of beams, its properties and *application*	Psychomotor	Mechanism
CO2	***Identify*** the principles of elasticity, ***derive*** expression for twisting couple and ***determine*** rigidity modulus of a wire.	Psychomotor : Affective:	Analyze, Mechanism Respond
CO3	. ***Understand*** *flow* of liquid, viscosity and *identify* its *applications and* ***Define*** surface tension	Psychomotor : Affective:	Apply Mechanism Receive
CO4	***recall*** the concepts of electric and magnetic field and ***explain*** the calibration of the equipments.	Psychomotor : Affective:	Analyze Mechanism Receive
CO5	. ***Understand*** basic concepts of gates and ***identify*** its ***applications***	Psychomotor : Affective:	Analyze Mechanism Receive

Ex. No	Experiments (Any eight experiments)	Cos
1.	Young's modulus by non-uniform bending using pin and microscope	CO2
2.	Young's modulus by non-uniform bending using optic lever, scale and telescope	CO2
3.	Rigidity modulus by static torsion method.	CO1
4.	Rigidity modulus by torsional oscillations without mass	CO1
5.	Surface tension and interfacial Surface tension – drop weight method	CO3
6.	Comparison of viscosities of two liquids – burette method	CO3
7.	Specific heat capacity of a liquid – half time correction	CO3
8.	Verification of laws of transverse vibrations using sonometer	CO4
9.	Calibration of low range voltmeter using potentiometer	CO4
10.	Determination of thermo emf using potentiometer	CO4
11	Verification of De Morgan's theorems using logic gate ICs.	CO5
12	Use of NAND as universal building block.	CO5

	LECTURE	PRACTICAL	TOTAL
HOURS	0	30	30

TEXT BOOKS

1. C. L. Arora, "B.Sc .Practical Physics*",* S. Chand & Company Ltd. Ram Nagar, New Delhi–110055. 2007.
2. R. K. Shukla & Anchal Srivastava. "Practical Physics," New Age International (P) Ltd, Publishers, (Formerly Wiley Eastern Limited), 4835/24, Ansari Raod, Daryagani, New Delhi–11002. 2006.

REFERENCE BOOKS

1. Geeta Sanon, "B. Sc., Practical Physics", 1st Edition, S. Chand and Company, 2007.
2. Chattopadhyay, D., Rakshit, P. C. and Saha, B., "An Advanced Course in Practical Physics," 8th Edition, Books & Allied Ltd., Calcutta, 2007.
3. G. L. Squires, "Practical Physics*"*, Fourth edition, Cambridge University Press, 2001.
4. Indu Prakash and Ramakrishna, "A Text Book of Practical Physics," 11th Edition, Kitab Mahal, New Delhi, 2011.
5. C. Ouseph,K. Rangarajan, "A Text Book of Practical Physics*"*, Volume I,II, S.Viswanathan

Publishers,1997.

E–Resources:

1. Amal Kumar Das , Department of Physics, IIT Kanpur, "Introduction to Electromagnetic Theory", National Programme on Technology Enhanced Learning (NPTEL), https://onlinecourses.nptel.ac.in/noc20_ph16/preview

Mapping of COs with POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO1	0	0	2	2	2	3	2	2	3	0	0
CO2	0	0	2	2	2	3	2	2	3	0	0
CO3	0	0	2	2	2	3	2	2	3	0	0
Total	0	0	6	6	6	9	6	6	9	0	0
Scaled Value	0	0	2	2	2	2	2	2	2	0	0

1 – 5 →1, 6 – 10→ 2, 11 – 15→ 3

0-No Relation, 1- Low Relation, 2-Medium Relation, 3-High Relation

COURSE CODE	XCY307	L	T	P	SS	C
COURSE NAME	WATER QUALITY ANALYSIS	2	0	0	0	2
C:P:A	1.5:0:0.5	L	T	P	SS	H
		2	0	0	0	2

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	***Ensure*** the quantity and quality of water with respect to standards and their relation to public health.	Cognitive Affective	Understand Respond
CO2	***Identify*** the sources of water and ***illustrate*** the water transport and distribution	Cognitive	Understand Applying
CO3	***Classify*** the cycles of decomposition of sewage and ***Examine*** the characteristics of sewage	Cognitive	Understand
CO4	***Describe*** the function and principles of various water and waste water treatment units.	Cognitive Affective	Understand Respond
CO5	***Select*** the disposal methods for sewage and ***classify*** the different treatment methods for sludge.	Cognitive	Understand

UNIT I - WATER TECHNOLOGY **6**

Hardness of Water: types and estimation of hardness (problems) - internal treatment, external treatment – demineralization process – desalination using reverse osmosis.

UNIT II - SOURCES AND TRANSMISSION OF WATER **6**

Public water supply schemes, Forms and properties of water –per capita demand - population forecasts - variation in demand pattern – water quality – BIS and ISO specifications– water borne diseases – planning of public water supplies.

UNIT III - WATER TREATMENT **6**

Layout of Treatment plants for conventional water treatment plant. Principles and Functions of Screen, Flash Mixer, Flocculator, Sedimentation Tank, Slow and Rapid Sand Filters, and Disinfection Process-advanced water treatment techniques.

UNIT IV - WASTE WATER TREATMENT **6**

oxidation Characteristics and composition of sewage - cycles of decomposition of organic wastes - D.O, BOD and COD and their significance. Treatment methods - Layout of waste water treatment plant- Activated sludge process and its modifications; Tricking filters and Rotating biological pond.

UNIT V - DISPOSAL OPTIONS **6**

Land disposal - sewage farming practice - dilution - discharge into rivers, - oxygen sag - self-purification - eutrophication. - sludge treatment - properties and characteristics of sludge - sludge digestion and drying beds.

	LECTURE	TUTORIAL	PRACTICAL	SELF STUDY	TOTAL
HOURS	30	0	0	0	30

TEXT BOOKS

1. Gurucharan Singh," Water supply and Sanitary Engineering", Standard Publishers Distributors, 2009
2. Garg, S.K., "Environmental Engineering I & II", Khanna Publishers, New Delhi 2007
3. S.K. Garg, Wastewater Engineering, Khanna Publishers, New Delhi, 2007
4. CPHEEO Manual on Water Supply And Treatment,1999
5. CPHEEO Manual on Sewerage And Sewage Treatment,1993

REFERENCES

1. Karia G L & Christian R A, "Wastewater Treatment", Prentice Hall of India, New Delhi, 2013.
2. Rangwala, " Water Supply and Sanitary Engineering PB,24/e, Charotar Publishing house Pvt. Ltd.-Anand, 2011.
3. B.C. Punmia, Wastewater Engineering, Volume – II, Laxmi Publication 2008.
4. LinvilG.Rich, Unit operations of Sanitary Engineering, Tata Mcgraw Hill, New Delhi, 2007.
5. Standard methods for the Examination of Water and wastewater, 17th Edition, WPCF, APHA and AWWA, USA,1989.

Mapping of COs with POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO1	2	1	0	1	0	2	0	0	2	1	3
CO2	2	1	0	1	0	2	0	0	2	1	3
CO3	2	1	0	1	0	2	0	0	2	1	3
CO4	2	1	0	1	0	3	0	0	2	1	3
CO5	2	1	0	1	0	3	0	0	2	1	3
Total	10	5	0	5	0	12	0	0	10	5	15
Scaled Value	2	1	0	1	0	3	0	0	2	1	3

1 – 5 →1, 6 – 10→ 2, 11 – 15→ 3

0-No Relation, 1- Low Relation, 2-Medium Relation, 3-High Relation

COURSE CODE	XCY308	L	T	P	SS	C
COURSE NAME	PESTICIDE CHEMISTRY	2	0	0	0	2
C: P: A	1.5:0:0.5	L	T	P	SS	H
		2	0	0	0	2

COURSE OUTCOMES:		Domain	Level
CO1	***Explain*** about the pesticides and their toxicity with respect to structure and category	Cognitive	Understand
CO2	***Illustrate*** the preparation and property of pesticides	Cognitive	Analyze
CO3	***Identify*** the pesticide residues, prevention and care	Cognitive Affective	Analyze Receive
CO4	***Demonstrate*** the extraction and analytical methods of pesticide residues	Cognitive Affective	Understand Responding
CO5	***Extend*** the awareness to the public on bio-pesticides	Cognitive Affective	Understand Responding

UNIT - I INTRODUCTION **7**

History of pesticides. Chemistry of Pesticides: Brief introduction to classes of pesticides (Chemical class, targets), structures, chemical names, physical and chemical properties.
Toxicity of pesticides: Acute and chronic toxicity in mammals, birds, aquatic species etc. Methods of analysis of pesticides.

UNIT - II INSECTICIDES **6**

Classification and study of following insecticides with respect to structure, chemical name, physical properties, chemical properties, synthesis, degradation, metabolism, formulations, Mode of action, uses, toxicity.
Organophosphates and Phosphothionates: Acephate, Chlorpyriphos, Monocrotophos, and parathion-methyl. Organochlorine – Endosulfan, heptachlor; Carbamate: Cartap hydrochloride, Methomyl, Propoxur.

UNIT –III PESTICIDES RESIDUES **3**

Introduction- application of agrochemicals, dissemination pathways of pesticides, causes of pesticide residues, remedies. Pesticides residues in atmosphere- entry into atmosphere, action of pesticides, effects on environments. Pesticides residues in water- entry into water systems, action and effect in aquatic environment. Pesticides residues in soil. entry into soil, absorption, retention and transport in soil, effects on microorganism, soil condition and fertility, decomposition and degradation by climatic factors and microorganism.

UNIT –IV PESTICIDE RESIDUES EFFECT AND ANALYSIS **6**

Effects of pesticides residue on human life, birds and animals- routes for exposure to pesticides, action of pesticides on living system. Analysis of pesticides residues- sample preparation, extraction of pesticides residues (soil, water and vegetables/fruits) simple methods and schemes of analysis, multi-residue analysis.

UNIT –V BIOPESTICIDES: **8**

Biopesticides: Pheromones, attractants, repellents – Introduction, typesand application (8- Dodecen-1-ol, 10-cis-12-hexadecadienoic, Trimedlure, Cue-lure, methyl eugenol, N,N- Diethyl-m-toluamide, Dimethyl phthalate, Icaridin). Baits- Metaldehyde, Iron (II) phosphate,
Indoxacarb, Zinc Phosphide, Bromadiolone.

LECTURE	TUTORIALS	PRACTICALS	SELF STUDY	TOTAL
30	0	0	0	30

TEXT BOOKS

1. Handa SK. Principles of pesticide chemistry. Agrobios (India); 2012.
2. Matolcsy G, Nádasy M, Andriska V. Pesticide chemistry. Elsevier; 1989.
3. J. Miyamoto and P. C. Kearney Pesticide Chemistry Human Welfare and the Environment vol. IV Pesticide

Residue and Formulation Chemistry, Pergamon press,1985.

4. R. Cremlyn: Pesticides, John Wiley.

REFERENCES

1. Roy N. K., Chemistry of Pesticides. CBS Publisher & Distributors PLtd; 1st Ed. (2010).
2. Nollet L.M., Rathore H.S., Handbook of pesticides: methods ofpesticide residues analysis. CRC press; 2016.
3. Ellerbrock R.H., Pesticide Residues: Significance, Management andAnalysis, 2005

E RESOURCES

Mapping of COs with POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO1	2	1	0	1	0	2	0	0	2	1	3
CO2	2	1	0	1	0	2	0	0	2	1	3
CO3	2	1	0	1	0	2	0	0	2	1	3
CO4	2	1	0	1	0	3	0	0	2	1	3
CO5	2	1	0	1	0	3	0	0	2	1	3
Total	10	5	0	5	0	12	0	0	10	5	15
Scaled Value	2	1	0	1	0	3	0	0	2	1	3

1 – 5 →1, 6 – 10→ 2, 11 – 15→ 3

0-No Relation, 1- Low Relation, 2-Medium Relation, 3-High Relation

COURSECODE	XUM003	L	T	P	SS	C
COURSENAME	DISASTER MANAGEMENT	1	0	0	1	1
C:P:A	1.0 : 0: 0	L	T	P	SS	H
		1	0	0	1	2

COURSEOUTCOMES		DOMAIN	LEVEL
CO1	***Understanding***theconceptsofapplicationoftypes ofdisasterpreparedness	Cognitive	Apply
CO2	***Infer***theendconditions&***Discuss***thefailuresduetodisaster.	Cognitive	Analyse
CO3	***understanding***of importance of seismic waves occurring globally	Cognitive	Analyse
CO4	***Estimate***Disasterandmitigationproblems.	Cognitive	Apply
CO5	Keen***knowledge***onessentials ofriskreduction	Cognitive	Apply

UNITI -INTRODUCTION	9
Introduction–Disasterpreparedness–GoalsandobjectivesofISDRProgramme-Risk identification – Risk sharing – Disaster and development: Development plans and disastermanagement–Alternative to dominant approach – disaster – development linkages - Principleofrisk partnership.	
UNITII-APPLICATIONOFTECHNOLOGY INDISASTERRISK REDUCTION	**9**
Applicationofvarioustechnologies:Databases–RDBMS–ManagementInformationsystems – Decision support system and other systems – Geographic information systems – Intranets andextranets–videoteleconferencing.Triggermechanism–Remotesensing-aninsight–contributionof remotesensing and GIS-Casestudy.	
UNITIII-AWARENESSOF RISKREDUCTION	**9**
Triggermechanism–constitutionoftriggermechanism–riskreductionbyeducation–disaster informationnetwork–risk reduction bypublicawareness.	
UNITIV-DEVELOPMENTPLANNING ONDISASTER	**9**
Implicationofdevelopmentplanning–Financialarrangements–Areasofimprovement–Disasterpreparedness–Communitybased disastermanagement –Emergencyresponse.	
UNITV-SEISMICITY	**9**
Seismicwaves–Earthquakesandfaults– measuresofanearthquake,magnitudeandintensity–grounddamage– Tsunamisand earthquakes.	

	LECTURE	TUTORIAL	PRACTICAL	SELFSTUDY	TOTAL
HOURS	45	0	0	0	45

TEXTBOOKS

1.SiddharthaGautamandKLeelakrishaRao,"DisasterManagementProgrammesand Policies",VistaInternationalPubHouse,2012

ArunKumar,"GlobalDisasterManagement",SBSPublishers,2008

REFERENCES

1.EncyclopaediaOfDisaster Management,NehaPublishers &Distributors, 2008

2. PardeepSahni,Madhavimalalgodaandariyabandu,"Disasterriskreductioninsouthasia",PHI,2002
3. Amitasinvhal,"Understandingearthquakedisasters"TMH,2010.
4. PardeepSahni,AlkaDhamejaandUmamedury,"Disastermitigation:Experiencesandreflections",PHI, 2000

Mapping of COs with POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO1	2	1	0	1	0	2	0	0	2	1	3
CO2	2	1	0	1	0	2	0	0	2	1	3
CO3	2	1	0	1	0	2	0	0	2	1	3
CO4	2	1	0	1	0	3	0	0	2	1	3
CO5	2	1	0	1	0	3	0	0	2	1	3
Total	10	5	0	5	0	12	0	0	10	5	15
Scaled Value	2	1	0	1	0	3	0	0	2	1	3

1 – 5 →1, 6 – 10→ 2, 11 – 15→ 3

0-No Relation, 1- Low Relation, 2-Medium Relation, 3-High Relation

SEMESTER IV

பாடக்குறியீடு/ Course Code	பாடப்பெயர்/ Course Name	L	T	P	SS	H	C
XGT401	**பொதுத்தமிழ் - 4**	3	0	0	0	3	3

Pre-requisite	பன்னிரெண்டாம் வகுப்பில் தமிழை ஒருபாடமாகப் பயின்றிருக்க வேண்டும்.	
பாடப்பயன்கள் / Course outcomes	இப்பாடத்தைக் கற்பதால் பின்வரும் பயன்களை மாணவர்கள் அடைவர்.	
CO1	சங்கஇலக்கியத்தில் காணப்பெறும் வாழ்வியல் சிந்தனைகளை அறிந்து கொள்வர்.	புரிந்துகொள்ளல் (Understand)
CO2	தமிழின் தொன்மையையும், செம்மொழித் தகுதியையும் அறிந்து கொள்ளுதல்.	புரிந்துகொள்ளல் (Understand)
CO3	நாடக இலக்கியம் மூலம் நடிப்பாற்றலையும், கலைத் தன்மையையும், படைப்பாற்றலையும் வளர்த்தல்.	தெரிந்துகொள்ளல் (Apply)
CO4	தமிழிலிருந்து அலுவலகக்கடிதங்களை மொழிபெயர்ப்பதால் ஆங்கில அறிவைப் பெறுதல்.	தெரிந்துகொள்ளல் (Apply)
CO5	மொழியறிவோடு வேலை வாய்ப்பினைப் பெறுதல்.	பகுப்பாய்வுசெய்தல் Analyze
K1- Remember; K2 – Understand; K3 –Apply; K4 Analyze; K5 Evaluate; K6 – Create.		

அலகு - I	**எட்டுத்தொகை**	**9மணிகள்**
நற்றிணை (10,14,16) குறுந்தொகை (16,17,19, 20, 25, 29, 38, 40), கலித்தொகை (38,51), அகநானூறு (15,33,55), புறநானூறு (37,88,112), பரிபாடல் (55)		
அலகு - II	**பத்துப்பாட்டு**	**9மணிகள்**
நெடுநல்வாடை – நக்கீரர்.		
அலகு - III	**நாடகம்**	**9மணிகள்**
கலகக்காரர் தோழர் பெரியார் – மு.ராமசாமி.		
அலகு - IV	**பாடம் தழுவிய இலக்கிய வரலாறு**	**9மணிகள்**
அலகு - V	**மொழித் திறன்**	**9மணிகள்**

1. மொழிபெயர்ப்பு / கலைச்சொற்கள்
2. ஆங்கிலப் பகுதியைத் தமிழில் மொழிபெயர்த்தல்.
3. அலுவலகக் கடிதம் – தமிழில் மொழிபெயர்த்தல்.

	Total Lecture Hours	**45மணிகள்**
பாடநூல்கள்		
1.	எட்டுத் தொகை, எம்.நாராயண வேலுப்பிள்ளை, நர்மதா பதிப்பகம், சென்னை.	
2.	பத்துப்பாட்டு மூலமும் நச்சினார்க்கினியர் உரையும், டாக்டர்.உ.வே.சாமிநாதையர், டாக்டர் .உ.வே.சாமிநாதையர் நூல் நிலையம், சென்னை.	
3.	கலகக்காரர்தோழர்பெரியார் – மு.ராமசாமி (நாடகநூல்)	
பார்வைநூல்கள்		
1.	தமிழ்இலக்கிய வரலாறு – சிற்பிபாலசுப்பிரமணியன்.	
2.	புதியநோக்கில் தமிழ்இலக்கியவரலாறு - தமிழண்ணல்	
3.	வகைமை நோக்கில் தமிழ்இலக்கியவரலாறு – எஃப்.பாக்கியமேரி.	

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
Web Sources	
1	Tamil Heritage Foundation - www.tamilheritage.org<http://www.tamilheritage.org>
2	Tamil virtual University Library - www.tamilvu.org/library http://www.virtualvu.org/library
3	Project Madurai - www.projectmadurai.org.
4	Chennai Library - www.chennailibrary.com<http://www.chennailibrary.com>.
5	Tamil Universal Digital Library-www.ulib.prg<http://www.ulib.prg>.
6	Tamil E-Books Downloads – tamilebooksdownloads.blogspot.com
7	Tamil Books online - books.tamilcube.com
8	Catalogue of the Tamil books in the Library of British Congress archive.org
9	Tamil novels online - books.tamilcube.com
Strong-3,	Medium-2, Low-1

Mapping of COs with POs:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**
CO1	0	0	3	3	3	0	0	0	0	0	0
CO2	0	0	3	3	3	0	0	0	0	0	0
CO3	0	0	3	3	3	0	0	0	0	0	0
CO4	0	0	3	3	3	0	0	0	0	0	0
CO5	0	0	3	3	3	0	0	0	0	0	0
Total	0	0	15	15	15	0	0	0	0	0	0
Scaled Value	0	0	3	3	3	0	0	0	0	0	0

1 – 5 →1, 6 – 10→ 2, 11 – 15→ 3

0-No Relation, 1- Low Relation, 2-Medium Relation, 3-High Relation

COURSE CODE	XGE402	L	T	P	SS	H	C
COURSENAME	ENGLISH IV	3	0	0	0	3	3
C:P:A	3:0:0						

COURSE OUTCOMES: After the completion of course, the learners will be able to get comprehensive skills like:		Domain	Level
CO1	***Learn*** to communicate effectively and appropriately in real life situation.	Cognitive	Understand
CO2	***Use*** English effectively for study purpose across the curriculum	Cognitive	Apply
CO3	***Develop*** interest in and appreciation of Literature	Cognitive	Understand
CO4	***Develop*** and integrate the use of the four language skills	Cognitive	Understand
CO5	***Enhance*** their language skills especially in the areas of grammar and pronunciation.	Cognitive	Understand

SYLLABUS		HOURS
UNIT-I	**LIFE WRITING**	**6+3+0=9**
1.1 I am Malala-Malala Yousafzai - Chapter 1 1.2 My Inventions - Nikola Tesla - Chapter 2		
UNIT-II	**ONE ACT PLAY**	**6+3+0=9**
2.1 The Zoo Story- Edward Albee 2.2 The Proposal- Anton Chekhov		
UNIT-III	**INTERVIEWS**	**6+3+0=9**
Interviews 3.1 Nelson Mandela's Interview with Larry King. 3.2 Rakesh Sharma's Interview with Indira Gandhi from Space 3.3 Lionel Messi with Sid Lowe (Print)		
UNIT-IV	**LANGUAGE COMPETENCY**	**6+3+0=9**
4.1 Refuting, Arguing & Debating 4.2 Making Suggestions & Responding to Suggestions, Asking for and Giving Advice 4.3 Interviews (face to face, telephone and video conferencing)		
UNIT - V	**ENGLISH FOR WORKPLACE**	**6+3+0=9**
5.1 Job Applications: Covering letters, CV and Resume 5.2 Creating a digital profile - LinkedIn 5.3 Filling Forms (Online & Manual): creation of account, railway reservation, ATM, Credit/debit card 5.4 Body Language -Practical Skills for Interviews.		
L=30 / T=15	**Total Hours**	**45**
Tutorial Activities 13) Reading and understanding incomplete texts 14) Summarize a piece of prose or poetry 15) Communication Practice 16) Role play		
Text books:		

- Borg, Taylor & Francis, *Writing Your Life: A Guide to Writing Autobiographies*, Mary 2021
- Colin Dolley, Rex Walfor. *The One-Act Play Companion: A Guide to plays, playwrights*, 2015
- Jeanne Kelly. *How to Build a Professional Digital Profile* Kindle Edition by Bernish, Bernish Communications Associates, LLC; 1st edition, 2012
- Tesla, Nikola. *My Inventions by Ingram* Short title, 2011
- Yousafzai, Malala. *I Am Malala The Girl Who Stood Up for Education and Was Shot by the Taliban*, Christina Lamb , Little Brown, 2013

E-Resources:

- For Readers' Theatre: https://www.youtube.com/watch?v=JaLQJt8orSw&t=469s(the link to the performance; refer scripts by Aaron Sheperd)
- http://BBC learn English.com
- Nelson Mandela with Larry King
- Interviews: http://edition.cnn.com/TRANSCRIPTS/0005/16/lkl.00.html

Mapping of COs with POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO1	0	0	3	3	3	1	0	0	2	0	0
CO2	0	0	3	3	3	1	0	0	2	0	0
CO3	0	0	3	3	3	1	0	0	2	0	0
CO4	0	0	3	3	3	1	0	0	2	0	0
CO5	0	0	3	3	3	1	0	0	2	0	0
Total	0	0	15	15	15	5	0	0	10	0	0
Scaled Value	0	0	3	3	3	1	0	0	2	0	0

1 – 5 →1, 6 – 10→ 2, 11 – 15→ 3

0-No Relation, 1- Low Relation, 2-Medium Relation, 3-High Relation

COURSECODE	XCY403	L	T	P	SS	C
COURSENAME	GENERAL CHEMISTRY IV	3	1	0	0	4
C:P:A	3.2:0:0.8	L	T	P	SS	H
		3	1	0	0	4

COURSEOUTCOMES		DOMAIN	LEVEL
CO1	***Describe*** the structure-property relations and reactivity of benzene and polynuclear aromatic compounds	Cognitive Affective	Remember Receiving
CO2	***Discuss*** the chemistry and named reactions related to carboxylic acids and their derivatives;	Cognitive Affective	Understand Receiving
CO3	***Analyse*** the chemistry of transition elements with respect to various periodic properties and group wise discussions.	Cognitive Affective	Remember Receiving
CO4	***Explain*** the isomerism, Werner's Theory and stability of chelate complexes	Cognitive	Remember
CO5	***Discuss*** the second law and third law of of thermodynamics and their applications.	Cognitive Affective	Understand Receiving

UNIT I AROMATIC HYDROCARBONS **9+3**

Benzene: Source, structure of benzene, stability of benzene ring, molecular orbital picture of benzene, aromaticity, Huckel's (4n+2) rule and its applications. Electrophilic substitution reactions - General mechanism of aromatic electrophilic substitution - nitration, sulphonation, halogenation, Friedel-Craft's alkylation and acylation. Mono substituted and disubstitutedbenzene - Effect of substituent – orientation and reactivity. Polynuclear Aromatic hydrocarbons: Naphthalene – nomenclature, Haworth synthesis; physical properties, reactions – electrophilic substitution reaction, nitration, sulphonation, halogenation, Friedel – Crafts acylation & alkylation, preferential substitution at □ - position – reduction, oxidation –uses.Anthracene – synthesis by Elbs reaction, Diels – Alder reaction and Haworth synthesis; physical properties; reactions - Diels-Alder reaction, preferential substitution at C-9 and C-10; uses.

UNIT II CARBOXYLIC ACIDS AND DERIVATIVES **9+3**

Carboxylic Acids: Nomenclature, structure, preparation and reactions of aliphatic and aromatic monocarboxylic acids. Physical properties, acidic nature, effect of substituent on acidic strength. HVZ reaction, Claisen ester condensation, Bouveault Blanc reduction, decarboxylation, Hunsdieckerreaction.Formic acid-reducing property. Reactions of dicarboxylic acids, hydroxy acids and unsaturated acids. Carboxylic acid Derivatives: Preparations of aliphatic and aromatic acid chlorides, esters, amides and anhydrides. Nucleophilic substitution reaction at the acyl carbon of acyl halide, anhydride, ester, amide. Schottan- Baumann reaction. Claisen condensation, Dieckmann and Reformatsky reactions, Hofmann bromamide degradation and Curtius rearrangement

UNIT III GENERAL CHARACTERISTICS OF d-BLOCK ELEMENTS **8+3**

Transition Elements- Electronic configuration - General periodic trend variable valency, oxidation states, stability of oxidation states, colour, magnetic properties, catalytic properties and tendency to form complexes. Comparative study of transition elements and non transitionelements comparison of II and III transition series with I transition series. Group study of Titanium, Vanadium, Chromium, Manganese, Iron, Cobalt, Nickel and Zinc groups

UNIT IV CO-ORDINATION CHEMISTRY - I **9+3**

IUPAC Nomenclature of coordination compounds, Isomerism in coordination compounds. Werner's coordination theory – effective atomic number –interpretation of geometry and magnetic properties by Pauling's theory – geometry of co-ordination compounds with co-ordination number Chelates – types of ligands forming chelates – stability of chelates,applications of chelates in qualitative and quantitative analysis–application of DMG and oxine in gravimetric analysis –estimation ofhardness of water using EDTA, metal ion indicators.Role of metal chelates in living systems – haemoglobin and chlorophyll

UNIT V THERMODYNAMICS II **10+ 3**

Second Law of thermodynamics - Limitations of first law, spontaneity and randomness; Carnot's cycle; Concept of entropy, entropy change for reversible and irreversible processes, entropy of mixing, calculation of entropy changes of an ideal gas and a van der Waals gas with changes intemperature, volume and pressure, entropy and disorder. Free energy and work functions - Need for free energy functions, Gibbs free energy, Helmholtz free energy - their variation with temperature, pressure and volume, criteria for spontaneity; Gibbs-Helmholtz equation –derivations and applications; Maxwell relationships, thermodynamic equations of state; Thermodynamics of mixing of ideal gases, Ellingham Diagram-application. Third law of thermodynamics - Nernst heat theorem; Applications of third law - evaluation of absolute entropies from heat capacity measurements, exceptions to third law.

	LECTURE	TUTORIAL	PRACTICAL	SELFSTUDY	TOTAL
HOURS	**45**	**15**	**0**	**0**	**60**

TEXTBOOKS

1. MorrisonR.T.andBoydR.N.,OrganicChemistry(6th edition),NewYork,Allyn&BaconLtd., (1976).
2. Bahl B.S. and ArunBahl, Advanced Organic Chemistry, (12th edition), New Delhi, Sultan Chand&Co., (1997).
3. B.R.Puri, L.R.Sharma and M.S.Pathania, Principles of Physical Chemistry, 47th edition, Vishal Publishing Co, 2016.
4. B.R. Puri and L.R. Sharma and K.C. Kalia, Principles of Inorganic Chemistry, ShobanLalNagin Chand and Co,1990
4. Sharma .K.K, Sharma.L.K. A Text book on physical Chemistry, 6thed., Sultan Chand, 2016.

REFERENCES

1. I. L. Finar, Organic Chemistry Vol-1& 2, 6thedn, Pearson Education Asia, 2004
2. G.M.Barrow, Physical Chemistry, 6th edn, McGraw-Hill Inc., US, 1996.
3. R.D.Madan, "Advanced Inorganic Chemistry"

ERESOURCES

https://www.mooc-list.com/course/organic-chemistry-i-saylororg
https://www.canvas.net/courses/exploring-chemistry
http://freevideolectures.com/Course/3001/Chemistry-I/3
https://ocw.mit.edu/courses/chemistry/5-12-organic-chemistry-i-spring-2005/
https://nptel.ac.in/courses/112102255
https://nptel.ac.in/courses/104101136

Mapping of COs with POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO1	3	3	0	1	2	2	0	0	3	3	3
CO2	3	3	0	1	2	2	0	0	3	3	3
CO3	3	3	0	1	2	2	0	0	3	3	3
CO4	3	3	0	1	2	3	0	0	3	3	3
CO5	3	3	0	1	2	3	0	0	3	3	3
Total	15	15	0	5	10	12	0	0	15	15	15
Scaled Value	3	3	0	1	2	3	0	0	3	3	3

1 – 5 →1, 6 – 10→ 2, 11 – 15→ 3

0-No Relation, 1- Low Relation, 2-Medium Relation, 3-High Relation

COURSE CODE	XCY404	L	T	P	SS	C
COURSE NAME	PHYSICAL CHEMISTRY PRACTICAL – I	0	0	3	0	2
C:P:A	1: 0.8:0.2	L	T	P	SS	H
		0	0	3	0	3

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	***Describe*** the principles and methodology for the chemical kinetics practical work	Cognitive Psychomotor	Remember Perception
CO2	***Explain*** the procedure, data and methodology for the thermochemistry practical work.	Cognitive Psychomotor	Understand Set
CO3	***Apply*** the principles and procedure for electrochemistry and kinetics studies	Cognitive Psychomotor Affective	Apply Set Receiving
CO4	***Demonstrate*** the principles of colorimetry, colligative property and adsorption studies..	Cognitive Psychomotor Affective	Apply Set Receiving

2 hours each exp

Chemical kinetics

1. Determination of rate constant of acid catalysed hydrolysis of an ester . (methyl acetate).
2. Determination of order of reaction between iodide and persulphate(initial rate method).
3. Polarimetry: Determination of rate constant of acid catalysedinversion of cane sugar

Thermochemistry

4. Determination of heat of neutralisation of a strong acid by a strongbase.
5. Determination of heat of hydration of copper sulphate.

Electrochemistry – Conductance measurements

6. Determination of cell constant
7. Determination of molar conductance of strong electrolyte
8. Determination of dissociation constant of acetic acid

Colorimetry

9. Determination of concentration of copper sulphate solution

Colligative property

10. Determination of molecular weight of an organic compound by Rastmethod using naphthalene or diphenyl as solvent

Adsorption

11. Construction of Freundlich isotherm for the adsorption of aceticacid on activated charcoal

	LECTURE	TUTORIAL	PRACTICAL	SELF STUDY	TOTAL
	0	0	30	0	30

TEXT BOOKS

1. Sindhu, P.S.*Practicals in Physical Chemistry*, Macmillan India :New Delhi, 2005.

REFERENCES

1. Khosla, B. D.Garg,V. C.; Gulati, A.; *Senior Practical PhysicalChemistry*, R.Chand : New Delhi, 2011.
2. Gupta, Renu, *Practical Physical Chemistry*, 1st Ed.; New AgeInternational: New Delhi, 2017
E RESOURCES
1. https://www.vlab.co.in/broad-area-chemical-sciences

Mapping of COs with POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO1	3	3	2	2	2	3	3	3	3	3	3
CO2	3	3	2	2	2	3	3	3	3	3	3
CO3	3	3	2	2	2	3	3	3	3	3	3
CO4	3	3	2	2	2	3	3	3	3	3	3
Total	12	12	8	8	8	12	12	12	12	12	12
Scaled Value	3	3	2	2	2	3	3	3	3	3	3

1 – 5 →1, 6 – 10→ 2, 11 – 15→ 3

0-No Relation, 1- Low Relation, 2-Medium Relation, 3-High Relation

COURSE CODE	XPH405	L	T	P	C
COURSE NAME	ALLIED PHYSICS –II	3	0	0	3
C:P:A	3.0:0:0	L	T	P	H
		3	0	0	3

COURSE OUTCOMES

On the successful completion of this course students would able to

OBJECTIVES : To understand the basic concepts of optics, modern Physics, concepts of relativity and quantum physics, semiconductor physics, and electronics.		**DOMAIN**	**LEVEL**
CO1	***Explain*** the concepts of interference diffraction and ***rephrase*** the concept of polarization based on wave patterns	Cognitive	Understanding analyze
CO2	***Outline*** the basic foundation of different atom models and ***Relate*** the importance of interpreting improving theoretical models based on observation.	Cognitive	Remembering understanding
CO3	***Summarize*** the properties of nuclei, nuclear forces structure of atomic nucleus and nuclear models. ***Interpret*** nuclear processes like fission and fusion. ***Understand*** the importance of nuclear energy, safety measures.	Cognitive	Remembering, understanding apply
CO4	***Describe*** the basic concepts of relativity like equivalence principle, inertial frames and Lorentz transformation.	Cognitive	Remembering, understanding apply
CO5	***Summarize*** the working of semiconductor devices, Zener diode, transistors and practical devices.	Cognitive	Remembering understanding

UNIT – I	**OPTICS**	**9**

Interference – interference in thin films –colors of thin films – air wedge – determination of diameter of a thin wire by air wedge – diffraction – diffraction of light vs sound – normal incidence – experimental determination of wavelength using diffraction grating (no theory) – polarization – polarization by double reflection – Brewster's law – optical activity – application in sugar industries.

UNIT – II	**ATOMIC PHYSICS**	**9**

Atom models – Bohr atom model – mass number – atomic number – nucleons – vector atom model – various quantum numbers – Pauli's exclusion principle – electronic configuration – periodic classification of elements – Bohr magneton – Stark effect –Zeeman effect (elementary ideas only) – photo electric effect – Einstein's photoelectric equation – applications of photoelectric effect: solar cells, solar panels, optoelectric devices

UNIT – III	**NUCLEAR PHYSICS**	**9**

Nuclear models – liquid drop model – magic numbers – shell model – nuclear energy – mass defect – binding energy – radioactivity – uses – half life – mean life - radio isotopes and uses –controlled and uncontrolled chain reaction – nuclear fission – energy released in fission – chain reaction – critical reaction – critical size-atom bomb – nuclear reactor – breeder reactor – importance of commissioning PFBR in our country – heavy water disposal, safety of reactors: seismic and floods –introduction to DAE, IAEA – nuclear fusion – thermonuclear reactions – differences between fission and fusion.

UNIT – IV	**INTRODUCTION TO RELATIVITY AND GRAVITATIONAL WAVES**	**9**

Frame of reference – postulates of special theory of relativity – Galilean transformation equations – Lorentz transformation equations – derivation – length contraction – time dilation – twin paradox – mass-energy equivalence –introduction on gravitational waves, LIGO, ICTS opportunities at International Centre for Theoretical Sciences.

UNIT – V	**SEMICONDUCTOR PHYSICS**	**9**

p-n junction diode – forward and reverse biasing – characteristic of diode – zener diode – characteristic of zener diode – voltage regulator – full wave bridge rectifier – construction and working – advantages (no mathematical treatment) – USB cell phone charger –introduction to e-vehicles and EV charging stations

HOURS	**LECTURE**	**TUTORIAL**	**TOTAL**
	45	**0**	**45**

TEXT BOOKS

1. R. Murugesan (2005), Allied Physics, S. Chand & Co, New Delhi.
2. K. Thangaraj and D. Jayaraman (2004), Allied Physics, Popular Book Depot, Chennai.
3. Brijlal and N. Subramanyam(2002), Text book of Optics, S. Chand & Co, New Delhi.
4. R.Murugesan (2005), Modern Physics, S. Chand & Co, New Delhi.
5. A. Subramaniyam Applied Electronics, 2nd Edn., National Publishing Co., Chennai..

REFERENCE BOOKS

1. Resnick Halliday and Walker (2018), Fundamentals of Physics, 11th Edn., John Willey and Sons, Asia Pvt. Ltd., Singapore.
2. D.R. Khannaand H.R. Gulati (1979).Optics, S.Chand & Co. Ltd., New Delhi.
3. A. Beiser (1997), Concepts of Modern Physics, Tata Mc Graw Hill Publication, New Delhi.
4. Thomas L. Floyd (2017), Digital Fundamentals, 11th Edn., Universal Book Stall, New Delhi.
5. V.K.Metha (2004), Principles of electronics, 6th Edn. ,S. Chand and Company, New Delhi.

E REFERENCES

1. https://www.berkshire.com/learning-center/delta-p-facemask/
2. https://www.youtube.com/watch?v=QrhxU47gtj4
3. https://www.youtube.com/watch?time_continue=318&v=D38BjgUdL5U&feature=emb_logo
4. https://www.youtube.com/watch?v=JrRrp5F-Qu4
5. https://www.validyne.com/blog/leak-test-using-pressure-transducers/
6. https://www.atoptics.co.uk/atoptics/blsky.htm -
7. https://www.metoffice.gov.uk/weather/learn-about/weather/optical-effects

Mapping of COs with POs:

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO1	0	0	0	1	2	2	0	0	3	0	0
CO2	3	3	0	1	2	2	0	0	3	3	3
CO3	3	3	0	1	2	2	0	0	3	3	3
CO4	0	0	0	1	2	2	0	0	3	0	0
CO5	0	0	0	1	2	2	0	0	3	0	0
Total	6	6	0	5	10	10	0	0	15	6	6
Scaled to 1, 2, 3	2	2	0	1	2	2	0	0	3	2	2

1 – 5 →1, 6 – 10→ 2, 11 – 15→ 3

0 – No relation 1 – Low relation 2 – Medium relation 3 – High relation

COURSE CODE	XPH406	L	T	P	C
COURSE NAME	ALLIED PHYSICS PRACTICALS – II	0	0	3	2
C:P:A	1:0.7:0.3	L	T	P	H
		0	0	3	3

COURSE OUTCOMES
On the successful completion of this course students would able to

OBJECTIVES : Apply various Physics concepts to understand concepts of Light, electricity and magnetism and waves, set up experimentation to verify theories, quantify and analyse, able to do error analysis and correlate results		**Domain**	**Level**
CO1	***Understand*** basic concepts of physics and ***identify*** its ***applications***	Psychomotor	Mechanism
CO2	***Identify*** the principles of optics, and ***determine*** refractive index.	Psychomotor: Affective:	Analyze, Respond
CO3	***Develop*** *Knowledge* to differentiate resistance of material affected by temperature.	Psychomotor: Affective:	Mechanism Receive
CO4	***Recall*** the concepts of laws and ***explain*** the methods of magnetic field.	Psychomotor: Affective:	Mechanism Receive
CO5	***Understand*** function of semiconductor and zener diode and how it is working regulator.	Psychomotor: Affective:	Analyze Receive

Ex. No	Experiments (Any eight experiments)	COs
1.	Radius of curvature of lens by forming Newton's rings	CO1
2.	Thickness of a wire using air wedge	CO1
3.	Wavelength of mercury lines using spectrometer and grating	CO1
4.	Refractive index of material of the lens by minimum deviation	CO2
5.	Refractive index of liquid using liquid prism	CO2
6.	Specific resistance of a wire using PO box	CO3
7.	Thermal conductivity of poor conductor using Lee's disc	CO3
8.	Determination of Earth's magnetic field using field along the axis of a coil	CO4
9.	Characterisation of Zener diode	CO5
10.	Construction of Zerner/IC regulated power supply	CO5
11.	Construction of AND, OR, NOT gates using diodes and transistor	CO5
12.	NOR gate as a universal building block	CO5

	LECTURE	PRACTICAL	TOTAL
HOURS	0	30	30

TEXT BOOKS

1. C. L. Arora, "B.Sc .Practical Physics", S. Chand & Company Ltd. Ram Nagar, New Delhi–110055. 2007.
2. R. K. Shukla & Anchal Srivastava. "Practical Physics," New Age International (P) Ltd, Publishers, (Formerly Wiley Eastern Limited), 4835/24, Ansari Raod, Daryagani, New Delhi–11002. 2006.

REFERENCE BOOKS

1. Geeta Sanon, "B. Sc., Practical Physics", 1st Edition, S. Chand and Company, 2007.
2. Chattopadhyay, D., Rakshit, P. C. and Saha, B., "An Advanced Course in Practical Physics," 8th Edition, Books & Allied Ltd., Calcutta, 2007.
3. G. L. Squires, "Practical Physics", Fourth edition, Cambridge University Press, 2001.
4. Indu Prakash and Ramakrishna, "A Text Book of Practical Physics," 11th Edition, Kitab Mahal, New Delhi, 2011.
5. C. Ouseph,K. Rangarajan, "A Text Book of Practical Physics", Volume I,II, S.Viswanathan Publishers,1997.

E–Resources:

1. Amal Kumar Das , Department of Physics, IIT Kanpur, "Introduction to Electromagnetic Theory", National Programme on Technology Enhanced Learning (NPTEL), https://onlinecourses.nptel.ac.in/noc20_ph16/preview

Mapping of COs with POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO1	0	0	2	2	2	3	2	2	3	0	0
CO2	0	0	2	2	2	3	2	2	3	0	0
CO3	0	0	2	2	2	3	2	2	3	0	0
CO4	0	0	2	2	2	3	2	2	3	0	0
CO5	0	0	2	2	2	3	2	2	3	0	0
Total	0	0	10	10	10	15	10	10	15	0	0
Scaled Value	0	0	2	2	2	3	2	2	3	0	0

1 – 5 →1, 6 – 10→ 2, 11 – 15→ 3

0-No Relation, 1- Low Relation, 2-Medium Relation, 3-High Relation

COURSE CODE	XCY407	L	T	P	SS	C
COURSE NAME	INSTRUMENTAL METHODS OF CHEMICAL ANALYSIS	2	0	0	0	2
C: P: A	1.5:0:0.5	L	T	P	SS	H
		2	0	0	0	2

COURSE OUTCOMES:		Domain	Level
CO1	***Discuss*** theory, instrumentation and application of flame photometry and Atomic Absorption spectrometry	Cognitive Affective	Understand Respond
CO2	***Explain*** theory, instrumentation and application of UV visible and Infrared spectroscopy.	Cognitive	Understand
CO3	***Describe*** the instrumentation, theory and applications of thermal and electrochemical techniques	Cognitive	Understand
CO4	***Outline*** the use of chromatographic techniques in the separation and identification of mixtures	Cognitive Affective	Understand Apply Respond
CO5	***Illustrate*** preparation of solutions, stoichiometric calculations	Cognitive Affective	Understand Receive

UNIT - I QUALITATIVE AND QUANTITATIVE ASPECTS OF ANALYSIS **7**

S.I Units, Distinction between Mass and Weight. Moles, Millimoles, Milli equivalence, Molality, Molarity, Normality, Percentage by Weight and Volume, ppm, ppb. Density and Specific Gravity of Liquids. Stoichiometry Calculations Sampling, evaluation of analytical data, Errors – Types of Errors, Accuracy, Precision, Minimization of Errors. Significant Figures. Methods of Expressing Precision: Mean, Median, Average Deviation, Standard Deviation, Coefficient of Variation, Confidence Limits, Q- test, F-test, T-test. The Least Square Method for Deriving Calibration plots.

UNIT - II ATOMIC ABSORPTION SPECTROSCOPY **6**

Basic principles of instrumentation (choice of source, monochromator, detector, choice of flame and Burner designs. Techniques of atomization and sample introduction; Method of background correction, sources of chemical interferences and their method of removal. Techniques for the quantitative estimation of trace level of metal ions from water samples.

UNIT – III UV-VISIBLE AND IR SPECTROSCOPY **3**

Origin of spectra, interaction of radiation with matter, fundamental laws of spetroscopy and selection rules, validity of Beer-Lambert's law. UV-Visible Spectrometry: Basic principles, instrumentation (choice of source, monochromator and detector) for single and double beaminstrument; Basic principles of quantitative analysis: estimation of metalions from aqueous solution, geometrical isomers, keto-enol tautomers.

Infrared Spectroscopy: Basic principles of instrumentation (choice of source, monochromator& detector) for single and double beaminstrument; sampling techniques.

UNIT –IV THERMAL AND ELECTRO-ANALYTICAL METHODS OF ANALYSIS **6**

TGA and DTA- Principle, Instrumentation, methods of obtaining Thermograms, factors affecting TGA/DTA, Thermal analysis of silver nitrate, calcium oxalate and calcium acetate DSC- Principle, Instrumentation and applications. Electroanalytical methods: polarography - principle, instrumentation and applications. Derivative polarography- Cyclic Voltammetry - principle.

UNIT –V SEPARATION AND PURIFICATION TECHNIQUES **8**

Classification, principle, Factors affecting - Solvent Extraction – Liquid - Liquid Extraction, Chromatography: Column, TLC, Paper, Gas, HPLC and Electrophoresis, Principle, Classification, Choice of Adsorbents,Solvents, Preparation of Column, Elution Mechanism of separation: adsorption, partition & ion exchange. Development of chromatograms and Rf value.

LECTURE	TUTORIALS	PRACTICALS	SELF STUDY	TOTAL
30	0	0	0	30

TEXT BOOKS

1 Vogel, Arthur I: A Test book of Quantitative Inorganic Analysis (Rev. by G.H. Jeffery and others) 5th Ed., The English Language Book Society of Longman.
2. R. Gopalan, P. S. Subramanian and K. Rengarajan, Elements of Analytical Chemistry, Sultan Chand, New Delhi, 2007
3. Skoog, Holler and Crouch, Principles of Instrumental Analysis, Cengage Learning, 6th Indian Reprint (2017).
4. R. Speyer, Thermal Analysis of Materials, CRC Press, 1993.
5. R.A. Day and A.L. Underwood, Quantitative Analysis, 6thedn., Prentice Hall of India Private Ltd., New Delhi, 1993

REFERENCES

1 D. A. Skoog, D. M. West and F. J. Holler, Analytical Chemistry: An Introduction, 5thedn., Saunders college publishing, Philadelphia, 1998.
2 Dash U N, Analytical Chemistry; Theory and Practice, Sultan Chand and sons Educational Publishers, New Delhi, 2011.
3 Christian, Gary D; Analytical Chemistry, 6th Ed., John Wiley & Sons, New York, 2004.
4 Mikes, O. &Chalmes, R.A. Laboratory Handbook of Chromatographic & Allied Methods, Elles Harwood Ltd. London
5 G.H. Jeffery, J. Bassett, J. Mendham and R.C. Denney, Vogel's Textbook of Quantitative Chemical Analysis, sixth edition PearsonEducation, 2000

E RESOURCES

1. http://www.epa.gov/rpdweb00/docs/marlap/402-b-04-001b-14- final.pdf
2. http://eric.ed.gov/?id=EJ386287
3. http://www.sjsu.edu/faculty/watkins/diamag.htm
4. http://www.britannica.com/EBchecked/topic/108875/separation- and purification
5. http://www.chemistry.co.nz/stoichiometry.htm

Mapping of COs with POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO1	3	2	0	3	2	3	3	3	3	3	2
CO2	3	2	0	3	2	3	3	3	3	3	2
CO3	3	2	0	3	2	3	3	3	3	3	2
CO4	3	2	0	3	2	3	3	3	3	3	2
CO5	3	2	0	3	2	3	3	3	3	3	2
Total	15	10	0	15	10	15	15	15	15	15	10
Scaled Value	3	2	0	3	2	3	3	3	3	3	2

1 – 5 →1, 6 – 10→ 2, 11 – 15→ 3

0-No Relation, 1- Low Relation, 2-Medium Relation, 3-High Relation

COURSE CODE	XCY408	L	T	P	SS	C
COURSE NAME	FORENSIC SCIENCE	2	0	0	0	2
C: P: A	1.5:0:0.5	L	T	P	SS	H
		2	0	0	0	2

COURSE OUTCOMES:		Domain	Level
CO1	***Identify*** the types of poisons and classification of poisons in the living and the deadorganisms and also get information about Postmortem.	Cognitive Affective	Remember Respond
CO2	***Explore*** on Human bombs, possible explosives (gelatin sticks and RDX) and metal defector devices and other security measures for VVIP - composition of bulletsand detecting powder burns	Cognitive Affective	Understand Receive
CO3	***Identify*** the forgery documents, different types of forged signatures	Cognitive Affective	Understand Receive
CO4	***Express*** how to tracks and trace using police dogs, foot prints identificationand gain the knowledge in analyzing biological substances - blood, semen, saliva, urine and hair - DNA Finger printing for tissue identification in dismembered bodies	Cognitive Affective	Understand Analyze Respond
CO5	***Explain*** about Aids - causes and prevention and also have an exposure onhandling fire explodes.	Cognitive	Understand Apply

UNIT - I POISONS **7**

Poisons - types and classification - diagnosis of poisons in the living andthe dead -clinical symptoms - postmortem appearances. Heavy metal contamination (Hg, Pb, Cd) of seafoods - use of neutron activation analysisin detecting arsenic in human hair. Treatment in cases of poisoning – use of antidotes for common poisons.

UNIT - II CRIME DETECTION **6**

Accidental explosion during manufacture of matches and fireworks (as in Sivakasi). Human bombs - possible explosives (gelatin sticks and RDX) - metal detector devices andother security measures for VVIP-composition of bullets and detecting powder burns.

UNIT – III FORGERY AND COUNTERFEITING **3**

Documents - different types of forged signatures - simulated and traced forgeries -inherent signs of forgery methods - writing deliberately modified

- uses of ultraviolet rays -comparison of type written letters – checking silver line water mark in currency notes – alloy analysis using AAS todetect counterfeit coins – detection of gold purity in 22 carat ornaments – detecting gold plated jewels -authenticity of diamond.

UNIT –IV TRACKS AND TRACES **6**

Tracks and traces - small tracks and police dogs - foot prints - costing of foot prints -residue prints, walking pattern or tyre marks – miscellaneous traces and tracks – glass fracture - tool marks - paints - fibres - Analysis of biological substances - blood, semen, saliva, urine and hair - Cranial analysis (head and teeth) DNA Finger printing for tissue identification in dismembered bodies - detecting steroid consumption in athletes and racehorses.

UNIT –V MEDICAL ASPECTS **8**

Aids - causes and prevention - misuse of scheduled drugs - burns and their treatment by plastic surgery. Metabolite analysis using mass spectrum - Gas chromatography-Arson -natural fires and arson - burning characteristics and chemistry of combustible materials -nature of combustion. Ballistics - classification - internal and terminal ballistics

- small arms -laboratory examination of barrel washing and detection of powder residue by chemical tests.				
LECTURE	**TUTORIALS**	**PRACTICALS**	**SELF STUDY**	**TOTAL**
30	**0**	**0**	**0**	**30**

TEXT BOOKS

1. SA Iqbal, M Liviu, Textbook of forensic chemistry, Discoverypublishing house private limited, 2011.
2. Kelly M. Elkins, Introduction to Forensic Chemistry, CRC Press,Taylor & Francis Group, 2019.
3. Javed I. Khan, Thomas J. Kennedy, Donnell R. Christian, Jr., Basicprinciples of Forensic chemistry, Humana Press, first edition, 2012.
4. Bapuly AK, (2006) Forensic Science – Its application in crimeinvestigation, Paras Medical Publisher, Hyderabad.
   Sharma B.R., (2006) Scientific Criminal Investigation, Universal Law Publishing Co. Pvt. Ltd, New Delhi.

REFERENCES

1. Richard Saferst in and Criminalistics-An Introduction to Forensic Science (College Version), Sopfestein, Printice hall, eighth edition,2003
2. Suzanne Bell, Forensic Chemistry, Pearson, second international edition, 2014.
3. Jay Siegel, Forensic chemistry: Fundamentals and applications, Wiley-Blackwell, first edition, 2015.
4. Max M. Houck & Jay A. Segal, (2006) Fundamentals of ForensicScience, Elsevier Academic press.
5. Henry C. Lee, Timothy Palmbach, Marilyn T. Miller, (2006) HenryLee's Crime Scene Book Elsevier Academic press

E RESOURCES

1. http://www.library.ucsb.edu/ist/03-spring/internet.html
2. http://www.wonder howto.com/topic/forensic-science/

Mapping of COs with POs:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**
CO1	1	0	1	3	0	3	3	1	1	0	3
CO2	1	0	1	3	0	3	3	1	1	0	3
CO3	1	0	1	3	0	3	3	1	1	0	3
CO4	1	0	1	3	0	3	3	1	1	0	3
CO5	1	0	1	3	0	3	3	1	1	0	3
Total	5	0	5	15	0	15	15	5	5	0	15
Scaled Value	1	0	1	3	0	3	3	1	1	0	3

1 – 5 →1, 6 – 10→ 2, 11 – 15→ 3

0-No Relation, 1- Low Relation, 2-Medium Relation, 3-High Relation

COURSE CODE	XUM004	L	T	P	SS	C
COURSE NAME	INTRODUCTION TO ENTREPRENEURSHIP	1	0	0	1	1
PREREQUISITES	NIL	L	T	P	SS	H
C:P:A	0.8:0:0.2	1	0	0	1	2

COs	Outcome	Domain	Level
CO1	Discuss the concept of Entrepreneurship	Cognitive	Remember
CO2	Explain about an Entrepreneur	Cognitive	Remember and Understand
CO3	***List*** the characteristics of Entrepreneur	Cognitive	Remember
CO4	***Understand*** the ways to acquire skills of Entrepreneur	Cognitive	Remember and Understand
CO5	***Understand*** the concept of Intrapreneurship	Cognitive	Remember and Understand

UNIT I INTRODUCTION TO ENTREPRENEURSHIP **3+3**

Meaning and Concept of Entrepreneurship, History of Entrepreneurship Development, Role of Entrepreneurship in Economic Development, Myths about Entrepreneurs, Agencies in Entrepreneurship Management and Future of Entrepreneurship

UNIT IITHE ENTREPRENEUR **3+3**

Gender Discrimination in society and in family, Gender equity, equality, and empowerment. Social and Economic Status of Women in India in Education, Health, Employment, Definition of HDI, GDI and GEM. Contributions of Dr.B.R. Ambethkar, Thanthai Periyar and Phule to Women Empowerment.

UNIT IIICHARACTERISTICS OF AN ENTREPRENEUR **3+3**

Introduction - Characteristic Features of Successful Indian Entrepreneurs - Differences between an Entrepreneur and a Manager - Difference between an Entrepreneur and an Intrapreneur - Relationship between the terms Entrepreneur, Entrepreneurial and Entrepreneurship - Difference between a Scientist, Inventor and Entrepreneur - Relationship between Entrepreneur and Enterprise - Difference between Entrepreneur and Enterprise - Difference between a Self-employed person and Entrepreneur - Common Myths on Entrepreneur

UNIT IV SKILLS FOR AN ENTREPRENEUR **3+3**

Business Management Skills - Communication and active listening skills - Risk-taking skills – Networking Skills – Critical Thinking Skills – Problem Solving Skills – Creative Thinking Skills – Customer Service Skills – Financial Skills – Leadership Skills – Time Management and Organizational Skills – Technical Skills

UNIT V INTRAPRENEURSHIP **3+3**

What is Intrapreneurship – Understanding Intrapreneurship – Types of Intrapreneurs – Characteristics of Intrapreneurs – Examples of Intapreneurship

	LECTURE	SELF STUDY	TOTAL
	15	15	30

TEXT BOOK

1. Jayashree Suresh, Entrepreneurial Development, Margham Publications.

REFERENCE BOOKS

1. Essentials of Entrepreneurship and Small Business Management (6th Edition) by Norman M. Scarborough (Paperback - Jan 13, 2010)
2. Entrepreneurship and Small Business Management, Student Edition by Glencoe McGraw-Hill (Hardcover - Feb 24, 2005)
3. Vasant Desai, Dynamics of Entrepreneurship Development, Star Publication, New Delhi.

E-RESOURCES

1. https://in.indeed.com/career-advice/career-development/entrepreneur-skills
2. https://www.investopedia.com/terms/i/intrapreneurship.asp

Mapping of COs with POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO1	1	0	1	3	0	3	3	1	1	0	3
CO2	1	0	1	3	0	3	3	1	1	0	3
CO3	1	0	1	3	0	3	3	1	1	0	3
CO4	1	0	1	3	0	3	3	1	1	0	3
CO5	1	0	1	3	0	3	3	1	1	0	3
Total	5	0	5	15	0	15	15	5	5	0	15
Scaled Value	1	0	1	3	0	3	3	1	1	0	3

1 – 5 →1, 6 – 10→ 2, 11 – 15→ 3

0-No Relation, 1- Low Relation, 2-Medium Relation, 3-High Relation

SEMESTER V						
COURSECODE	**XCY501**	**L**	**T**	**P**	**SS**	**C**
COURSENAME	**ORGANIC CHEMISTRY I**	**3**	**1**	**0**	**1**	**4**
C:P:A	**3.8:0:0.2**	**L**	**T**	**P**	**SS**	**H**
		3	**1**	**0**	**1**	**5**

COURSEOUTCOMES		**DOMAIN**	**LEVEL**
CO1	***Explain*** stereochemistry, symmetry elements, optical activity and conformational analysis of acyclic and cyclic compounds .	Cognitive	Understand
CO2	***Describe*** the preparation with mechanism, properties and Naming reactions of aldehydes, ketones & carboxylicacid and their derivatives.	Cognitive	Remember
CO3	***Explain*** preparation, properties and applications of nitrogen containing compounds.	Cognitive Affective	Apply Receiving
CO4	***Describe*** basic concepts, characteristic features, preparation and reaction of heterocyclic compounds. .	Cognitive	Remember Responding
CO5	***Apply*** and ***Identify*** the types of rearrangement reactions and its synthetic applications	Cognitive	Apply Remember

UNIT I STEREOCHEMISTRY **9+3**

Structural isomerism - types with examples – tautomerism – keto-enol. Stereochemistry - Representation of molecules in saw horse, Fischer, flying-wedge and Newman formulae. Symmetry elements - chirality – asymmetric molecules. Optical rotation – specific rotation -optical purity - Optical isomers - enantiomers - diastereomers – epimers - notation of optical isomers - Cahn-Ingold-Prelog rules, R and S notations for optical isomers with one and two asymmetric carbon atoms - erythro and threo representations - D and L representations - Stereo selectivity, stereo specificity - asymmetric synthesis. Geometrical isomerism – nomenclature of geometrical isomers – cis/trans, E-Z notation- Methods to assign configurations - Conformational Analysis - Conformation - Conformational nomenclature: eclipsed, staggered, gauche and potential energy diagram. -Conformational analysis of ethane and cyclohexane

UNIT II CARBONYL COMPOUNDS AND THEIR DERIVATIVES: **9+3**

Common methods for the synthesis of aldehydes and ketones - Grignard reagents - Aldol, Perkin, and Benzoin condensations, Wittig reaction, Mannich reaction, Reformatsky reaction and Cannizaro reaction. Preparation of carboxylic acids,Synthesis of acid chlorides, esters and amides, Preparation and reactivity of carboxylic acid derivatives - acid chlorides, esters, amides and anhydrides - Mechanisms of esterification and hydrolysis (acid and base catalysed reactions) - Oxidation by Tollen's reagent, $KMnO_4$, hypohalite, SeO_2 and peracids. Reduction by H_2/Ni, H_2-Pd-C, $NaBH_4$, $LiAlH_4$, MPV, Clemmenson and Wolff-Kischner reductions. α, β unsaturated aldehydes and Ketones – preparation and reactions.

UNIT III CHEMISTRY OF NITROGEN COMPOUNDS **10+3**

Preparation of nitroalkanes and nitroarenes - Chemical reactions of nitroalkanes and nitroarenes -. Methods of preparation of alkyl and aryl amines - Gabriel phthalimide reaction and Hofmann reaction - Structural features effecting basicity of amines - basicity of aliphatic and aromatic amines -reactions of amines. Aryl diazonium salts - preparation, stability, reactions and synthetic transformations. Amino acids - essential and nonessential - zwitterions formation - isoelectric point - chemical reactions of amino acid. Polypeptides and proteins - primary, secondary, tertiary and quaternary structure of proteins - determination of primary structure with end group analysis.

UNIT IV HETEROCYCLIC COMPOUNDS	7+3
Aromatic characteristics of pyrrole, furan, thiophene and pyridine - Comparison between basicity of pyridine, piperidine and pyrrole. Methods of synthesis and chemical reactions with particular emphasis on the mechanism of electrophilic substitution and mechanism of nucleophilic substitution reaction in pyridine derivatives. Preparation and reactions of indole, quinoline and isoquinoline with special reference to Fisher indole synthesis, Skraup synthesis and Bischler-Napieralski synthesis.	
UNIT V REARRANGEMENTS	**10+3**
Rearrangement to electron-deficient carbon - 1,2 shift (Wagner-Meerwein rearrangement, pinacol rearrangement, Wolff rearrangement, benzil-benzilic acid rearrangement). Aromatic rearrangements from oxygen to ring carbon – Fries, Claisen and benzidine rearrangement. Rearrangement to electron-deficient nitrogen – Beckmann, Schmidt, Hofmann, Lossen, Curtius rearrangement). Rearrangement to electron-deficient oxygen: Baeyer-Villigeroxidation,Dakin reaction	

	LECTURE	TUTORIAL	PRACTICAL	SELFSTUDY	TOTAL
HOURS	**45**	**15**	**0**	**0**	**60**

TEXTBOOKS

1. MorrisonR.T.andBoydR.N.,OrganicChemistry(6th edition),NewYork,Allyn&BaconLtd., (1976).
2. Bahl B.S. and ArunBahl, Advanced Organic Chemistry, (12th edition), New Delhi, Sultan Chand &Co., (1997).
3. I. L. Finar, Organic Chemistry Vol-1, 6th edn, Pearson Education Asia, 2004.
4. G.Marcloudan, Organic Chemistry, 5th edition, Roberts and company, 2009

Mapping of COs with POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO1	3	3	0	1	2	2	0	0	3	3	3
CO2	3	3	0	1	2	2	0	0	3	3	3
CO3	3	3	0	1	2	2	0	0	3	3	3
CO4	3	3	0	1	2	3	0	0	3	3	3
CO5	3	3	0	1	2	3	0	0	3	3	3
Total	15	15	0	5	10	12	0	0	15	15	15
Scaled Value	3	3	0	1	2	3	0	0	3	3	3

1 – 5 →1, 6 – 10→ 2, 11 – 15→ 3

0-No Relation, 1- Low Relation, 2-Medium Relation, 3-High Relation

COURSE CODE	XCY502	L	T	P	SS	C
COURSE NAME	INORGANIC CHEMISTRY I	3	1	0	1	4
C:P:A	3.4:0:0.6	L	T	P	SS	H
		3	1	0	1	5

COURSEOUTCOMES		DOMAIN	LEVEL
CO1	***Discuss*** crystal field theory, magnetic properties and spectral properties of complexes.	Cognitive	Remember Understanding
CO2	***Explain*** preparation and properties of metal carbonyls	Cognitive	Understanding
CO3	***List*** the comparative account of the characteristics of lanthanoids and actinoids	Cognitive Affective	Understanding Receiving
CO4	***Describe*** the objective of this unit is to expose the students to the basic concepts of structure of solids, electrical and magnetic properties of solids..	Cognitive	Remember Understanding
CO5	***Illustrate*** the properties and uses of inorganic polymers of silicon, sulphur, boron and phosphorous	Cognitive Affective	Understanding Receiving Responding

UNIT I CO-ORDINATION CHEMISTRY - II **10+3**

Crystal field theory –Crystal field splitting of energy levels in octahedral and tetrahedral complexes, Crystal field stabilization energy (CFSE), spectrochemical series - calculation of CFSE in octahedral and tetrahedral complexes - factors influencing the magnitude of crystal field splitting, crystal field effect on ionic radii, lattice energies, heats of ligation with water as a ligand (heat of hydration), interpretation of magnetic properties, spectra of $[Ti(H_2O)_6]^{3+}$ - Jahn – Teller effect. Stability of complexes in aqueous solution, stability constants- factors affecting the stability of a complex ion, thermodynamic and kinetic stability (elementary idea). Comparison of VBT and CFT.

UNIT II ORGANOMETALLIC COMPOUNDS **9+3**

Organometallic compounds:Metal Carbonyls-Mono and polynuclear carbonyls, General methods of preparation ofcarbonyls – general properties of binary carbonyls – bonding incarbonyls – structure and bonding in carbonyls of Ni, Fe, Cr, Co, Mn, Ru and Os. EAN rule as applied to metal carbonyls.Ferrocene-Methods of preparation, physical and chemical properties

UNIT III INNER TRANSITION ELEMENTS (LANTHANOIDS AND ACTINOIDS) **6+3**

General characteristics of f-block elements - Comparative account of lanthanoids and actinoids - Occurrence, Oxidation states, Magnetic properties, Colour and spectra - Lanthanoids and Actinoids, Separation by ion-Exchange and Solvent extraction methods – Lanthanoids contraction- Chemistry of thorium and Uranium-Occurrence, Ores, Extraction, properties and uses - Preparation, Properties and uses ofceric ammonium sulphate, thorium dioxide and uranyl acetate.

UNIT IV SOLID STATE CHEMISTRY **10+3**

Ionic bonding – lattice energy – Born equation and its derivation, radius ratio rules – structures of some ionic crystals – derivation of Bragg's equation. Spinels and inverse spinels – defects in solids, non-stoichiometric compounds – Electrical, Magnetic and optical properties of solids – band theory – semiconductors – superconductors. Classification of solids – amorphous and crystalline solids – Van der waals crystals – covalent crystals – Laws of crystallography – Elements of symmetry – Weiss and Miller indices – Crystal systems and Bravais lattices. Structure of ionic solids – crystal structures – Sodium chloride, Zinc blende, wurtzite, Crystal defects – Schottky and Frenkel defects – F-cente

UNIT V INORGANIC POLYMERS **10+3**

General properties – classification of inorganic polymers based on element in the backbone (Si, S, B and P) - preparation and properties of silicones (polydimethylsiloxane and polymethylhydrosiloxane) phosphorous based polymer (polyphosphazines and polyphophonitrilic chloride), sulphur based polymer (polysulfide and polymeric sulphurnitride), boron based polymers (borazine polymers) – industrial applications of inorganic polymers

	LECTURE	TUTORIAL	PRACTICAL	SELFSTUDY	TOTAL
HOURS	**45**	**15**	**0**	**0**	**60**

TEXTBOOKS

1. Lee J.D.,Concise Inorganic Chemistry, UK, Black well science (2006).
2. W. U. Malik, G. D. Tuli, and R. D. Madan: Selected Topic in Inorganic Chemistry, S. Chand & Company Ltd, New Delhi, 1998.
3. PuriB.R..,Sharma L.R., KaliaK.K.,Principles of Inorganic Chemistry, (23rd edition), New Delhi, ShobanLalNagin Chand & Co., (2003).
4. P.L. Soni, Text book of Ionrganic Chemistry, 20thedn, Sultan chand& Sons, 2000
5. R. D. Madan, Modern Inorganic Chemistry, 3rdedn, S. Chand & Company Ltd., Reprint 2014.

REFERENCES

1. Day,J.SelbinandH.H.Sisler,Theoretical Inorganic Chemistry; Literary Licensing(LLC), Montana, 2012.
2. N. H. Ray, Inorganic Polymers, Academic Press, 1978.
3. F.A.Cotton and G.Wilkinson, C.A.Murillo and M.Bochmann, Advanced Inorganic Chemistry; 6thEd., A Wiley - Interscience Publications, John Wiley and Sons,USA, 1999.
4. J.E.Huheey,Inorganic Chemistry;4th Ed.,Harper and Row publisher, Singapore,2006.

E-RESOURCES

1.www.epgpathshala.nic.in
2. www.nptel.ac.in
3. http:/swayam.gov.in

Mapping of COs with POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO1	3	3	0	1	2	2	0	0	3	3	3
CO2	3	3	0	1	2	2	0	0	3	3	3
CO3	3	3	0	1	2	2	0	0	3	3	3
CO4	3	3	0	1	2	3	0	0	3	3	3
CO5	3	3	0	1	2	3	0	0	3	3	3
Total	15	15	0	5	10	12	0	0	15	15	15
Scaled Value	3	3	0	1	2	3	0	0	3	3	3

1 – 5 →1, 6 – 10→ 2, 11 – 15→ 3

0-No Relation, 1- Low Relation, 2-Medium Relation, 3-High Relation

COURSECODE	XCY503	L	T	P	SS	C
COURSENAME	PHYSICALCHEMISTRY I	3	1	0	1	4
C:P:A	3.6:0:0.4	L	T	P	SS	H
		3	1	0	1	5

COURSEOUTCOMES		DOMAIN	LEVEL
CO1	***Explain*** Gibbs and Helmholtz free energy functions, partial molar quantities and Ellinghams	Cognitive Affective	Understanding Receiving
CO2	***Apply*** the concepts of chemical kinetics to predict the rate of the reaction and order of the reaction, ***demonstrate*** the effect of temperature on reaction rate, and the significance of free energy and entropy of activation	Cognitive Affective	Apply Receiving
CO3	***Compare***and***apply***the different types of adsorption mechanisms for different type of adsorption reactions	Cognitive Affective	Understanding Apply Receiving
CO4	***Demonstrate*** the types and characteristics of colloids, preparation of sols and emulsions, and ***determine*** the molecular weights of macromolecules.	Cognitive Affective	Understanding Apply Receiving
CO5	***Apply*** the concepts of photochemistry in fluorescence, phosphorescence, chemiluminescence and color perception of vision	Cognitive Affective	Understanding Apply Receiving

UNIT I-THERMODYNAMICS - III **10+3**

Free energy and work functions - Need for free energy functions, Gibbs free energy, Helmholtz free energy - their variation with temperature, pressure and volume, criteria for spontaneity; Gibbs-Helmholtz equation – derivations and applications; Maxwell relationships,thermodynamic equations of state; Thermodynamics of mixing of ideal gases, Ellingham Diagram-application. Partial molar properties – chemical potential, Gibbs Duhem equation, variation of chemical potential with temperature and pressure, chemical potential of a system of ideal gases, Gibbs- Duhem-Margules equation.

UNIT II-CHEMICAL KINETICS **10 +3**

Rate of reaction - Average and instantaneous rates, factors influencing rate of reaction - molecularity of a reaction - rate equation - order of reaction. order and molecularity of simple and complex reactions, Rate laws - Rate constants – derivation of rate constants and characteristics for zero, first order, second and third order (equal initial concentration)– Derivation of time for half change with examples. Methods of determination of order of Volumetry, manometry and polarimetry.Effect of temperature on reaction rate – temperature coefficient -concept of activation energy - Arrhenius equation. Theories of reaction rates – Collision theory – derivation of rate constant of bimolecular gaseous reaction – Failure of collision theory. Lindemann's theory of unimolecular reaction. Theory of absolute reaction rates – Derivation of rate constant for a bimolecular reaction – significance of entropy and free energy of activation. Comparison of collision theory and ARRT.

Complex reactions – reversible and parallel reactions (no derivation and only examples)– kinetics of consecutive reactions – steady state approximation.

UNIT III–ADSORPTION AND CATALYSIS **8+3**

Adsorption – Chemical and physical adsorption and their general characteristics- distinction between them Different types of isotherms – Freundlich and Langmuir. Adsorption isotherms and their limitations –BET theory, kinetics of enzyme catalysed reaction –Michaelis- Mentenand Briggs- Haldene equation – Lineweaver- Burk plot – inhibition –reversible – competitive, noncompetitive and uncompetitive (no derivation of rate equations). Catalysis – general characteristics of catalytic reactions, auto catalysis,promoters, negative catalysis, poisoning of a catalyst – theories of homogenous and heterogeneous catalysis – Kinetics of Acid – base and enzyme catalysis. Heterogenous catalysis

UNIT IV–COLLOIDS AND SURFACE CHEMISTRY **9+3**

Colloids: Types of Colloids, Characteristics Colloids (Lyophilic and Lyophobic sols),Preparation of Sols-Dispersion methods, aggregation methods, Properties of Sols- Optical properties, Electrical properties – Electrical double layer, Electro Kinetic properties- Electro-osmosis, Electrophoresis,Coagulation or precipitation, Stability of sols, associated colloids, Emulsions, Gels-preparation of Gels, Applications of colloids Macromolecules: Molecular weight of Macromolecules-Number average molecular weight-average molecular weight, Determination of Molecular weight of molecules

UNIT V-PHOTOCHEMISTRY **8+3**

Laws of photo chemistry – Lambert – Beer, Grotthus – Draper and Stark – Einstein. Quantum efficiency. Photochemical reactions – rate law – Kinetics of H_2-Cl_2, H_2-Br_2 and H_2-I_2 reactions, comparison between thermal and photochemical reactions. Fluorescence – applications including fluorimetry – sensitised fluorescence, phosphorescence – applications -chemiluminescence and photosensitisation – examples Chemistry of Vision – 11 cis retinal –vitamin A as a precursor - colour perception of vision.

	LECTURE	TUTORIAL	PRACTICAL	SELFSTUDY	TOTAL
HOURS	**45**	**15**	**0**	**0**	**60**

TEXTBOOKS

1. Puri B.R., Sharma L.R and Pathania M.S., Principles of Physical Chemistry, 47thed., Vishal Publishing Company, 2016
2. Sharma .K.K, Sharma.L.K. A Text book on physical Chemistry, 6thed., Sultan Chand, 2016.
3. MaronS.H.andLando J.B. Fundamentals of Physical Chemistry, Macmillan.
4. Glasstone S. and Lewis. D., Elements of Physical Chemistry. Macmillan

REFERENCES

1. J. N. Gurtu and A. Gurtu, Advanced Physical Chemistry; 5th Ed., PragathiPrakashan, Meerut, 2006.
2. J. I. Steinfeld, J. S. Francisco and W. L. Hase, Chemical Kinetics and Dynamics; 2nd Ed., Prentice Hall, New Jersey, 1999.
3. P. W. Atkins, Physical Chemistry; 7th Ed
4. D. A. McQuarrie, Text Book of Physical Chemistry, University Science Books, Mill Valley, California, 1983.
5. R. A. Alberty and R. J. Silbey, Physical Chemistry, John Wiley and Sons, New York, 1992.

E-RESOURCES:

1. https://nptel.ac.in
2. https://swayam.gov.in
3. www.epgpathshala.nic.in

Mapping of COs with POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO1	1	1	0	1	2	2	0	0	3	1	3
CO2	1	1	0	1	2	2	0	0	3	1	3
CO3	1	1	0	1	2	2	0	0	3	1	3
CO4	1	1	0	1	2	3	0	0	3	1	3
CO5	1	1	0	1	2	3	0	0	3	1	3
Total	5	5	0	5	10	12	0	0	15	5	15
Scaled Value	1	1	0	1	2	3	0	0	3	1	3

1 – 5 →1, 6 – 10→ 2, 11 – 15→ 3

0-No Relation, 1- Low Relation, 2-Medium Relation, 3-High Relation

COURSE CODE	XCY504	L	T	P	SS	C
COURSE NAME	GRAVIMETRIC ESTIMATION PRACTICAL	0	0	3	0	2
C:P:A	1.0: 0.8:0.2	L	T	P	SS	H
		0	0	3	0	3

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	Ability to ***Identify*** the various inorganic complexes	Cognitive Psychomotor	Remember Perception
CO2	***Analyse*** the quantity of individual metal present in a given mixture and ***explain*** the characteristic properties of the complexes.	Cognitive Psychomotor Affective	Understand Analyse Perception Receive
CO3	***Use*** the principle behind the gravimetric analysis.	Cognitive	Apply

Gravimetric Estimation Practical	**3 hours each expt**

1. Estimation of Lead as lead chromate.
2. Estimation of Barium as barium chromate.
3. Estimation of Nickel as Nickel - DMG complex.
4. Estimation Calcium as calcium oxalate
5. Estimation of sulphate as barium sulphate.

	LECTURE	TUTORIAL	PRACTICAL	SELF STUDY	TOTAL
HOURS	0	0	30	0	30

TEXT BOOKS

1. Venkateswaran V. Veerasamy R. Kulandaivelu A.R., Basic principles of Practical Chemistry,2nd edition, New Delhi, Sultan Chand & sons (1997).

Mapping of COs with POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO1	3	3	2	2	2	3	3	3	3	3	3
CO2	3	3	2	2	2	3	3	3	3	3	3
CO3	3	3	2	2	2	3	3	3	3	3	3
Total	9	9	6	6	6	9	9	9	9	9	9
Scaled Value	2	2	2	2	2	2	2	2	2	2	2

1 – 5 →1, 6 – 10→ 2, 11 – 15→ 3

0-No Relation, 1- Low Relation, 2-Medium Relation, 3-High Relation

COURSE CODE	XCY505	L	T	P	SS	C
COURSE NAME	INDUSTRIAL CHEMISTRY	2	1	0	1	3
PREREQUISITE	NIL	L	T	P	SS	H
C:P:A	2.6:0:0.4	2	1	0	1	4

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	***Describe*** the utilization of the raw materials in chemical industry.	Cognitive	Remember
CO2	***Explain*** the manufacturing process of cement, ceramics, glass and fertilizers.	Cognitive	Understand
CO3	***Recognize*** the technologies used in small scale chemical industries.	Cognitive	Understand
CO4	***Interpret*** the various toxic chemicals used in agro industries and synthesis of sugar	Cognitive Affective	Remember Receive
CO5	***Examine*** the various pollutants and gain awareness about industrial pollution.	Cognitive Affective	Analyze Respond

UNIT I	RAW MATERIALS AND ENERGY FOR CHEMICAL INDUSTRY	9+3

Raw materials – Characteristics of raw materials and their resources – methods of raw material concentrations – integral utilization of raw materials.Energy for chemical industry – Fuels – classification of fuels – coal – fuel gases and liquid fuels – petroleum – cracking – Octane number – cetane number – composition and uses of coal gas, water gas, producer gas, oil gas and gobar gas.

UNIT II	CEMENT, CERAMICS, GLASS AND FERTILIZERS	9+3

Cement: Manufacture – Wet Process and Dry process. Types, Analysis of major constituents, setting of cement, reinforced concrete. Cement industries in India. Ceramics: Important clays and feldspar, glazing and verification.Glass: Types, Composition, manufacture of Optical glass, colored glasses, lead glass and neutron absorbing glass. Fertilizers: Fertilizer industries in India, Manufacture of ammonia, ammonium salts, urea, superphosphate, triple superphosphate and nitrate salts.

UNIT III	SMALL SCALE CHEMICAL INDUSTRIES	9+3

Electrothermal and electrochemical industries: electroplating – surface coating industries – oils, fats and waxes – Textiles industry-soaps and detergents – cosmetics. Match industries and fire works: manufacture of some industrially important chemicals like potassium chlorate, and red phosphorus – metal powders.

UNIT IV	SUGAR AND AGRO CHEMICAL	9+3

Sugar: Cane sugar manufacture, recovery of sugar from molasses, sugar estimation, sugar industries in India. Agrochemical industries: Important categories of insecticides, fungicides, herbicides. Mode of action and synthesis of common pesticides like Gammexane, DDT, alathrin, Parathion, Malathion, Baygon, DDVP, Warfarin.

UNIT V	INDUSTRIAL POLLUTION & CHEMICAL TOXICOLOGY	9+3

Introduction – causes of industrial pollution – thermal power plants – nuclear power reactors– fertilizers and chemical industry – pulp and paper industries – agro based industries – cement industry.Toxic Chemicals in the environment – biochemical effects of arsenic, cadmium, lead, mercury and cyanide.				
LECTURE	**TUTORIAL**	**PRACTICAL**	**SELF STUDY**	**TOTAL**
45	**15**	**0**	**0**	**60**

TEXT BOOKS

1. B.K Sharma – Industrial chemistry – Goel publishing house.
2. B.N.Chakrabarty,Industrial Chemistry,Oxford&IBH Publishing Co.,New Delhi, (1981).
3. P.P.Singh, T.M.Joseph, R.G.Dhavale, College Industrial Chemistry, Himalaya Publishing House, Bombay, 4th edn., (1983).

REFERENCES

1. I.Mukhlyonov(ed.),Chemical Technology,Vol.1,Mir publication, Moscow, III edn., (1979).
2. A.K.De., Environmental Chemistry, Wiley Eastern Ltd.,11 edn., Meerut (1989).
3. R.Norris Shreve and J.A.Brink, Jr. Chemical Process Industries. IV edn., McGraw Hill, Tokyo, (1977).
4. B.K.Sharma and H.Kaur,Environmental Chemistry, Krishna Prakashan,Meerut, 1997.
5. A.K. De, Envionment Chemistry, Wiley Eastern Ltd., Meerut 1994,
6. A.K. Mukherjee, Environmental Pollution and Health Hazards – Causes and Control Galgotia Press, New Delhi 1986.

Mapping of COs with POs:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**
CO1	2	2	0	1	1	2	2	2	3	3	3
CO2	2	2	0	1	1	2	2	2	3	3	3
CO3	2	2	0	1	1	2	2	2	3	3	3
CO4	2	2	0	1	1	3	2	2	3	3	3
CO5	2	2	0	1	1	3	2	2	3	3	3
Total	10	10	0	5	5	12	10	10	15	15	15
Scaled Value	2	2	0	1	1	3	2	2	3	3	3

1 – 5 →1, 6 – 10→ 2, 11 – 15→ 3

0-No Relation, 1- Low Relation, 2-Medium Relation, 3-High Relation

SEMESTER VI						
COURSECODE	**XCY601**	**L**	**T**	**P**	**SS**	**C**
COURSENAME	**ORGANIC CHEMISTRY II**	**3**	**1**	**0**	**0**	**4**
C:P:A	**3.2:0:0.8**	**L**	**T**	**P**	**SS**	**H**
		3	**1**	**0**	**0**	**4**

COURSEOUTCOMES		**DOMAIN**	**LEVEL**
CO1	***Explain*** the green synthesis of Dyes and Rubbers in the Industry; and also give an idea towards Microwave and ultrasound methods.	Cognitive	Understanding
CO2	***Describe*** various synthetic strategies and terminologies involved in organic synthesis and the role of important reagents in organic synthesis	Cognitive	Remember
CO3	***Identify*** the basic concepts involved in spectroscopic techniques of UV, IR, NMR and Mass spectroscopy and ***apply*** techniques for characterization of molecules	Cognitive Affective	Apply Receiving
CO4	***Recognise*** the classification, structure and properties of Alkaloids, Terpenoids and Steroids,	Cognitive Affective	Understanding Responding
CO5	***Describe*** the general properties of carbohydrates.	Cognitive	Remember

UNIT I INDUSTRIAL ORGANIC CHEMISTRY — 9+3

Dyes -theory of color and constitution-classification-preparation and uses of azo dyes -methyl orange -malachite green, indigo dyes -Indigotin, anthraquinone dyes -alizarin, phthalein dyes – fluorescein. Polymers-definition-classification-preparation of Nylon 66, Nylon 6, Bakelite, and biodegradable polymers - Green Chemistry -Definition, need and basic principles of green chemistry -green synthesis -Aqueous phase reactions, reactions in ionic liquids, -Green catalysts - Phase transfer catalysts (PTC) and Biocatalysts. Microwave and Ultrasound assisted green synthesis

UNIT II SYNTHETIC METHODOLOGY AND REAGENTS — 10+3

Synthetic terminology -Disconnection, synthon, synthetic equivalent (SE), Functional group interconversion (FGI), Target molecule (TM).-retro synthetic analysis - List of Nucleophilic reagents and electrophilic reagents. Synthetic applications of malonic ester and ethylacetoacetate in the synthesis of a monocarboxylic acids (propionic acid and n-butyric acid). b) dicarboxylic acids (succinic acid and adipic acid). Retrosynthesis of the following molecules 4-methyl acetophenone, 2-methylcyclopentane and 2-allyl phenol. Role of following reagents in organic synthesis: DIBAL, Gilmann reagent, DCC.

UNIT III APPLICATIONS OF SPECTROSCOPY — 9+3

UV and Visible Spectroscopy: types of electronic transitions Selection rule. Chromophore and auxochromes. Various types of shifts in λ max and in ϵ max. Woodward fisher rule of Calculation of λ max. Infrared spectroscopy: types of vibrations and number of vibrational degrees of freedom. Selection Rules- The characteristic ranges of absorption of IR radiation of various functional groups. NMR Spectroscopy: NMR active nuclei. Equivalent and non-equivalent protons and number of signals. TMS. Chemical shift and coupling constant-NMR spectrum of simple molecules. Mass Spectrometry: principles- Molecular ion- peak, base peak- - meta stable peak. General fragmentation – McLafferty rearrangement - Retro-Diels-Alder rearrangement.

UNIT IV NATURAL PRODUCTS — 9+3

Alkaloids: Definition - classification - properties - structural determination - Sources, isolation, physiological activities and structure of conine, cocaine and quinine. Terpenoids: definition, isoprene rule and classification with suitable examples - Steroids and Hormones: definition - classification - Occurrence, structure and physiological activities of cholesterol, estrogens and testosterone.

UNIT V CARBOHYDRATES					8+3
Carbohydrates: Definition - Classification - Classification of sugars as reducing and nonreducing sugars - D- and L- configurations - Erythro and threodiastereomers - Anomers and epimers with suitable examples - Monosaccharides: Classification– Glucose - properties of glucose - Fructose and its properties - Conversion glucose into fructose and vice-versa - Formation of osazone and glycosides - Fischer open structure - Haworth projection cyclic structures (pyranose and furanose) - Disaccharides: α – and β – glucosidic linkages with suitable examples - 1,4' and 1,6' linkages with suitable examples - Structure and properties of sucrose- Polysaccharides: Cellulose,					
	LECTURE	**TUTORIAL**	**PRACTICAL**	**SELFSTUDY**	**TOTAL**
HOURS	**45**	**15**	**0**	**0**	**60**

TEXTBOOKS

1. P.T.Anatas and J.C. Warner, Green Chemistry Theory and Practice, New York : Oxford University Press, 1998.
2. I. L. Finar, Organic Chemistry Vol-1, 6th edn, Pearson Education Asia, 2004.
3. J.Clayden, N. Greeves, S. Warren, Organic Chemistry, 2ndedn, Oxford, 2012
4. W. Kemp, Organic Spectroscopy, Palgrave, 1991
5. S.Warren, Designing Organic Synthesis, Wiley India, 2009
6. B. G. Davis, A. J..Fairbanks, Carbohydrate Chemistry, Oxford Chemistry Primer, Oxford University Press, 2002.
7. P. Ghosh, Polymer Science & Technology, Tata McGraw-Hill Education, 1991.

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1. V.K. Ahluwalia**,** Green Chemistry, Narosa Publishing House Pvt. Ltd., New Delhi, Reprint 2013.
2. R. Silverstein, M., Bassler, G. C., Morrill, T. C. Spectrometric Identification of Organic Compounds , John Wiley and Sons, INC, Fifth edition, 1991.
3. W.Carruthers, Modern methods of Organic Synthesis, 4th edition, Cambridge University Press, 2004.
4. R.B. Seymour & C.E. Carraher, Polymer Chemistry: An Introduction, Marcel Dekker,Inc. New York, 1981.
5. D. L. Pavia et al, Introduction to Spectroscopy, 5th Edition, Cengage Learning India Ed. 2015.

E-RESOURCES:

1.www.epgpathshala.nic.in
2.www.nptel.ac.in
3.http:/swayam.gov.in
4.Virtual Textbook of Organic Chemistry
5.https://vlab.amrita.edu/

Mapping of COs with POs:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**
CO1	3	3	0	1	2	2	0	0	3	3	3
CO2	3	3	0	1	2	2	0	0	3	3	3
CO3	3	3	0	1	2	2	0	0	3	3	3
CO4	3	3	0	1	2	3	0	0	3	3	3
CO5	3	3	0	1	2	3	0	0	3	3	3
Total	15	15	0	5	10	12	0	0	15	15	15
Scaled Value	3	3	0	1	2	3	0	0	3	3	3

1 – 5 →1, 6 – 10→ 2, 11 – 15→ 3

0-No Relation, 1- Low Relation, 2-Medium Relation, 3-High Relation

COURSECODE	XCY602	L	T	P	SS	C
COURSENAME	INORGANICCHEMISTRY II	3	1	0	0	4
C:P:A	3.2:0:0.8	L	T	P	SS	H
		3	1	0	0	4

COURSEOUTCOMES		DOMAIN	LEVEL
CO1	***Discuss*** the various compounds of halogens and carbon.	Cognitive	Remember Understanding
CO2	***Explain*** the importance of tracer elements on biological system and the metal ion transport, Bohr effect, Na, K, Ca pump.	Cognitive Affective	Understanding Receiving
CO3	***Describe*** the function of Vitamin B_{12}, Zn-Cu enzyme, ferredoxin, cluster enzymes.	Cognitive Affective	Understanding Receiving
CO4	***Classify*** and ***predict*** the structures of various silicates.	Cognitive Affective	Apply Receiving
CO5	***Demonstrate*** the manufacturing processes of refractories, explosives, paints and pigments	Cognitive Affective	Understanding Receiving Responding

UNITI-UNITI-HALOGENS,CARBONANDNOBLEGAS COMPOUNDS **10+3**

Halogens -General trends in the properties of halogens – deviation of fluorine from other elements of the group. Preparation of fluorine – properties of fluorine – hydrogen fluoride –oxides of halogens– preparation properties and uses of hydrogen halides, oxyacids of halogens–freons. Interhalogen Compounds**:**XY,XY_3,XY_5 and XY_7 types and their structure.Pseudohalogens and pseudohalides definition with exmples.Inorganic Carbon Compounds:Types of **c**arbides - Covalent, ionic and interstitial carbides with suitable examples–oxides of carbon– oxyacids of carbon– carbonates– fullerenes. Noble gas compounds: preparation and properties of xenon fluorides and oxyfluoride and krypton fluoride.

UNITII –BIOINORGANIC CHEMISTRY **9+3**

Essential and trace elements: Role of Na^+, K^+, Mg^{2+}, Ca^{2+}, Fe^{3+}, Cu^{2+} and Zn^{2+} in biological systems. Effect of excess intake (Toxicity) of Metal ions – trace elements - As, Cd, Pb, Hg. Metal ion transport and storage: Iron – storage, transport - Transferrin and Ferretin; Iron-porphyrins –myoglobin, haemoglobin – oxygen transport - Bohr effect; Sodium/potassium pump, calcium pump; transport and storage – copper and zinc.

UNITIII-METALLO ENZYMES **10+3**

Isomerase and synthetases, structure of cyanocobalamin (Vitamin B12), nature of Co-C bond; Metalloenzymes - functions of carboxy peptidase A, zinc metalloenzyme – mechanism and uses, Zn-Cu enzyme -structure and function, carbonic anhydrase, Vitamin B-12 as transferase and isomerase - Iron-sulphur proteins - 2Fe-2S – rubredoxin, 4Fe-2S –ferridoxin, Iron sulphur cluster enzymes.Invivo and Invitro nitrogen fixation – biological functions of nitrogenase and molybdo enzymes.

UNITIV–SILICATES **6+3**

Introduction – general properties of silicates, structure – types of silicates– ortho silicates(zircon), pyrosilicates (thortveitite), chain silicates(pyroxenes), ring silicates(beryl), sheet silicates(talc, mica, asbestos), silicates having three dimensional structure (feldspars,zeolites, ultramarines)

UNIT V INDUSTRIAL APPLICATIONS OF INORGANIC COMPOUNDS **10+3**

Refractories, pyrochemical, explosives. Alloys, Paints and pigments - requirements of a good paint; classification, constituents of paints – pigments, vehicles, thinners, driers, extenders, anti-knocking agents,vanti-skinning agents, plasticizers, binders-application; varnishes- oils, spirit; enamels. Nanocomposite Hydrogels: synthesis, characterization and uses. Industrial visits and internship mandatory.

	LECTURE	TUTORIAL	PRACTICAL	SELFSTUDY	TOTAL
HOURS	**45**	**15**	**0**	**0**	**60**

TEXTBOOKS

1. Lee J.D.,Concise Inorganic Chemistry, UK, Black well science (2006).
2. W. U. Malik, G. D. Tuli, and R. D. Madan: Selected Topic in Inorganic Chemistry, S. Chand & Company Ltd, New Delhi, 1998.
3. A. K. De, Text book of Inorganic Chemistry, Wiley East Ltd, seventh edition, 1992
4. PuriB.R..,Sharma L.R., KaliaK.K.,Principles of Inorganic Chemistry, (23rd edition), NewDelhi, ShobanLalNagin Chand & Co., (2003).
5. P.L. Soni, Text book of Ionrganic Chemistry, 20thedn, Sultan chand& Sons, 2000
6. R. D. Madan, Modern Inorganic Chemistry, 3rdedn, S. Chand & Company Ltd., Reprint 2014.

REFERENCES

1. Day,J.SelbinandH.H.Sisler,Theoretical Inorganic Chemistry; Literary Licensing(LLC), Montana, 2012.
2. N. H. Ray, Inorganic Polymers, Academic Press, 1978.
3. F.A.Cotton and G.Wilkinson, C.A.Murillo and M.Bochmann, Advanced Inorganic Chemistry; 6thEd., A Wiley - Interscience Publications, John Wiley and Sons,USA, 1999.
4. J.E.Huheey,Inorganic Chemistry;4th Ed.,Harper and Row publisher, Singapore,2006.
5. Alan G. Sharp (1992), Inorganic Chemistry, 3rd Edition, Addition-Wesley, England

E-RESOURCES:

1.www.epgpathshala.nic.in
2. www.nptel.ac.in
3. http:/swayam.gov.in

Mapping of COs with POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO1	3	3	0	1	2	2	0	0	3	3	3
CO2	3	3	0	1	2	2	0	0	3	3	3
CO3	3	3	0	1	2	2	0	0	3	3	3
CO4	3	3	0	1	2	3	0	0	3	3	3
CO5	3	3	0	1	2	3	0	0	3	3	3
Total	15	15	0	5	10	12	0	0	15	15	15
Scaled Value	3	3	0	1	2	3	0	0	3	3	3

1 – 5 →1, 6 – 10→ 2, 11 – 15→ 3

0-No Relation, 1- Low Relation, 2-Medium Relation, 3-High Relation

COURSECODE	XCY603	L	T	P	SS	C
COURSENAME	PHYSICAL CHEMISTRY II	3	1	0	1	4
C:P:A	3.6:0:0.4	L	T	P	SS	H
		3	1	0	1	5

COURSEOUTCOMES		DOMAIN	LEVEL
CO1	***Classify*** the different phase rule systems and ***explain*** the physical properties of solutions	Cognitive Affective	Understanding Receiving
CO2	***Apply*** the concepts of chemical equilibrium in dissociation, formation and decomposition of some chemical compounds and also ***demonstrate*** important principles such as Le chatelier principle, van't Hoff reaction isotherm and Clausius-Clayperon equation.	Cognitive Affective	Remember Apply Receiving
CO3	***Identify*** the symmetry elements and the point group of the chemical molecules	Cognitive Affective	Understanding Receiving
CO4	***Explain*** the significance of Arrhenius theory, Debye-Huckel theory, Onsager equation and Kohlrausch's law in conductance.	Cognitive Affective	Remember Understanding Receiving
CO5	***Demonstrate*** the applicationof various electrochemical cells	Cognitive Affective	Understanding Apply Receiving

UNIT I-PHASE RULE AND SOLUTION **10+3**

Phase Rule: Concepts of phase, component and degrees of freedom, with examples. Gibb's phase rule – derivation. One-component system: Phase diagrams: Water and sulphur systems. Two component system: (i) Simple eutectic: Lead-silver system- Formation of compound with congruent melting point: Ferric chloride – water system.

Ideal solutions: Ideal solutions and Raoult's law, deviations from Raoult's law – non-ideal solutions. Distillation of solutions. Azeotropes. Partial miscibility of liquids- Critical solution temperature; effect of impurity on partial miscibility of liquids - Principle of steam distillation. Nernst distribution law and its applications. Colligative properties- elevation of boiling point, depression in freezing point – Abnormal behavior of solutions of electrolytes.

UNIT II-CHEMICALEQUILIBRIUM **8 +3**

Law of mass action – thermodynamic derivation – relationship between Kp and Kc –application to the homogeneous equilibria – dissociation of PCl_5 gas,N_2O_4 gas –equilibrium constant and degree of dissociation -formation of HI, NH_3 ,and SO_3 –heterogeneous equilibrium decomposition of solid calcium carbonate –Lechatelier principle – van't Hoff reaction isotherm – temperature dependence of equilibriumconstant – van't Hoff reaction isochore – Clayperon equation –ClausiusClayperon equation and its applications

UNIT III–GROUP THEORY **9+3**

Symmetry elements – symmetry operations – various point groups with examples – point groups – identification and determination – comparison of molecular and crystallographic symmetry-group multiplication table-Matrix representation of symmetry operations

UNIT IV–ELECTRICAL CONDUCTANCE AND TRANSFERENCE **10+3**

Arrhenius theory of electrolytic dissociation – Ostwald's dilution law, limitations of Arrhenius theory; behavior of strong electrolytes – interionic effects – Debye Huckel theory –Onsager equation (no derivation), significance of Onsager equation, Debye Falkenhagen effect, Wien effect. Ionic mobility – Discharge of ions on electrolysis (Hittorf's theoretical device), transport number –determination – Hittorf's method, moving boundary method – factors affecting transport number – determination of ionic mobility; Kohlrausch's law applications; molar ionic conductance and viscosity (Walden's rule); applications of

conductance measurements – determination of – degree of dissociation of weak electrolyte, dissociation constant of weak acid and weak base, ionic product of water, solubility and solubility product of sparingly soluble salts - conductometric titrations – acid base titrations.

UNIT V-GALVANIC CELLS AND APPLICATIONS	**8+3**

Galvanic cells – reversible and irreversible electrodes-emf and its measurement – types of electrodes –Derivation of Nernstt equation for electrode potential and cell emf-electrochemical series and its applications – liquid junction potential -Applications of emf measurement – determination of pH using glass electrodes – potentiometric titrations. Applications of concentration cells – storage cells : lead acid battery, Ni-Cd, Li-Fe battery – mechanism of discharging and recharging – fuel cells (H_2-O_2).

	LECTURE	**TUTORIAL**	**PRACTICAL**	**SELFSTUDY**	**TOTAL**
HOURS	**45**	**15**	**0**	**0**	**60**

TEXTBOOKS

1.Puri B.R., Sharma L.R and Pathania M.S., Principles of Physical Chemistry, 47thed., Vishal Publishing Company, 2016

2. Sharma .K.K, Sharma.L.K. A Text book on physical Chemistry, 6thed., Sultan Chand, 2016

3. MaronS.H.andLando J.B. Fundamentals of Physical Chemistry, Macmillan.

4. Glasstone S. and Lewis. D., Elements of Physical Chemistry. Macmillan

5.ArunBahl, B.S. Bahl, G. D. Tuli Essentials of physical chemistry, 28th edition 2019, S,Chand & Co.

REFERENCES

1. J. N. Gurtu and A. Gurtu, Advanced Physical Chemistry; 5th Ed., PragathiPrakashan, Meerut, 2006.

2. J. I. Steinfeld, J. S. Francisco and W. L. Hase, Chemical Kinetics and Dynamics; 2nd Ed., Prentice Hall, New Jersey, 1999.

3. P. W. Atkins, Physical Chemistry; 7th Ed

4. D. A. McQuarrie, Text Book of Physical Chemistry, University Science Books, Mill Valley, California, 1983.

5. R. A. Alberty and R. J. Silbey, Physical Chemistry, John Wiley and Sons, New York, 1992.

E-RESOURCES:

1. https://nptel.ac.in
2. https://swayam.gov.in
3. www.epgpathshala.nic.in
4. https://archive.nptel.ac.in/content/storage2/courses/112108150/pdf/PPTs/MTS_07_m.pdf

Mapping of COs with POs:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**
CO1	3	3	0	1	2	2	0	0	3	3	3
CO2	3	3	0	1	2	2	0	0	3	3	3
CO3	3	3	0	1	2	2	0	0	3	3	3
CO4	3	3	0	1	2	3	0	0	3	3	3
CO5	3	3	0	1	2	3	0	0	3	3	3
Total	15	15	0	5	10	12	0	0	15	15	15
Scaled Value	3	3	0	1	2	3	0	0	3	3	3

1 – 5 →1, 6 – 10→ 2, 11 – 15→ 3

0-No Relation, 1- Low Relation, 2-Medium Relation, 3-High Relation

COURSE CODE	XCY604	L	T	P	SS	C
COURSE NAME	RENEWABLE ENERGY	2	1	0	0	3
C: P: A	2.5:0:0.5	L	T	P	SS	H
		2	1	0	0	3

COURSE OUTCOMES		Domain	Level
CO1	***Describe*** the reserves of renewable energy and demand of energy needs.methodologies / technologies for effective utilization of renewable energy sources.	Cognitive	Remember
CO2	***Explain*** the methodology to harness solar energy and its applications.	Cognitive Affective	Understand Apply Receive
CO3	***Examine*** the potential of wind energy and its techniques.	Cognitive Affective	Understand Receive
CO4	***Recognize*** the significance of bio energy generation **.**	Cognitive Affective	Apply Respond
CO5	***Interpret*** the effective technology of various renewable energy resources.	Cognitive	Understand

UNIT I	INTRODUCTION TO ENERGY	3+6+3

World Energy Use – Reserves of Energy Resources – Environmental Aspects of Energy Utilisation – Renewable Energy Scenario in Tamil nadu, India and around the World – Potentials – Achievements / Applications – Economics of renewable energy systems.

UNIT II	SOLAR ENERGY	3+6+3

Solar Radiation – Measurements of Solar Radiation – Flat Plate and Concentrating Collectors – Solar direct Thermal Applications – Solar thermal Power Generation – Fundamentals of Solar Photo Voltaic Conversion – Solar Cells – Solar PV Power Generation – Solar PV Applications.

UNIT III - WIND ENERGY **3+6+3**

Wind Data and Energy Estimation – Types of Wind Energy Systems – Performance – Site Selection – Details of Wind Turbine Generator – Safety and Environmental Aspects.

UNIT IV - BIO – ENERGY **3+6+3**

Biomass direct combustion – Biomass gasifiers – Biogas plants – Digesters – Ethanol production – Bio diesel – Cogeneration – Biomass Applications

UNIT V - OTHER RENEWABLE ENERGY SOURCES **3+6+3**

Tidal energy – Wave Energy – Open and Closed OTEC Cycles – Small Hydro-Geothermal Energy – Hydrogen and Storage – Fuel Cell Systems – Hybrid Systems.

LECTURE	TUTORIALS	SELF STUDY	PRACTICALS	TOTAL
15	0	15	30	60

TEXT BOOKS

1. Rai. G.D., "Non Conventional Energy Sources", Khanna Publishers, New Delhi, (2011).
2. Twidell, J.W. & Weir, A., "Renewable Energy Sources", EFN Spon Ltd., UK, (2006).

REFERENCES

1. Sukhatme. S.P., "Solar Energy", Tata McGraw Hill Publishing Company Ltd., New Delhi, (1997).
2. Godfrey Boyle, "Renewable Energy, Power for a Sustainable Future", Oxford University Press, U.K., (1996).
3. Tiwari. G.N., Solar Energy – "Fundamentals Design, Modelling & Applications", Narosa

Mapping of COs with POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO1	1	0	0	3	0	3	0	1	1	0	1
CO2	1	0	0	3	0	3	0	1	1	0	1
CO3	1	0	0	3	0	3	0	1	1	0	1
CO4	1	0	0	3	0	3	0	1	1	0	1
CO5	1	0	0	3	0	3	0	1	1	0	1
Total	5	0	0	15	0	15	0	5	5	0	5
Scaled Value	1	0	0	3	0	3	0	1	1	0	1

1 – 5 →1, 6 – 10→ 2, 11 – 15→ 3

0-No Relation, 1- Low Relation, 2-Medium Relation, 3-High Relation

COURSE CODE	XCY605A	L	T	P	SS	C
COURSE NAME	NANOSCIENCE	2	1	0	0	3
C: P: A	2.5:0:0.5	L	T	P	SS	H
		2	1	0	0	3

COURSE OUTCOMES		Domain	Level
CO1	***Explain*** the general concepts and physical phenomena of relevance within the field of nanoscience.	Cognitive	Understand
CO2	***Describe*** the properties, synthesis, characteristics of nanomaterials, special nanomaterials and applications.	Cognitive Affective	Understand Receive
CO3	***Illustrate*** the structure, properties, applicability and characterization of nanomaterials.	Cognitive Affective	Understand Apply Receive
CO4	***Analyze*** the various synthesis procedures, characterizations and uses of carbon nanotubes,fullerene and graphene	Cognitive Affective	Apply Respond
CO5	***Discuss*** applications of nanomaterials of sensors and in optics and electronics	Cognitive Affective	Understand Receive

UNIT I - INTRODUCTION TO NANOSCIENCE **3+6+3**

Definition of terms – nanoscience, nanoparticles, clusters, quantum dots, nanostructures and nanocomposites. Electron behaviour in free space, bulk material and nanomaterials. Synthesis and stabilization of nanomaterialsTop down approach(physical methods), mechanical dispersion – ball milling, methods based on evaporation of a precursor-inert gas condensation, ion sputtering, spray pyrolysis, aerosol synthesis-nanolithography. Bottom–up approach (chemical methods) - solvothermal synthesis, photochemical method, gamma radiolysis, sonochemical synthesis, electro deposition, sol-gel method, nanomaterials via chemical routes- solvents reducing agents, capping agents-stabilization of nanoparticles -electrostatic and steric stabilization, common stabilizers, nanoparticle growth in solution, templated growth, Langmuir – Blodgett (L-B) method, reverse micelles-emulsion method.

UNIT II - PROPERTIES OF MATERIALS ON A NANOSCALE **3+6+3**

Optical properties of metal and semiconductor nanomaterials- surface Plasmon resonance (SPR), surface enhanced Raman spectra (SERS), quantum confinement effect, tuning of optical spectrum. Magnetic properties - Fe_3O_4 particle, supra magnetic properties, electronic properties, Chemical properties-chemical process on the surface of nanoparticles, catalysis, mechanical properties.

UNIT III - TECHNIQUES EMPLOYED FOR CHARACTERISATION OF NANOMATERIALS **3+6+3**

Spectrocopy – UV-visible, Photoelectron spectroscopy – Electron microscopy – Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM), Scanning probe microscopy (SPM) – Atomic Force Microscopy (AFM), Scanning Tunneling Microscopy (STM), Optical microscopy – confocal microscopy, X-ray diffraction (XRD) [Principle and Block diagram only].

UNIT IV - SPECIAL NANOMATERIALS **3+6+3**

Carbon Nano Structures Carbon nanotubes: Introduction - types - zigzag, armchair, helical, synthesis by CVD, Functionalization of Carbon Nanotubes, Reactivity of Carbon Nanotubes, Field emission, Fuel Cells, Display devices. Other Important Carbon based materials: Preparation and Characterization Fullerene, Graphene, properties, DLC and nanodiamonds and Applications. Semiconductor nanoparticles: Quantum dots, synthesis – chemical synthesis using clusters, properties, porous silicon – electrochemical etching, aerogel – types – silica aerogel, resorcinol formaldehyde (RF) aerogels, zeolites – applications. Self Assembled Nanomaterials: Self Assembled Monolayers (SAMS) – inorganic, organic molecules.

UNIT V - APPLICATION OF NANOMATERIALS				3+6+3
Biomedical Applications- drug, drug delivery, biolabelling, artificial implants, cancer treatment. Sensors – Natural nanoscale sensors, chemical sensors, biosensors, electronic noses. Optics & Electronics – Nanomaterials in the next generation computer technology, high definition TV, flat panel displays, quantum dot laser, single electron transistors [SET]. Nanotechnology in agriculture – Fertilizer and pesticides nanomaterials for water purification, nanomaterials in food and packaging materials, fabric industry.				
LECTURE	**TUTORIALS**	**SELF STUDY**	**PRACTICALS**	**TOTAL**
15	**0**	**15**	**30**	**60**

TEXT BOOKS

1. Sulabha K. Kulkarni, *Nanotechnology: Principles and Practices*,Capital Publishing Co., New Delhi.
2. Pradeep. T, *Nano: The Essentials, Understanding Nanoscience and Nanotechnology*; Tata McGraw-Hill Publishing Company Limited,NewDelhi, 2007.
3. Shah. M.A.; Tokeer Ahmad, *Principles of Nanoscince and Nanotechnology*; Narosa Publishing House, New Delhi, 2010.
4. Murthy. B.S; Shankar. P, Baldev Raj.; Rath. B.B. JamesMurday, *Textbook of Nanoscience and Nanotechnology*;Universities press,India Ltd ,Hyderabad. 2012.

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1. Sharma. P.K., *Understanding Nanotechnology*; Vista InternationalPublishing House, Delhi. 2008.
2. Charles P. Poole Jr.; Frank J. Owens. *Introduction to Nanotechnology;* A John Wiley & Sons, INC., Publication, 2003.
3. Viswanathan B., *Nano Materials;*Narosa Publishing House, NewDelhi, 2009.
4. Edited by C.N.R. Rao; Mu¨ller.A; Cheetham, A.K.*Nanomaterials Chemistry Recent Developments and New Directions*, WILEY-VCHVerlag GMBH & Co.,KGaA, Darmstad.
5. Jing Zhong Zhang, *Optical properties and spectroscopy of Nanomaterials*; World Scientific Publishing Pvt. Ltd., Singapore.

E RESOURCES

1. http://www.nanotechnology.com/docs/wtd015798.pdf
2. http://nccr.iitm.ac.in/Nanomaterials.pdf

Mapping of COs with POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO1	1	0	0	3	0	3	0	1	1	0	1
CO2	1	0	0	3	0	3	0	1	1	0	1
CO3	1	0	0	3	0	3	0	1	1	0	1
CO4	1	0	0	3	0	3	0	1	1	0	1
CO5	1	0	0	3	0	3	0	1	1	0	1
Total	5	0	0	15	0	15	0	5	5	0	5
Scaled Value	1	0	0	3	0	3	0	1	1	0	1

1 – 5 →1, 6 – 10→ 2, 11 – 15→ 3

0-No Relation, 1- Low Relation, 2-Medium Relation, 3-High Relation

COURSE CODE	XCY605B	L	T	P	SS	C
COURSE NAME	PHARMACEUTICAL CHEMISTRY	2	1	0	0	3
C:P:A	2.5:0:0.5	L	T	P	SS	H
		2	1	0	0	3

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	***Explain*** the basic concepts and aims of pharmaceutical chemistry	Cognitive	Understand
CO2	***Identify*** the role of drugs and its preparation.	Cognitive Affective	Apply Receive Respond
CO3	***Describe*** the antibiotics role pharmaceuticals in our life.	Cognitive	
CO4	***Recognise*** fermentation Aerobic and anaerobic fermentation in daily process.	Cognitive Affective	Understand
CO5	***Describe*** the important medicinal plant and its actions..	Cognitive	Remember Understand

UNIT I - BASIC CONCEPTS OF PHARMACEUTICAL CHEMISTRY	6
Basic concepts and aims of pharmaceutical chemistry- Terms and Definitions -drug, pharmacophore,pharmacology, pharmacopoeia, chemotherapy – Biological activities and examples -bacteria, virus, and vaccine. Causes, symptoms and drug for anemia, jaundice, cholera, alaria and filarial. Indian Medicinal plants and uses – Tulasi, Neem, Kizhanelli, Mango, Semparuthi, Adadodai and Thoothvelai.	
UNIT II - ANTIBACTERIALS	**6**
Sulpha drugs-examples and actions-prontosil, sulphathiazole, sulphafurazole. Antibiotics-definition and action of penicillin, streptomycin, chloramphenicol, erythromycin-tetracyclin –Antiseptics and disinfectans – definition and distinction – phenolic compounds, chlorocompounds and cationic surfactant	
UNIT III - ANALGESICS AND CNS STIMULANT	**6**
Analgesics: Definition and Actions – narcotic and non narcotic – morphine and its derivatives, Antipyretic analgesics - salicylic derivative, paracetamol, ibuprofen. Drugs affecting CNS – Definition, distinction and examples for tranquilisers, sedatives, hypnotics, psychedelic drugs – LSD, Hashish – their effects.	
UNIT IV - ANASTHETICS AND DRUGS FOR CHRONIC DISEASES	**6**
Anaesthetics - definition – local and general – volatile nitrous oxide, ether, Chloroform, cyclo propane – uses and disadvantages – non – volatile intravenous – thiopental sodium, methohexitone, Causes, medicines and their mode of action for the treatment of cancer – antineoplastics – diabetes –Blood: Grouping, composition, Rh factor, blood pressure, hyper tension and hypotension. COVID19.	
UNIT V - VITAMINS, HARMONES AND ENZYMES	**6**
Vitamins – fat soluble vitamins – (i) vitamin A; (ii) vitamin D; (iii) vitamin B complex; (iv) vitamin C; (V) vitamin E; (vi) vitamin K; (vii) vitamin P. Hormones – Introduction, properties, Physiological function of some harmones:, oxytoxin, insulin, Enzymes – Chemical nature of enzymes, classification of enzymes, properties of enzymes, mechanism of enzyme action. Action of Co-enzymes.	

	LECTURE	TUTORIAL	PRACTICAL	SELF STUDY	TOTAL
HOURS	30	15	0	0	45

TEXT BOOKS

1. G.L. Patrick: Introduction to Medicinal Chemistry, Oxford University Press, UK.
2. Hakishan, V.K. Kapoor: Medicinal and Pharmaceutical Chemistry, Vallabh Prakashan,Pitampura, New Delhi.

REFERENCES
1. William O. Foye, Thomas L., Lemke , David A. William: Principles of Medicinal Chemistry, B.I. Waverly Pvt. Ltd. New Delhi.

Mapping of COs with POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO1	1	0	0	3	0	3	0	1	3	0	2
CO2	1	0	0	3	0	3	0	1	3	0	2
CO3	1	0	0	3	0	3	0	1	3	0	2
CO4	1	0	0	3	0	3	0	1	3	0	2
CO5	1	0	0	3	0	3	0	1	3	0	2
Total	5	0	0	15	0	15	0	5	15	0	10
Scaled Value	1	0	0	3	0	3	0	1	3	0	2

1 – 5 →1, 6 – 10→ 2, 11 – 15→ 3

0-No Relation, 1- Low Relation, 2-Medium Relation, 3-High Relation

COURSE CODE	XCY605C	L	T	P	SS	C
COURSE NAME	POLYMER SCIENCE	2	1	0	0	3
PREREQUISITES	NIL	L	T	P	SS	H
C:P:A	2.5:0:0.5	2	1	0	0	3

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	***Explain*** the chemistry of polymerization.	Cognitive	Understand
CO2	***Describe*** the preparation of individual polymers	Cognitive Affective	Understand Respond
CO3	***Interpret*** their physical properties of polymers and explain the molecular weight and size of polymers.	Cognitive Affective	Understand Apply Respond
CO4	***Recognize*** the polymerization techniques and ***Classify*** the uses of polymers.	Cognitive	Analyze
CO5	***Summarize*** the processing of polymers	Cognitive	Remember Understand

UNIT I - CLASSIFICATION OF POLYMERS AND CHEMISTRY OF POLYMERISATION **10+3**

Classification of Polymers, linear polymers, non-linear or branched polymers, cross – linked polymers, homo chain hetero chain, homopolymers co-polymers block polymers and graft polymers. Chemistry of polymerization: Types of polymerization – mechanism – chain, growth, co-ordination, ring opening, metathetical, group transfer, polyaddition and polycondensation polymerizations.

UNIT II - INDIVIDUAL POLYMERS **10+3**

Individual Polymers: Monomers required general methods of preparation, repeat units and uses of the following polymers and resins, polystyrene, polyacrylonitrile, polymethyl, methacrylate, Polytetra – fluoroethylene, polybutadienes and polychloroprene, polyesters, polycarbonates, polyimides, polyamides (Kevlar), polyurethanes, polyethylene, glycols, phenol – formaldehyde, urea – formaldehyde, melamine – formaldehyde and epoxy resins.

UNIT III - PROPERTIES OF POLYMERS **10+3**

Intrinsic properties – processing properties – basic idea of isomerism of polymers – configuration of polymer chain – geometrical structure – syndiotatic, isotatic and atatic polymers. Glass transition temperature: Definition – factors affecting glass transition temperature – relationships between glass transition temperature and (a) molecular weight, (b) melting point and (c) plasticizer – importance of glass transition temperature – heat distortion temperature. Molecular weight and size of polymers: Number average, weight average, sedimentation and viscosity average molecular weights – molecular weights and degree of polymerization – poly dispersity – molecular weight distribution in polymers – size of polymer molecules – kinetics of polymerization.

UNIT IV - POLYMERISATION TECHNIQUES DEGRADATION AND USES OF POLYMERS **8+3**

Polymerisation Techniques: Bulk, solution, suspension, emulsion, melt condensation and interfacial polycondensation polymerizations, Degradation: Types of degradation – thermal, mechanical, ultrasonic and photodegradation – photo stabilizers – oxidative degradation – antioxidants – hydrolytic degradation. Uses of polymers in electronics and biomedicine.

UNIT V - POLYMER PROCESSING **7+3**

Polymer processing: Plastics (thermo and thermosetting), elastomers, fibres, compounding, plasticizers, colorants, flame retardants. Compression and injection moudlings – film extrusion and calendaring –die casting and rotational casting – thermofoaming – reinforcing.					
	LECTURE	**TUTORIAL**	**PRACTICAL**	**SELF STUDY**	**TOTAL**
HOURS	**30**	**15**	**0**	**0**	**45**
TEXT BOOKS					

1. Seymour, R.B. & Carraher, C.E. Polymer Chemistry: An Introduction, Inc. New York, (1981).
2. Odian, G. Principles of Polymerization, 4th Ed. Wiley, (2004).
3. Billmeyer, F.W. Textbook of Polymer Science, 2nd Ed. Wiley Interscience, (1971)..
4. Ghosh, P. Polymer Science & Technology, Tata McGraw-Hill Education, (1991).
5. Lenz, R.W. Organic Chemistry of Synthetic High Polymers, Interscience Publishers, NewYork, (1967).

Mapping of COs with POs:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**
CO1	2	2	0	0	0	1	0	1	1	2	1
CO2	2	2	0	0	0	1	0	1	1	2	1
CO3	2	2	0	0	0	1	0	1	1	2	1
CO4	2	2	0	0	0	1	0	1	1	2	1
CO5	2	2	0	0	0	1	0	1	1	2	1
Total	10	10	0	0	0	5	0	5	5	10	5
Scaled Value	2	2	0	0	0	1	0	1	1	2	1

1 – 5 →1, 6 – 10→ 2, 11 – 15→ 3

0-No Relation, 1- Low Relation, 2-Medium Relation, 3-High Relation

COURSECODE	XCY608	L	T	P	SS	C
COURSENAME	PYTHON FOR CHEMIST	2	0	0	1	2
C:P:A	1.4:0:0.6	L	T	P	SS	H
		2	0	0	1	3

COURSEOUTCOMES:		Domain	Level
CO1	***Explain***the basics of Python	Cognitive	Understand
CO2	***Classify*** the various data analysis methods in Python	Cognitive Affective	Understand Receive
CO3	***Identify*** the various languages related to cheminformatics	Cognitive Affective	Understand Receiving
CO4	***Apply*** Machine Learning on Chemical Data for structre-property relationships in chemical molecules	Cognitive Affective	Apply Respond
CO5	***Use*** Python for ModelingChemicalSystems	Cognitive	Understand Apply

UNIT-IBEGINCODINGINBASEPYTHON **6**

Introduction, NumericalOperations-PracticeProblems. StringOperations: Indexing, PrimerDesignforPolymeraseChain, Reaction, PracticeProblems. Functions: PracticeProblems. ConditionalStatements:BooleanVariables, LogicGates, PracticeProblems. Loops: For Loop-ListComprehension, Iterables, While-Loop,Continue,Break,andPass, PracticeProblems. That'saWrap, ReadTheseNext,

UNIT-II DATAANALYSISINPYTHON **6**

Introduction, Scientific Computing with NumPy: Reshaping, Indexing, Algebra, Application. Pandas for Data Analysis-Loading the Data: Extraction from Raw Data, Exploratory Data Analysis, Data Manipulation-Subsetting, Sorting, Merging. SeabornforVisualization, That'saWrap, ReadTheseNext

UNIT–IIICHEMINFORMATICS **6**

Cheminformatics-Introduction, TheSMILESandSMARTSLanguages-SMILES, SMARTS., RDKit, AtomsandBonds, Reactions, InspectingaDatabase, FindingSubstructures, Fingerprints, MolecularSimilarity, That'saWrap, ReadTheseNext.

UNIT–IVMACHINELEARNINGONCHEMICALDATA **6**

Introduction, Background: Humanβ-Secretase1pIC_{50}. SupervisedLearning:DataPreparation-LoadDataSet,RandomizingtheOrderoftheInstances, DataPartitioning, StandardizingtheFeatures. RegressionofpIC_{50}TrainingtheModel,ModelPerformance,RandomForestRegressor.ClassificationofBACE-1Inhibitor/Noninhibitor: LogisticRegressionClassifier, RandomForestClassifier.Further Discussion Items forSupervisedLearning,:k-foldCrossValidation, HyperparameterSelection,SavingYourWork,UnderstandingYourWorkUnsupervisedLearning:DimensionalityReduction, Clustering, Anomaly(Outlier)Detection. That'saWrap, ReadTheseNext.

UNIT–VMODELINGCHEMICALSYSTEMS	6

Introduction, FileFormats, DynamicModelinginSciPy, AtomicSimulationEnvironmentforStandardInterface-TheAtomsObject,Calculators, GeometryOptimization. ProteinStructureswithBIOPYTHON-FileI/O, NavigatingProteinStructure, Application. That'saWrapReadTheseNext.

LECTURE	TUTORIALS	PRACTICALS	SELFSTUDY	TOTAL
30	0	0	0	30

TEXTBOOKS

1. M. Kanagasabapathy, Python for Chemistry,An introduction to Python algorithms, Simulations, and Programing for Chemistry, (2023),BPB Publications.

REFERENCES

1. Diego Sierra-CostaKenneth M. Merz Jr.*Python for Chemists*; American Chemical Society, 2022. DOI: 10.1021/acsinfocus.7e5030

ERESOURCES

Available at http://www-mitchell.ch.cam.ac.uk/noel/
– http://www.enthought.com/

Mapping of COs with POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO1	1	0	0	1	2	2	3	2	3	0	1
CO2	1	0	0	1	2	2	3	2	3	0	1
CO3	1	0	0	1	2	2	3	2	3	0	1
CO4	1	0	0	1	2	3	3	2	3	0	1
CO5	1	0	0	1	2	3	3	2	3	0	1
Total	5	0	0	5	10	12	15	10	15	0	5
Scaled Value	1	0	0	1	2	3	3	2	3	0	1

1 – 5 →1, 6 – 10→ 2, 11 – 15→ 3

0-No Relation, 1- Low Relation, 2-Medium Relation, 3-High Relation

COURSE CODE	XUM005	L	T	SS	C
COURSE NAME	CYBER SECURITY	1	0	1	1
C:P:A	0.8:0:0.2	L	T	SS	H
		1	0	1	2

COURSE OUTCOMES On the successful completion of this course students would able to		Domain	Level
CO1	***Understand*** the fundamentals of Cyber Security and the technologies.	Cognitive	Understand
CO2	***Understand*** the organizational structure of Cyber security	Cognitive	Understand
CO3	***Understand*** the Cyber Security policy development	Cognitive	Understand
CO4	***Understand*** the Indian IT act and the initiatives	Cognitive	Understand
CO5	***Understand*** and ***Apply*** the Cyber security practices	Cognitive	Understand and Apply

UNIT – I: INTRODUCTION	**6**
Cyber Security – Cyber Security policy – Domain of Cyber Security Policy – Laws and Regulations – Enterprise Policy – Technology Operations – Technology Configuration – Strategy Versus Policy – Cyber Security Evolution – Productivity – Internet – E commerce – Counter Measures – Challenges	
UNIT – II: CYBER SECURITY OBJECTIVES AND GUIDANCE	**6**
Cyber Security Metrics – Security Management Goals – Counting Vulnerabilities – Security Frameworks – E Commerce Systems – Industrial Control Systems – Personal Mobile Devices – Security Policy Objectives – Guidance for Decision Makers – Tone at the Top – Policy as a Project– Cyber Security Management – Arriving at Goals – Cyber Security Documentation – The Catalog Approach – Catalog Format – Cyber Security Policy Taxonomy.	
UNIT – III: CYBER SECURITY POLICY CATALOG	**6**
Cyber Governance Issues – Net Neutrality – Internet Names and Numbers – Copyright and Trademarks – Email and Messaging – Cyber User Issues – Malvertising – Impersonation – Appropriate Use – Cyber Crime – Geo location – Privacy – Cyber Conflict Issues – Intellectual property Theft – Cyber Espionage – Cyber Sabotage – Cyber Welfare– Computer Forensics – Steganography	
UNIT – IV:CYBER SECURITY INITIATIVES AND IT ACT	**6**
Counter Cyber Security Initiatives in India, Cyber Security Excercsie, Cyber Security Incident Handling, Cyber Security Assurance, IT Act, Hackers–Attacker–Counter measures ,Web Application Security , Digital Infrastructure Security ,Defensive Programming. Traditional Problems Associated with Computer Crime, Introduction to Incident Response.	
UNIT – V: SECURITY PRACTICES	**6**
Guidelines to choose web browsers, Securing web browser ,Antivirus ,Email security ,Guidelines for setting up a Secure password ,Two–steps authentication ,Password Manager ,Wi–Fi Security ,Guidelines for social media security ,Tips and best practices for safer Social Networking. Basic Security for Windows, User Account Password Introduction to mobile Smartphone Security ,Android Security ,IOS Security Online Banking Security ,Mobile Banking Security ,Security of Debit and Credit Card ,UPI Security Security of Micro ATMs e–wallet Security Guidelines Security Guidelines for Point of Sales(POS)	

HOURS	LECTURE	TUTORIAL	TOTAL

	30	**0**	**30**

TEXT BOOKS

1. Jennifer L. Bayuk, J. Healey, P. Rohmeyer, Marcus Sachs , Jeffrey Schmidt, Joseph Weiss "Cyber Security Policy Guidebook" John Wiley & Sons 2012.
2. Rick Howard "Cyber Security Essentials" Auerbach Publications 2011.
3. Cyber Laws & Information Technology, JothiRathan,VijayRathan,Bhrath Pubishers,7th Edition January 2019.

REFERENCE BOOKS

1.Modern Cyber security Practices by Pascal Ackerman, BPB Publications,2020
2. Dan Shoemaker Cyber security The Essential Body Of Knowledge, 1st ed. Cengage Learning 2011
3. Rhodes–Ousley, Mark, "Information Security: The Complete Reference", Second Edition, McGraw–Hill, 2013.

E–REFERENCES

1. https://www.coursera.org/specializations/cyber–security
2. www. nptel.ac.in
3. http://professional.mit.edu/programs/short–programs/applied–cybersecurityhttps://us.norton.com/internetsecurity–how–to–cyber–security–best–practices–for–employees. html
4. https://www.meity.gov.in/content/cyber–laws

Mapping of COs with POs

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2
CO1	0	0	0	1	1	1	1	0	1	0	1
CO2	0	0	0	1	1	1	1	0	1	0	1
CO3	0	0	0	1	1	1	1	0	1	0	1
CO4	0	0	0	1	1	1	1	0	1	0	1
CO5	0	0	0	1	1	1	1	0	1	0	1
Total	0	0	0	5	5	5	5	0	5	0	5
Scaled to 1, 2, 3	0	0	0	**1**	**1**	**1**	**1**	0	**1**	0	**1**

0 – No relation 1– Low relation 2– Medium relation 3 – High relation