S M V E C
SCHOOL OF ARTS AND SCIENCE
(Approved by Government of Puducherry, Affiliated to Pondicherry University)
Madagadipet, Puducherry - 605107

BACHELOR OF SCIENCE
IN
CHEMISTRY

ACADEMIC REGULATIONS 2023
(R-2023)
CURRICULUM AND SYLLABI

COLLEGE VISION AND MISSION

Vision

To be globally recognized for excellence in quality education, innovation and research for the transformation of lives to serve the society.

Mission

M1: Quality Education:

To provide comprehensive academic system that amalgamates the cutting edge technologies with best practices.

M2: **Research and Innovation:**

To foster value based research and innovation in collaboration with industries and institutions globally for creating intellectuals with new avenues.

M3: Employability and Entrepreneurship:

To inculcate the employability and entrepreneurial skills through value and skill based training.

M4: Ethical Values:

To instill deep sense of human values by blending societal righteousness with academic professionalism for the growth of society.

Department of Chemistry

Vision and Mission

Vision

To develop the department as world class centre of excellence in all aspects of higher education and research with an expertise in chemical sciences.

Mission

M1: Quality Education:

To inculcate quality inter-disciplinary training to improve the welfare of humanity.

M2: Practical knowledge:

To provide laboratory training in the field of chemistry in both public and private sectors.

M3: Research:

To educate our students for research to meet the global environmental issues

M4: Knowledge:

To produce graduates of International distinction, committed to integrity, professionalism and lifelong learning by widening their knowledge horizons in range and depth.

STRUCTURE FOR UNDERGRADUATE PROGRAMME

Sl. No	Course Category	Breakdown of Credits
1	Modern Indian Language (MIL)	6
2	English (ENG)	6
3	Discipline Specific Core Courses (DSC)	67
4	Discipline Specific Elective Courses (DSE)	16
5	Inter-Disciplinary courses (IDC)	20
6	Skill Enhancement Courses (SEC)	12
7	Employability Enhancement Courses (EEC*)	--
8	Ability Enhancement Compulsory Courses (AECC)	4
9	Open Elective (OE)	4
10	Extension Activity (EA)	-
11	Internship	3
12	Online certificate Course	-
Total		**138**

SCHEME OF CREDIT DISTRIBUTION – SUMMARY

Sl. No	Course Category	Credits per Semester						Total Credits
		I	II	III	IV	V	VI	
1	Modern Indian Language (MIL)	3	3	-	-	-	-	06
2	English (ENG)	3	3	-	-	-	-	06
3	Discipline Specific Core Courses (DSC)	10	10	10	06	16	15	67
4	Discipline Specific Elective Courses (DSE)	-	-	4	4	4	4	16
5	Inter-disciplinary courses (IDC)	4	4	6	6	-	-	20
6	Skill Enhancement Courses (SEC)	2	2	2	2	2	2	12
7	Employability Enhancement Courses (EEC*)	-	-	-	-	-	-	-
8	Ability Enhancement Compulsory Courses (AECC)	1	1	1	1	-	-	04
9	Open Elective (OE)	-	-	2	2	-	-	04
10	Extension Activity (EA)	-	-	-	-	-	-	-
11	Internship				3			03
12	Online certificate Course	-	-	-	-	-	-	-
Total		**23**	**23**	**25**	**24**	**22**	**21**	**138**

**** EEC will not be included for the computation of "Total of credits as well as CGPA".***
****Modern Indian Languages are to be selected from the list given in Annexure I***

SEMESTER – I										
Sl. No.	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Theory										
1	A23TAT101C/ A23FRT101C	Language – I*	MIL	3	0	0	3	25	75	100
2	A23GET101C	General English I	ENG	3	0	0	3	25	75	100
3	A23CHT101D	General Chemistry - I	DSC	4	0	0	4	25	75	100
4	A23CHT102D	Analytical Chemistry	DSC	4	0	0	4	25	75	100
5	A23MAD103C	Allied Mathematics- I	IDC	3	1	0	4	25	75	100
Practical										
6	A23CHL101D	Volumetric Analysis & Chromatography	DSC	0	0	4	2	50	50	100
Skill Enhancement Course										
7	A23ENSA02C	Soft Skill	SEC	2	0	0	2	100	0	100
Ability Enhancement Compulsory Course										
8	A23AETA01C	Public Administration	AECC	2	0	0	1	100	0	100
Employability Enhancement Course										
9	A23CHC101D	Microsoft Excel	EEC	0	0	4	0	100	0	100
First Semester Total							**23**	**475**	**425**	**900**

Modern Indian Languages are to be selected from the list given in Annexure I

SEMESTER – II										
Sl. No.	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Major Disciplinary Course										
1	A23CHT203D	General Chemistry - II	**MJD**	4	0	0	4	25	75	100
2	A23CHT204D	Physical Chemistry - I	**MJD**	4	0	0	4	25	75	100
Minor Disciplinary Course										
3	A23MAD206C	Allied Mathematics II	**MID**	4	0	0	4	25	75	100
Multi-Disciplinary Course										
4	A23ENSA03C	Communication Skills	**MLD**	3	0	0	3	25	75	100
Ability Enhancement Course										
5	A23TAT202C / A23FRT202C	Tamil -II / French II	**AEC**	2	0	0	2	25	75	100
6	A23GET202C	General English II	**AEC**	2	0	0	2	25	75	100
Skill Enhancement Course										
7	A23CHL202D	Organic Qualitative Analysis Practical	**SEC**	0	0	6	3	50	50	100
Value Added Course										
8	A23VAC201C	Understanding India	VAC	2	0	0	2	100	0	100
9	A23VAC202C	Environmental Studies	**VAC**	2	0	0	2	100	0	100
Employability Enhancement Course										
10	A23CHC202D	Microsoft Excel Expert	**EEC**	0	0	4	0	100	0	100
			Semester Total				26	500	500	1000

Modern Indian Languages are to be selected from the list given in Annexure I

SEMESTER – III										
Sl. No.	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Major Disciplinary Course										
1	A23CHT305D	Organic Chemistry - I	MJD	4	0	0	4	25	75	100
2	A23CHT306D	Inorganic Chemistry - I	MJD	4	0	0	4	25	75	100
Minor Disciplinary Course										
3	A23PHD317C	Allied Physics –I	MID	4	0	0	4	25	75	100
Multi-Disciplinary Course										
4	A23ENM305C	Content Writing	MLD	3	0	0	3	25	75	100
Skill Enhancement Course										
5	A23CHL303D	Inorganic Qualitative Analysis - I	SEC	0	0	6	3	50	50	100
Value Added Course										
6	A23VAC303C	Health and Wellness, Yoga Education, Sports and Fitness	VAC	2	0	0	2	100	0	1 00
Employability Enhancement Course										
7	A23CHC303D	Embedded Systems using Arduino	EEC	0	0	4	0	100	0	100
Third Semester Total							20	350	350	700

SEMESTER – IV										
Sl. No.	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Major Disciplinary Course										
1	A23CHT407D	Organic Chemistry - II	MJD	4	0	0	4	25	75	100
2	A23CHT408D	Agricultural Chemistry	MJD	4	0	0	4	25	75	100
3	A23CHL404D	Inorganic Qualitative Analysis - II	MJD	0	0	6	3	50	50	100
Minor Disciplinary Course										
4	A23PHD418C	Allied Physics –II	MID	4	0	0	4	25	75	100
Project										
5	A23CHP401D	Community Engagement Service	CES	0	0	4	2	100	0	100
Value Added Course										
6	A23VAC404C	Digital Technologies	VAC	2	0	0	2	100	0	100
Employability Enhancement Course										
7	A23CHC404D	Java Programming	EEC	0	0	4	0	100	0	100
Fourth Semester Total							**19**	**375**	**325**	**700**

SEMESTER – V										
Sl. No.	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Major Disciplinary Course										
1	A23CHT509D	Inorganic Chemistry - II	MJD	4	0	0	4	25	75	100
2	A23CHT510D	Physical Chemistry - II	MJD	4	0	0	4	25	75	100
3	A23CHT511D	Applied Chemistry	MJD	4	0	0	4	25	75	100
4	A23CHL505D	Physical Chemistry Practical	MJD	0	0	6	3	50	50	100
Minor Disciplinary Course										
5	A23CHD501D	Food and Preservation Chemistry	MID	4	0	0	4	25	75	100
Internship										
6	A23CHN501D	**Summer Internship**	SKD	0	0	8	4	50	50	100
Fifth Semester Total							**23**	**200**	**400**	**600**

SEMESTER – VI										
Sl. No.	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Major Disciplinary Course										
1	A23CHT612D	Inorganic Chemistry III	MJD	4	0	0	4	25	75	100
2	A23CHT613D	Organic Chemistry III	MJD	4	0	0	4	25	75	100
3	A23CHT614D	Physical Chemistry III	MJD	4	0	0	4	25	75	100
4	A23CHL606D	Industrial Chemistry Practical	MJD	0	0	6	3	50	50	100
Minor Disciplinary Course										
5	A23NDD6XXD	Food Analysis	MID	4	0	0	4	25	75	100
Sixth Semester Total							**19**	**150**	**350**	**500**

SEMESTER – VII										
Sl. No.	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Major Disciplinary Course										
1	A23CHT715D	Industrial Chemistry	MJD	4	0	0	4	25	75	100
2	A23CHT716D / A23CHT717D	Polymer Chemistry/ Advanced Analytical Chemistry	MJD	4	0	0	4	25	75	100
3	A23CHT718D / A23CHT719D	Green Chemistry/ Basic Nano Chemistry	MJD	4	0	0	4	25	75	100
4	A23CHL707D	Gravimetric Analysis and preparation of Organic Compounds Practical	MJD	0	0	6	3	50	50	100
Minor Disciplinary Course										
5	A23NDD7XXD	Food Safety and Sanitation	MID	4	0	0	4	25	75	100
6	A23BTD709D	Basics of Forensic Science	MID	4	0	0	4	25	75	100
Seventh Semester Total							**23**	**175**	**425**	**600**

SEMESTER – VIII										
Sl. No.	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Major Disciplinary Course										
1	A23CHT820D / A23CHT821D / A23CHT822D	Supramolecular Chemistry / Advance Nano Chemistry / Pericyclic & Organic Photo Chemistry	MJD	4	0	0	4	25	75	100
2	A23CHT823D / A23CHT824D / A23CHT825D	Research Methodology / Natural Products & Heterocyclic Compounds / Retrosynthetic Analysis	MJD	4	0	0	4	25	75	100
3	A23CHP802D	Research Project [OR]	Project	0	0	24	12	50	50	300
	A23CHT826D	1. Advanced Topics in Inorganic Chemistry	MJD	4	0	0	4	25	75	100
	A23CHT827D	2. Advanced Topics in Organic Chemistry	MJD	4	0	0	4	25	75	100
	A23CHT828D	3. Advanced Topics in Physical Chemistry	MJD	4	0	0	4	25	75	100
Eighth Semester Total							**20**	**100/ 125**	**200/ 375**	**300 / 500**

Annexure – I

MODERN INDIAN LANGUAGES (MIL)

(FOR THOSE WHO ARE ADMITTED FROM AY 2023-24)

Language I *- Offered in First Semester		
Sl. No.	Course Code	Course Title
1	A23FRT101C	French – I
2	A23HNT101C	Hindi – I
3	A23TAT101C	Tamil – I
Language II ** – Offered in Second Semester		
Sl. No.	Course Code	Course Title
4	A23FRT202C	French – II
5	A23HNT202C	Hindi – II
6	A23TAT202C	Tamil – II

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Department	**TAMIL**	Programme: B.Sc. Chemistry						
Semester	**First**	Course Category Code: **MIL**			*End Semester Exam Type: **TE**			
Course Code	**A23TAT101C**	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**TAMIL – I**	**3**	**0**	**0**	**3**	**25**	**75**	**100**
(Common to	**B.A, B.Sc., BBA., B.COM., BCA., B.COM CS.,)**							

Prerequisite	பன்னிரெண்டாம் வகுப்பில் தமிழை ஒரு பாடமாகப் பயின்றிருக்க வேண்டும்.	
Course Objectives	• செவ்விலக்கிய தன்மை கொண்ட தமிழ்மொழியின் சிறப்பினை எடுத்துரைப்பதாக இப்பாடத்திட்டம் அமைக்கப்பட்டுள்ளது.	
	• இரண்டாயிரம் ஆண்டுகாலத் தமிழின் தொன்மையையும் வரலாற்றையும் அதன் விழுமியங்களையும் பண்பாட்டையும் எடுத்துரைப்பதாக இப்பாடத்திட்டம் அமைக்கப்பட்டுள்ளது.	
	• தமிழ் இலக்கியம் உள்ளடக்கத்திலும், வடிவத்திலும் பெற்றமாற்றங்கள், அதன் சிந்தனைகள், அடையாளங்கள் ஆகியவற்றைக் காலந்தோறும் எழுதப்பட்ட இக்கியங்களின் வழியாகக் கூறுவதற்கு இப்பாடத்திட்டம் அமைக்கப்பட்டுள்ளது.	
	• வாழ்வியல் சிந்தனைகள், ஒழுக்கவியல் கோட்பாடுகள், சமத்துவம், சூழலியல் எனப் பல கூறுகளை மாணவர்களுக்கு எடுத்துரைக்கும் விதத்தில் இப்பாடத்திட்டம் உருவாக்கப்பட்டுள்ளது.	
	• சிந்தனை ஆற்றலைப் பெருக்குவதற்குத் தாய்மொழியின் பங்களிப்பினை உணர்த்த இப்பாடத்திட்டம் அமைக்கப்பட்டுள்ளது.	
Course Outcome	**On completion of the course, the students will be able to**	BT Mapping (Highest Level)
	CO1 இலக்கியங்கள் உணர்த்தும் வாழ்வியல் நெறிமுறைகளைப் பேணி நடத்தல்.	**K3**
	CO2 நமது எண்ணத்தை வெளிப்படுத்தும் கருவியாகத் தாய்மொழியைப் பயன்படுத்துதல்.	**K3**
	CO3 தகவல் தெடர்புக்குத் தாய்மொழியின் முக்கியத்துவத்தை உணர்தல்.	**K2**
	CO4 தாய்மொழியின் சிறப்பை அறிதல்.	**K2**
	CO5 இலக்கிய இன்பங்களை நுகரும் திறன்களை வளர்த்தல்.	**K3**

UNIT-I	**இக்கால இலக்கியம்- மரபுக்கவிதைகள்- புதுக்கவிதைகள்- சிறுகதை**	**Periods: 09**
மரபுக்கவிதைகள் - பாரதியார்-வெள்ளிப் பனிமலையின் மீதுலாவுவோம்... (13 பாடல்கள்)- பாரதிதாசன்-புரட்சிக்கவி (பேரன்புக் கொண்டவரே...முதல் - கவிஞனுக்கும் காதலிக்கும் மீட்சிதந்தார் வரை) தங்கப்பா - பனிப்பாறை நுனிகள் - வாழ்க்கை ஓவியம். **புதுக்கவிதைகள்-**அப்துல் ரகுமான் - வடலூரும் வார்தாவும் - யுகி - உயிர்ப்பு (இயற்கையின் எலும்பு முறிப்பு) – **சிறுகதை** -ஆர்.சூடாமணி - சாம்பலுக்குள்.		**CO1**
UNIT-II	**நாடகம் -உரைநடை- நாவல்**	**Periods: 09**
நாடகம் - பிரபஞ்சன் - முட்டை - **உரைநடை** - இரா.வேங்கடாசலபதி - அந்தக் காலத்தில் காப்பி இல்லை –**நாவல்** - இரா.முருகவேள் - மிளிர்கல்		**CO2**
UNIT-III	**பக்தி இலக்கியம் -சைவம்- வைணவம் - கிறித்துவம் - இஸ்லாம்**	**Periods: 09**
பக்தி இலக்கியம் -சைவம்-திருஞானசம்பந்தா - முதல் திருமுறை - தோடுடையசெவியன்...பாடல் மட்டும் - திருநாவுக்கரசர் - நான்காம் திருமுறை - கூற்றாயினவாறு...பாடல் மட்டும்- சுந்தரர் - ஏழாம் திருமுறை - பித்தாபிறைசூடி...பாடல் மட்டும் - மாணிக்கவாசகர் - திருவாசகம் - புல்லாய் புழுவாய்...பாடல் மட்டும் - திருமூலர் - திருமந்திரம் - ஆர்க்கும் இடுமின்...பாடல் மட்டும் - காரைக்காலம்மையார்-திருவிரட்டை மணிமாலை - அன்பால் அடைவதெவ்வாறு...பாடல் மட்டும். **வைணவம்** - பொய்கையாழ்வார் - வையம் தகளியாய்...பாடல் மட்டும் -பூதத்தாழ்வார் - அன்பே தகளியாய்...பாடல் மட்டும் - பேயாழ்வார் - திருக்கண்டேன் பொன்மேனி...பாடல் மட்டும் - நம்மாழ்வார் - திருவாய்மொழி - உளன் எனின்...பாடல் மட்டும் - பெரியாழ்வார் - பெரியாழ்வார் திருமொழி - வாக்குத் தூய்மை...பாடல் மட்டும் -ஆண்டாள் - நாச்சியார் திருமொழி– என்பு உருகி இனவேல்...பாடல் மட்டும் - **கிறித்துவம்** - இரட்சண்ய மனோகரம் - ஆவிக்குறுவெந்துயர்...முதல் உனையல்லது பற்றுதோ வரை - **இஸ்லாம்** - குணங்குடி மஸ்தான் சாகிபு– ரகுமான் கண்ணி -அடைத்த மனக்கோட்டை...முதல் என்கண் வரை		**CO3**
UNIT-IV	**சிற்றிலக்கியம் - முத்தொள்ளாயிரம் - உலா- கலம்பகம்- பள்ளு- இடைக்காலப் புலவர்கள்**	**Periods: 09**
சிற்றிலக்கியம் - முத்தொள்ளாயிரம் - 1.வேரறுகைபம்பிச் சுரையாய்...2.மாலை விலைபகர்வார்... 3.என்னை உரையல் ...எனத் தொடங்கும் பாடல்கள் மட்டும் - **உலா** - குலோத்துங்கசோழன் உலா - தாளை அரவிந்தச் சாதி...முதல் நிலவென்றாள் வரை -		**CO4**

கலம்பகம் -திருவரங்கக்கலம்பகம் - உருமாறிப் பலபிறப்பும்...முதல் ஆடீர் வாசல் வரை - **பள்ளு** - முக்கூடற்பள்ளு - நாட்டுவளம் - கறைபட்டுள்ளது...எனத்தொடங்கும் பாடல் மட்டும் -**தூது**-அழகர் கிள்ளைவிடு தூது - இன்சொல்லை.....முதல் உபதேசமாக உரைப்பாய் வரை **இடைக்காலப் புலவர்கள்** - இராமலிங்க அடிகள் - மஹாதேவமாலை–படித்தேன்...முதல் பொய் உலகியல் வரை – வீரமாமுனிவர் திருக்காவலூர்க் கலம்பகம் - தழை–போதவிழ்ப்...எனத்தொடங்கும் பாடல் மட்டும் - மு.முஹம்மதுதஹா - .'.கௌதுமுஹிய்யித்தீன் பிள்ளைத் தமிழ் - வயிறுபுடைக்க உண்கின்றீர்...பாடல் மட்டும்.

UNIT-V	**மொழிப்பயிற்சி-இலக்கிய வரலாறு**	**Periods: 09**

மொழிப்பயிற்சி - 1.வலிமிகும் இடங்கள் ,வலிமிகா இடங்கள்.- 2.அகரவரிசைப்படுத்துதல்.-3.நேர்காணல் - **இலக்கிய வரலாறு** - இக்கால இலக்கியம், பக்தி இலக்கியம், சிற்றிலக்கியம் குறித்த பாடப்பகுதியை ஒட்டியது. **CO5**

Lecture Periods: 45	**Tutorial Periods:-**	**Practical Periods:-**	**TotalPeriods:45**

Text Books

1. **பாரதியார் – பாரதியார் கவிதைகள், Kindle Edition**, Published June 2, 2020.
2. **சிவகுமார். எஸ்., - கொங்குதேர் வாழ்க்கை,** பாடல் தொகுப்பு நூல் - தொகுதி -1 யுனைடெட் ரைட்டர்ஸ், சென்னை -86. முதற்பதிப்பு 2003.
3. **சூடாமணி.ஆர். - தனிமைத் தளிர், தேர்ந்தெடுத்த சிறுகதைகள்,** காலச்சுவடு பதிப்பகம், முதல் பதிப்பு: செப்டம்பர் 2013.
4. **பிரபஞ்சன் - ஜீவநதி (நாடகங்கள்) – கவிதா பப்ளிகேஷன், 8, மாசிலாமணி தெரு, பாண்டிபஜார், தி.நகர், சென்னை -600 017**
5. **முருகவேள். இரா., - மிளிர்கல்,** ஐம்பொழில் பதிப்பகம், திருப்பூர், இரண்டாம் பதிப்பு, 2014.

Reference Books

1. **வல்லிக்கண்ணன், புதுக்கவிதையின் தோற்றமும் வளர்ச்சியும், ஸ்ரீசெண்பகா பதிப்பகம்**, ஜனவரி,1, 2020.
2. **சிற்பிபாலசுப்பிரமணியம் மற்றும் நீலபத்மநாபன் (ப.ஆசி.) – புதிய தமிழ் இலக்கிய வரலாறு, தொகுதி-1,2,3,** சாகித்திய அகாதெமி, புதுடெல்லி, 2013.
3. **பாக்கியமேரி, வகைமை நோக்கில் தமிழ் இலக்கிய வரலாறு (செம்மை மற்றும் விரிவுப் பதிப்பு),** பாரிநிலையம். சென்னை,
4. **ஆனந்தன், முனைவர்.சு., - தமிழ் இலக்கிய வரலாறு,** கண்மணி பதிப்பகம், திருச்சி-2. இருபத்தி மூன்றாம் பதிப்பு– 2015.
5. **பரந்தாமனார், அ.கி., - நல்ல தமிழ் எழுத வேண்டுமா,** பாரி நிலையம், சென்னை, 1998.

Web References

1. http://www.tamilvu.org
2. http://www.tamilweb.com
3. http://www.tamilkodal.com
4. www.store.tamillexican.com
5. www.kala.tamilforu.blogspot.com
6. www.noolagam.com

* TE – Theory Exam, LE – Lab Exam

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)					Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO 3
1	3	3	3	3	3	3	3	3
2	3	3	3	3	3	3	3	3
3	3	2	3	3	2	3	3	3
4	2	3	2	1	2	2	3	2
5	3	3	3	3	3	3	3	3

Correlation Level: 1: Low, 2: Moderate, 3: High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**FRENCH**	Programme: B.Sc. Chemistry						
Semester	**First**	Course Category Code: **MIL** *End Semester Exam Type: **TE**						
Course Code	**A23FRT101C**	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**FRENCH I**	**3**	**0**	**0**	**3**	**25**	**75**	**100**
(Common to B.A.., B.SC., and BCA Branches)								

Prerequisite	French language in class 12th	
Course Objectives	To introduce the basics of French language to the students	
	To enable the students to read, understand and write simple sentences	
	To help them to grasp the fundamentals of French grammar	
	To make the students to formulate correct phrases	
	To introduce them French and Francophone countries and their cultures	
Course Outcomes	***On completion of the course, the students will be able to***	BT Mapping (Highest Level)
	CO1 have a general understanding of the language	**K1**
	CO2 analyze and interpret simple phrases written in French	**K2**
	CO3 have the basics of French grammar	**K3**
	CO4 communicate and ask basic questions in French language	**K4**
	CO5 appreciate the diversity and multiplicity of French and Francophone world	**K5**

UNIT-I	**S'introduire**	**Periods:09**
1. Le francais, les Francais, la France 2. Je m'appelle Elise, et vous ? 3. Saluer, se presenter, remercier 4. Vous dansez ? D'accord 5. Interroger quelqu'un et donner des informations		**CO1**
UNIT-II	**Demander des questions sur quelqu'un**	**Periods:09**
1. Monica, Yokiko et compagnie 2. Dire ce qu'on l'aime 3. Les voisins de Sophie 4. Demander des informations sur quelqu'un		**CO2**
UNIT-III	**Expliquer quelque chose**	**Periods:09**
1. Tu vas au Luxembourg ? 2. Dire où on va, dire d'où on vient 3. Nous venons pour l'inscription 4. A vélo, en train, en avion… 5. Expliquer un itinéraire, proposer quelque chose		**CO3**
UNIT-IV	**Poser des questions et commander**	**Periods:09**
1. Pardon monsieur, le BHV s'il vous plait 2. Au marché 3. Acheter quelque chose, demander le prix 4. On déjeune ici ? 5. Aller au restaurant, comprendre un menu		**CO4**
UNIT-V	**Inviter et proposer quelque chose**	**Periods:09**
1. On va chez ma copine ? 2. Proposer quelque chose 3. Demander et donner des informations sur quelqu'un 4. Chez Susana 5. Etre invité chez quelqu'un		**CO5**

Lecture Periods: 45	**Tutorial Periods:**	**Practical Periods:-**	**Total Periods: 45**

Text Books

1. Sylvie Poisson Quinton and Michèle Maheo, *Festival 1 Méthode de Français*, CLE editions, 2009
2. Nathalie Hirschsprung and Tony Tricot, *Cosmopolite 1*, Hachette editions, 2017
3. Caroline Veltcheff and Stanley Hilton, *Preparation du Delf A1*, Hachette editions, 2011

Reference Books

1. Régine Mérieux and Yves Loiseau, *Latitudes 1*, Didier editions, 2017
2. Annie Berthet and Emmanuelle Daili, *Alter Ego + A1*, Hachette editions, 2012
3. Bruno Giradeau, *Réussir le Delf A1*, Didier editions, 2019
4. Richard Lescure, *Delf A1 150 Activités,* Langers and CLE, 2005
5. Manisha Verma, *La grammaire élémentaire française*, Notion Press, 2010

Web References

1. https://www.tv5monde.com
2. https://www.rfi.fr
3. https://www.lemonde.fr
4. https://www.frenchpodcasts.com
5. https://www.coursera.org

* TE – Theory Exam, LE – Lab Exam

COs/POs/PSOs Mapping

COs	Program Outcomes (PO)					Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3
1	3	3	3	3	3	3	3	3
2	3	3	3	3	2	3	3	3
3	3	3	3	3	3	3	2	3
4	2	3	2	2	3	3	3	3
5	3	3	3	3	3	3	3	3

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**ENGLISH**	Programme: B.Sc. Chemistry						
Semester	**First**	Course Category Code: **ENG**				End Semester Exam Type: **TE**		
Course Code	**A23GET101C**	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**GENERAL ENGLISH - I**	**3**	**0**	**0**	**3**	**25**	**75**	**100**
(Common to B.A.., B.SC., AND BCA Branches)								

Prerequisite	Basic part-two language and knowledge gained from Grammar and Vocabulary	
Course Objectives	To recognize the rhythms, metrics and other aspects of Literature	
	To read a variety of texts critically and proficiently	
	To enable the students to enjoy the flair of literature through the work of great writer	
	To make the students to know the functions of basic grammar	
	To enable them understanding the intrinsic nuances of writing in English language	
Course Outcomes	***On completion of the course, the students will be able to***	BT Mapping (Highest Level)
	CO1 Comprehend and discuss the various facets of selected poems	**K3**
	CO2 Analyze and interpret texts written in English	**K3**
	CO3 Read drama with graduate-level interpretive and analytical proficiency	**K3**
	CO4 Improve the fluency and formation of grammatically correct sentence	**K3**
	CO5 Enhance the writing skills for specific purposes	**K3**

UNIT-I	**POETRY**	**Periods:09**	
6. Rudyard Kipling – *IF* 7. William Wordsworth – *Daffodils* 8. Percy Bysshe Shelley – *Ozymandias* 9. William Ernest Henley – *Invictus* 10. Rabindranath Tagore – *On the Nature of Love*			**CO1**
UNIT-II	**PROSE**	**Periods:09**	
5. Bertrand Russell – *The Road to Happiness* 6. Charles Lamb – *A Dissertation upon Roast Pig*			**CO2**
UNIT-III	**SHORT STORIES**	**Periods:09**	
6. Oscar Wilde – *The Devoted Friend* 7. R. K. Narayan – *God and the Cobbler*			**CO3**
UNIT-IV	**DRAMA**	**Periods:09**	
6. H H Munro – *The Death Trap* 7. J.M. Synge – *Riders to the Sea*			**CO4**
UNIT-V	**GRAMMAR AND COMPOSITION**	**Periods:09**	
6. Parts of Speech 7. Subject-Verb Agreement 8. Letter Writing 9. Essay Writing			**CO5**

Lecture Periods:45	**Tutorial Periods:0**	**Practical Periods:-**	**Total Periods:45**

Text Books

4. Narayan, R.K, *Malgudi days*, Indian Thought Publication, 2019
5. Synge John Millington, *Riders to the Sea*, Sahitya Sarowar Publisher, 2022
6. P. C. Wren, H. Martin, *High School Wren and Martin English Grammar and Composition*, S. Chand & Company Pvt. Ltd, 2022.

Reference Books

1. Lamb, Charles, *Selected Prose*, Penguin Classics Publication, 2nd Edition, 2013.
2. S.C. Gupta, *English Grammar & Composition Very Useful for All Competitive Examinations*, Arihant Publications, 2014.
3. Saki, H. H. Munro, F. Carruthers Gould, *The Complete Works of Saki: Illustrated Edition: Novels, Short Stories, Plays, Sketches & Historical Works, including Reginald, The Chronicles of Clovis, ... The Death-Trap*, The Westminster Alice Kindle Edition, e-artnow, 2018.
4. J.M. Synge, S.C. Narula. *Riders to the Sea*. Surjeet Publication. 2018.
5. S.C.Gupta. *A Handbook for Letter Writing*. Arihant Publication. 2016.

Web References

1. https://www.englishcharity.com/of-love-by-francis-bacon-explanation/
2. https://www.gradesaver.com/charles-lamb-essays/study-guide/summary-a-dissertation-upon-roast-pig
3. https://allpoetry.com/On-The-Nature-Of-Love
4. http://sittingbee.com/god-and-the-cobbler-r-k-narayan/
5. https://www.toppr.com/guides/essays/

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)					Program Specific Outcomes (PSOs)		
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3
1	3	3	3	3	3	3	3	3
2	3	3	3	3	3	3	3	3
3	3	2	3	3	2	3	3	3
4	2	3	2	1	2	2	3	2
5	3	3	3	3	3	3	3	3

Correlation Level

High	Moderate	Low
3	2	1

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**Chemistry**			Programme: B.Sc., Chemistry				
Semester	**First**			Course Category Code: **DSC**		*End Semester Exam Type: **TE**		
Course Code	**A23CHT101D**			Periods/Week			Credit	Maximum Marks
				L	T	P	C	CAM / ESE / TM
Course Name	**GENERAL CHEMISTRY - I**			**4**	**-**	**-**	**4**	**25 / 75 / 100**
Pre requisite	Higher Secondary Chemistry Book							
Course Objectives	• To understand about atomic various models, atomic structure and stability of atom							
	• To gain knowledge on periodicity and periodic properties of elements							
	• To improve knowledge on organic nomenclature, structure, properties and polar effects of molecules							
	• To understand the molecular symmetry and operations							
	• To learn about basic concepts in the stereochemistry							
Course Outcome	**On completion of the course, the students will be able to**							BT Mapping (Highest Level)
	CO1	Develop knowledge on the various atomic model and electronic configuration						**K3**
	CO2	Analyze periodicity and periodic properties of elements						**K3**
	CO3	Apply the knowledge on organic nomenclature in the various field						**K3**
	CO4	Understand molecular symmetry and various symmetry operations						**K3**
	CO5	Use the basic concepts of stereochemistry in the organic molecules						**K2**
UNIT-I	**ATOMIC STRUCTURE**							**Periods:12**
Rutherford model of the atom- defects of Rutherford model - Discovery of neutron, Bohr model of an atom- merits and demerits- Hydrogen atom spectra – Sommerfeld modification- de Broglie's concept- dual nature, quantum numbers- shapes of s, p, d atomic orbitals. Arrangement of electrons in atoms- Hund's rule – Pauli exclusion principle- Heisenberg's uncertainty principle. Aufbau principle and n+l rule. Electronic configuration of atoms up to atomic number 30 and stability of half filled and completely filled orbitals								**CO1**
UNIT-II	**PERIODICITY AND PERIODIC PROPERTIES**							**Periods:12**
Cause of periodicity. Classification of elements in to s, p, d and f blocks. : Atomic properties- Elementary ideas of Covalent radius Van der Waals radius-Ionic radius and their periodic trends. Ionisation Energy, Electron affinity, Electro negativity and their periodic trends–Pauling and Mulliken-Jaffe scale of Electro negativity.								**CO2**
UNIT-III	**ORGANIC NOMENCLATURE, STRUCTURE AND PROPERTIES**							**Periods:12**
Classification and nomenclature of organic compounds – IUPAC systems. Structure and shape of aliphatic organic molecules: Hybridization – Definition, sp^3 hybridization of carbon (methane) – sp^2 hybridization in alkenes (ethane) and sp hybridization in alkynes (ethane). Electronic Displacement Effects: Inductive Effect, Electromeric Effect, Resonance and Hyper conjugation. Reactive Intermediates: Carbocations, Carbanions, free radicals, carbenes and nitrenes (Structure and stability).								**CO3**
UNIT-IV	**STEREOCHEMISTRY**							**Periods:12**
Conformations of ethane and butane. Wedge, Newmann, Sawhorse and Fischer and their Interconversion. chirality due to stereo centre (upto two carbon atoms). Enantiomerisms, Diastereomerisms and Meso compounds. Threo and erythro; D and L; cis – trans nomenclature; Configuration: CIP Rules: R/ S (for only one chiral carbon atoms) and E / Z Nomenclature (for ethene). Optical and Geometrical isomerism.								**CO4**
UNIT-V	**STATES OF MATTER (GAS AND LIQUID)**							**Periods:12**
Gaseous State: Postulates and derivation of the kinetic gas equation - Kinds of velocities - mean, RMS, most probable velocities (definition only) – Collision frequency – mean free path - Deviation of real gas from ideal behaviour- Derivation of Van der Waal's equation. **Liquid State**: Physical properties of liquids – Vapour pressure – surface tension – coefficient of viscosity – Effect of temperature and pressure on viscosity – concentration terms – molarity (M), Normality (N), molality (m), formality, mole fraction, percentage concentration.								**CO5**
Lecture Periods:60		**Tutorial Periods: -**		**Practical Periods:-**			**Total Periods:60**	

Text Books

1. Principles of Inorganic Chemistry, B. R. Puri, L. R. Sharma and K. C. Kalia, Shoban Lal Nagin Chand and Co., New Delhi, 2018.
2. R. T. Morrison and R. N. Boyd, Organic Chemistry, 7th edn., Printice-Hall of India Limited, New Delhi, 2010.

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

Reference Books

1. Inorganic Chemistry, D. F. Shriver, P. W. Atkins, W. H. Freeman and Co, London, 2010.
2. Inorganic Chemistry, J. E. Huheey, E. A. Kieter and R. L. Keiter, Harper Collins, New York, 2006, 4th edn.
3. Madan R.D., "Modern Inorganic Chemistry", S. Chand & Company, New Delhi, 2nd Edition, 2004.
4. I.L.Finar, "Organic chemistry Vol 1", Pearson Edition, Singapore, 6th Edition, 2005.
5. P.L. Soni, "Text Book of Organic Chemistry", Sultan Chand, New Delhi, 1st Edition, 2005.
6. J. March and M. Smith, Advanced Organic Chemistry, 6th edn. John-Wiley and sons, 2007.
7. G. D. Tuli, B. S. Bahl, Arun Bahl, "Essentials of Physical Chemistry", S.Chand Publication, 24th Edition, 2000.
8. Stereochemistry of carbon compounds by L.Eliel Mac Graw Hill

Web References

1. https://bit.ly/3vB6v0N
2. https://bit.ly/3juWayu
3. https://byjus.com/chemistry/processes-of-metallurgy/
4. https://bit.ly/3Gb99iy
5. https://www.organic-chemistry.org/
6. https://nptel.ac.in/content/storage2/courses/122101001/downloads/lec-36.pdf

* TE – Theory Exam, LE – Lab Exam

COs/POs/PSOs Mapping

Cos	Program Outcomes (POs)					Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3
1	1	3	2	2	3	3	3	2
2	3	2	2	3	3	3	2	2
3	3	2	3	2	3	3	2	3
4	2	3	3	2	2	3	3	3
5	3	2	3	2	2	2	2	3

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Assessment Pattern as per Bloom's Taxonomy

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**Chemistry**	Programme: B.Sc., Chemistry						
Semester	**First**	Course Category Code: **DSC**			*End Semester Exam Type: **TE**			
Course Code	**A23CHT102D**	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**ANALYTICAL CHEMISTRY**	**4**	**-**	**-**	**4**	**25**	**75**	**100**
Pre requisite	Basic Knowledge in the Higher Secondary standard Level							
Course Objectives	• To understand about handling of various chemicals and data analysis							
	• To gain knowledge on separation and purification of organic molecules by various methods							
	• To improve knowledge on various quantitative titration							
	• To understand the principles of gravimetric analysis and various precipitation procedures							
	• To learn about basic concepts of thermal analysis used in the chemical industries							

Course Outcome	**On completion of the course, the students will be able to**	BT Mapping (Highest Level)
	CO1 Develop knowledge on the handling of various chemicals and data analysis	**K3**
	CO2 Analyze separation and purification of organic molecules by various methods	**K3**
	CO3 Apply the knowledge of various quantitative analyses in the chemical industries	**K3**
	CO4 Understand principles of gravimetric analysis and various precipitation procedures	**K2**
	CO5 Use the basic concepts of thermal analysis chemical industries	**K2**

UNIT-I	**HANDLING OF CHEMICALS AND DATA ANALYSIS**	**Periods:12**
Safety and hygiene in the Chemistry Lab -Storage and handling of chemicals, handling of acids, ethers, toxic and poisonous chemicals. Antidotes, threshold vapour concentration and first aid procedure. Material safety data sheet (MSDS), Control of substances hazardous to health (COSHH). Calibration of volumetric apparatus: burette, pipette and standard flask. Errors in chemical analysis - Accuracy and precision, Types of errors – Determinate and indeterminate errors. Methods of eliminating or minimizing errors. Precision: mean, median, average deviation and coefficient of variation. Significant figure and its relevance. Normal error curve and its importance.		**CO1**

UNIT-II	**SEPARATION AND PURIFICATION TECHNIQUES**	**Periods:12**
Chromatographic techniques and applications - Principles of adsorption and partition chromatography: Paper, Thin layer, Column chromatography and ion exchange chromatography. General purification techniques - Purification of solid organic compounds: re-crystallization, sublimation. Use of miscible solvents. Use of drying agents and their properties. Purification of liquids.		**CO2**

UNIT-III	**QUANTITATIVE TITRIMETRY**	**Periods:12**
Methods of expressing concentration of solutions – Molarity, molality, formality, normality, mole fraction, ppm and ppb. Law of volumetric analysis. Requirements for titrimetric analysis. Primary and secondary standards. Limitation of volumetric analysis. Types of Acid base titrations. Buffer solutions. Henderson equation. Preparation of acidic and basic buffers. Relative strength of acids and bases from Ka and Kb values. Theory and choice of indicators. Complexometric titrations - Stability of complexes. Titration involving EDTA. Usage of metal ion indicators.		**CO3**

UNIT-IV	**QUANTITATIVE GRAVIMETRY**	**Periods:12**
Principles of gravimetric analysis- gravimetric factor- calculation involved- conditions for precipitation- theory of precipitation- types of precipitants- advantages- Purity of precipitates– Co-precipitation and Post precipitation-precipitation Precipitation from homogeneous solution; crucibles- types and maintenance- washing of the precipitates-Drying and ignition of precipitates.		**CO4**

UNIT-V	**THERMAL ANALYSIS**	**Periods:12**
Thermo Analytical Methods: Principles of TGA and DTA – Hondas balance – precautions in using thermo Balance – Outlines of Instrumentation (block diagram only) – Application in $CaC_2O_4.H_2O$ and $(CH_3COO)_2Ca.H_2O$ -Thermometric titration – Principle and instrumentation – Conditions for Thermometric Titration – Titration of HCl Vs NaOH– Applications of thermometric titration.		**CO5**

Lecture Periods:60	**Tutorial Periods:-**	**Practical Periods:-**	**Total Periods:60**

Text Book

1. U. N. Dash, Analytical Chemistry: Theory and Practice, Sultan Chand and sons Educational Publishers, New Delhi, 2011.
2. R. Gopalan, P. S. Subramanian and K. Rengarajan, Elements of Analytical Chemistry, Sultan Chand, New Delhi, 2007.
3. B. Sivasankar, Instrumental Methods of Analysis, Oxford University Press, 2012.

Reference Books

1. D. A. Skoog, D. M. West and F. J. Holler, Analytical Chemistry: An Introduction, 5th edn., Saunders college publishing, Philadelphia, 1998.
2. R.A. Day and A.L. Underwood, Quantitative Analysis, 6thedn., Prentice Hall of India Private Ltd., New Delhi, 1993.
3. H. Kaur, Instrumental Methods of Chemical Analysis, Pragati Prakashan, Meerut, 2010.
4. V.K. Srivastava, K.K. Srivastava, Introduction to Chromatography: Theory and Practice,
S. Chand and Company, New Delhi, 1987.

Web References

1. https://bit.ly/3pz9NR1
2. https://bit.ly/3vCz4uA
3. https://bit.ly/3lBgbos
4. https://bit.ly/3lENibe

* TE – Theory Exam, LE – Lab Exam

COs/POs/PSOs Mapping

Cos	Program Outcomes (POs)					Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3
1	3	3	2	2	1	3	3	3
2	2	2	2	3	-	2	2	2
3	3	3	3	2	1	3	3	2
4	1	2	2	1	-	1	2	3
5	3	3	3	1	2	2	3	1

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**Mathematics**		Programme: B.Sc Chemistry					
Semester	**First**		Course Category Code: **IDC**			*End Semester Exam Type: **TE**		
Course Code	**A23MAD103C**		Periods / Week			Credit	Maximum Marks	
			L	T	P	C	CAM	ESE	TM
Course Name	**ALLIED MATHEMATICS I**		**3**	**1**	**-**	**4**	**25**	**75**	**100**
(Common to B.Sc. Physics and B.Sc. Chemistry Branches)									
Prerequisite	Basic Electrical Engineering, Laplace Transform								
Course Outcome	**On completion of the course, the students will be able to**							BT Mapping (Highest Level)	
	CO1	Find Eigen values and Eigen vectors, diagonalization of a matrix.						**K2**	
	CO2	Find expansion of trigonometric values and solution of trigonometric solution.						**K3**	
	CO3	Analyze and solve Differential Equations.						**K4**	
	CO4	Understand the different types of integration.						**K3**	
	CO5	Solve double and Triple integral problems.						**K3**	
UNIT-I	**MATRICES**					**Periods: 12**			
Definitions - Rank of a Matrix- Consistency of system of equations - Characteristic equation -Eigen values and Eigen vectors of a real matrix- Diagonalization of matrices - Properties of Eigen values and Eigen vectors.									**CO1**
UNIT-II	**TRIGNOMETRY**					**Periods: 12**			
Expansions of cos nθ, sin nθ, tan nθ in terms of θ - Powers of sines and cosines of θ in terms of functions of multiples of θ – Expansions of sin θ and cos θ in a series of ascending powers of θ.									**CO2**
UNIT-III	**DIFFERENTIAL EQUATION**					**Periods: 12**			
Linear differential equations with constant coefficients - simultaneous linear differential equations - Solution by variation of parameter method.									**CO3**
UNIT-IV	**DEFINITE INTEGRALS**					**Periods: 12**			
Definite integrals – Integration by parts - Reduction formula.									**CO4**
UNIT-V	**MULTIPLE INTEGRALS**					**Periods: 12**			
Multiple Integrals - change of order of integration - Applications: Areas by double integration and volumes by triple integration(Cartesian).									**CO5**
Lecture Periods: 45		**Tutorial Periods: 15**		**Practical Periods: -**			**Total Periods: 60**		

Text Books

1.S. Durai Pandian and Laxmi Durai Pandian (1984) *Trigonometry*. Emerald Publishers, Chennai.

2. M.K. Venkataraman, Engineering Mathematics (First Year), 2rd Edition, The National PublishingCompany, Madras, 2001.

3. Shanti Narayan, "Integral Calculus", S Chand & Co. New Delhi, 2001.

Reference Books

1. A. Singaravelu "Algebra and Trigonometry", Vol.-I Meenakshi Agency, Chennai (2003).
2. P.R. Vittal,"Trigonometry, Margham" Publications, Chennai.(2004)
3. P. Kandasamy, K. Thilagavathy, "Mathematics of B.SC", Vol I & II, S. Chand Company Ltd, NewDelhi — 2004.
4. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley, Tenth edition, 2019
5. B.V.Ramana, "Higher Engineering Mathematics", Tata McGraw-Hill, New Delhi, Sixth edition 2018.

Web References

1. https://nptel.ac.in/courses/111/105/111105122/
2. https://www.khanacademy.org/math/precalculus/x9e81a4f98389efdf:trig/x9e81a4f98389efdf:inverse-trig/v/inverse-trig-functions-arcsin
3. https://www.khanacademy.org/math/statistics-probability
4. http://www.yorku.ca/yaoguo/math1025/slides/chapter/kuttler-linearalgebra –slides-Systemsofquation-handout.pdf
5. https://nptel.ac.in/courses/111/105/111105122/

* TE – Theory Exam, LE – Lab Exam

COs/POs/PSOs Mapping

Cos	Program Outcomes (POs)					Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3
1	3	2	3	2	-	2	3	1
2	3	2	3	2	1	3	2	1
3	3	2	3	3	-	2	3	1
4	2	3	2	-	3	3	2	2
5	3	2	-	3	1	3	2	1

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**Chemistry**			Programme: B.Sc., Chemistry				
Semester	**First**			Course Category Code: **DSC**		*End Semester Exam Type: **TE**		
Course Code	**A23CHL101D**	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**VOLUMETRIC ANALYSIS & CHROMATOGRAPHY**	**0**	**0**	**4**	**2**	**50**	**50**	**100**
Pre requisite	Higher Secondary Chemistry Book							
Course Objectives	• To understand about concentration of the solutions							
	• To gain knowledge on acid and base titration with indicator usage							
	• To improve knowledge on permanganometry titration							
	• To understand the principles of chromatography							
	• To learn about basic concepts of crystallization in the purification techniques							

Course Outcome	**On completion of the course, the students will be able to**		BT Mapping (Highest Level)
	CO1	Develop knowledge on preparation of solutions with different concentration	**K2**
	CO2	Analyze acid base titration in the industry level	**K3**
	CO3	Apply the knowledge of permanganometry titration in the chemical industries	**K3**
	CO4	Apply and analyze the chromatography separation concepts	**K3**
	CO5	Use the basic concepts of crystallization in the purification techniques with required apparatus	**K2**

List of Experiments **Periods: 30**

1. Preparation of standard solutions of different Molarities and Normalities.
2. Estimation of HCl by NaOH using a standard Oxalic acid solution
3. Estimation of Na_2CO_3 by HCl using a standard Na_2CO_3 Solution.
4. Estimation of Oxlaic acid by KMnO4 using a standard Oxalic acid solution
5. Estimation of $KMnO_4$ by Thio using a standard Potassium dichromate Solution
6. Estimation of Copper (II) Sulphate by $K_2Cr_2O_7$ solution.
7. Separation of mixtures by Chromatography: Measure the Rf value in each case(combination of two compounds to be given)
8. Identify and separate the components of a given mixture of two amino acids (glycine, aspartic acid, glutamic acid, tyrosine or any other amino acid) by paper chromatography
9. Identify and separate the sugars present in the given mixture by paper chromatography.

Recrystallization of benzoic acid

Lecture Periods:	**Tutorial Periods:**	**Practical Periods:-30**	**Total Periods:30**

Text Books

1. Pandey O.P, Bajpai D.N. &Giri S., "Practical Chemistry (For B.Sc. I, II and III Year Students)", S. Chand Limited, 1st Edition 1972.
2. Mendam J, Denney RC, Barnes JD, Thomas MJK, "Text book of quantitative chemical analysis", 6th Edition 2008.
3. Mohammed Awad Ali Khalid, "Redox Principles and advanced application", 1st Edition, 2017.

Reference Books

1. Venkateswaran. V, Veeraswmay. R, Kulandaivelu. A.R., "Basic Principles of Practical Chemistry", New Delhi, Sultan Chand and Sons.,1st Edition,1997.

2. Mendham. J, Denney. R.C, Bames. J.D, and Thomas, M. “Vogel’s Text book of Quantitative Analysis”, Pearson Education. 1st Edition, 1989.

3. Gopalan. R, Subramaniam. P.S, and Rengarajan. K, “Elements of Analytical Chemistry” ,Sultan Chand and Sons.1st Edition, 2004.

Web References

1. https://en.wikipedia.org/wiki/Acid%E2%80%93base_titration
2. https://en.wikipedia.org/wiki/Permanganometry
3. http://staff.buffalostate.edu/nazareay/che112/chromate.htm

* TE – Theory Exam, LE – Lab Exam

COs/POs/PSOs Mapping

Cos	Program Outcomes (POs)					Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3
1	3	3	2	2	1	3	2	3
2	2	2	3	3	1	2	2	2
3	3	3	3	2	1	2	2	2
4	2	1	2	1	-	1	2	3
5	3	3	3	1	2	3	3	1

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)			End Semester Examination (ESE) Marks	Total Marks
	Model Exam	Record	Attendance		
Marks	30	10	10	50	100

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	ENGLISH	Programme: B.Sc., Chemistry						
Semester	First	Course Category Code: SEC			End Semester Exam Type: -			
Course Code	A23ENSA02C	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	SOFT SKILLS	2	0	0	2	100	0	100

Prerequisite	Knowledge gained from Journal reading and Newspaper reading	
Course Objectives	To train students in Soft skills in order to enable them to be professionally competent	
	To facilitate the students for Goal setting and Goal Achieving skills	
	To enrich the sense of social responsibility and accountability of the students	
	To help the students to train them for Stress Management and Time Management	
	To train the students to work with team environment and Creative thinking	
Course Outcomes	***On completion of the course, the students will be able to***	BT Mapping (Highest Level)
	CO1 enhance the Soft skills and compete professionally	**K3**
	CO2 achieve Goal setting and Goal Achieving skills	**K3**
	CO3 improve theirsocial responsibility and accountability skills	**K3**
	CO4 enrich Stress Management and Time Management	**K3**
	CO5 demonstrate the quality of a Team ship and Creative thinking	**K3**

UNIT-I	**POSITIVE ATTITUDE**	**Periods:06**	
Skills-Personal Skills: Knowing Oneself/Self-Discovery - Confidence Building - Defining Strengths of Attitude - formation of attitudes - psychological factors - the power of positive attitude - the benefits of positive attitude – developing positive attitude - negative attitude – the causes of negative attitude - the consequences of negative attitude - how to change negative attitude			**CO1**
UNIT-II	**GOAL SETTING**	**Periods:06**	
Introduction - importance of goal setting - goal definition - types of goals - what exactly goal setting - why people don't set goals - how to choose the right goals - SMART GOALS - Career goals - benefits of career goal setting - goal setting tips			**CO2**
UNIT-III	**STRESS AND TIME MANAGEMENT**	**Periods:06**	
Definition of Stress management - types of stress - causes of stress - stress management and reduction techniques - Definition of Time management - Setting goals, planning – prioritizing - setting deadlines - multi-tasking - practicing self-discipline - overcoming procrastination			**CO3**
UNIT-IV	**TEAMWORK SKILLS**	**Periods:06**	
Communication as Social Construction - Dynamics of professional Group communication - Group and Team - Team Building Process - Managing conflict and appreciating/respecting differences - Decision making & effective negotiation - Types of teams - Understanding, Identity and nurturing sensitivity (in terms of gender, orientation, language)			**CO4**
UNIT-V	**PROBLEM SOLVING THROUGH CREATIVE THINKING**	**Periods:06**	
Thinking Creatively - Improving Perceptions - Creative thinking as an essential skill - Techniques of creative thinking (such as brainstorming, lateral thinking, mind mapping, rich pictures, role play) - Practical problem solving through creative thinking - Case Study			**CO5**

Lecture Periods:- 30	**Tutorial Periods:-**	**Practical Periods:**	**Total Periods:30**

Text Books

1. Sabina Pillai, Agna Fernandez, *Soft Skills and Employability Skills*, Cambridge University Press, 2017.
2. Jeff Butterfield, *Soft Skills for Everyone*, Cengage India Private Limited, 2nd Edition, 2020.
3. Alex K, *Soft Skills*, S Chand & Company, 1st Edition, 2014.

Reference Books

1. Barun Mitra, Personality Development and Soft Skills 2, Oxford University Press, 2016.
2. Prashant Sharma, Soft Skills 3rd Edition: Personality Development for Life Success, BPB Publications, 2021.
3. Ghosh, B.N, Managing Soft Skills for Personality Development, Tata McGraw Education Publication, 1st Edition, 2012.
4. R.S.Aggarwal. A Modern Approach to Non-Verbal. S Chand Publication. 2017.
5. K. K. Sinha, *Business Communication*, Galgotia Publishing, 4th Edition, 2011.

Web References

1. https://www.mindtools.com/a5ykiuq/personal-goal-setting
2. https://www.healthlinkbc.ca/health-topics/stress-management-managing-your-time
3. https://www.herzing.edu/blog/7-important-teamwork-skills-you-need-school-and-your-career
4. https://online.hbs.edu/blog/post/what-is-creative-problem-solving
5. https://www.lucidchart.com/blog/7-steps-to-creating-better-goals

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)					Program Specific Outcomes (PSOs)		
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3
1	1	3	3	1	1	1	3	3
2	3	3	3	1	1	1	3	2
3	3	3	3	1	2	1	3	3
4	3	3	3	1	2	1	3	1
5	3	3	3	1	3	1	3	3

Correlation Level

High	Moderate	Low
3	2	1

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	80		-	10	10	-	100

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**Chemistry**	Programme: B.Sc., Chemistry						
Semester	**First**	Course Category Code: AE**CC**				*End Semester Exam Type:		
Course Code	A23AETA01C	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**PUBLIC ADMINISTRATION**	**2**	**-**	**-**	**1**	**100**	**-**	**100**
	(Common to Branches)							
Pre requisite	Higher Secondary Chemistry Book							
Course Objectives	• To introduce the elements of public administration • To help the students obtain a suitable conceptual perspective of public administration • To introduce them the growth of institution devices to meet the need of changing times • To instill and emphasize the need of ethical seriousness in contemporary Indian PublicAdministration							
Course Outcome	**On completion of the course, the students will be able to**							BT Mapping (Highest Level)
	CO1	Understand the concepts and evolution of Public Administration.						**K3**
	CO2	Be aware of what is happening in the Public Administration in the country						**K3**
	CO3	Explain the Territory Administration in the State and the Centre						**K3**
	CO4	Appreciate emerging issues in Indian Public Administration						**K3**

UNIT-I	**INTRODUCTION TO PUBLIC ADMINISTRATION**	**Periods:7**	
Meaning, nature and Scope of Public Administration and its relationship with other disciplines- Evolution of Public Administration as a discipline – Woodrow Wilson, Henry Fayol , Max Weber andothers - Evolution of Public Administration in India – Arthashastra – Colonial Administration upto 1947			**CO1**
UNIT-II	**PUBLIC ADMINISTRATION IN INDIA**	**Periods:8**	
Enactment of Indian Constitution - Union Government – The Cabinet – Central Secretariat –– All India Services – Training of Civil Servants – UPSC – Niti Ayog – Statutory Bodies: The Central Vigilance Commission – CBI - National Human Rights Commission – National Women's Commission –CAG			**CO2**
UNIT-III	**STATE AND UNION TERRITORY ADMINISTRATION**	**Periods:8**	
Differential Administrative systems in Union Territories compared to States Organization of Secretariat: -Position of Chief Secretary, Functions and Structure of Departments, Directorates – Ministry of Home Affairs supervision of Union Territory Administration – Position of Lt.Governor in UT Government of Union Territories Act 1963 – Changing trend in UT Administration in Puducherry and Andaman and Nicobar Island			**CO3**
UNIT-IV	**EMERGING ISSUES IN INDIAN PUBLIC ADMINISTRATION**	**Periods:7**	
Changing Role of District Collector – Civil Servants – Politicians relationship – Citizens Charter - Public Grievance Redressal mechanisms – The RTI Act 2005 – Social Auditing and Decentralization Public Private partnership			**CO4**

Lecture Periods:30	**Tutorial Periods:**	**Practical Periods:-**	**Total Periods:30**

Text Books

1. Avasthi and Maheswari, "Public Administration", Lakshmi Narain Agarwal, 1st Edition, 2016.
2. Ramesh K.Arora, "Indian Public Administration: Institutions and Issues", New Age International Publishers, 3rd Edition, 2012.
3. Rumki Basu, "Public Administration: Concept and Theories", Sterling, 1st Edition, 2013.

Reference Books

1. Siuli Sarkar, "Public Administration in India", Prentice Hall of India, 2ndEdition, 2018.
2. M. Laxmikanth, "Public Administration", McGraw Hill Education, 1 Edition, 2011.

3. R.B.Jain, “Public Administration in India: 21st Century Challenges for Good Governance”, Deep and Deep Publications, 1 Edition, 2002.

Web References

1. http://cic.gov.in/
2. http://www.mha.nic.in/
3. http://rti.gov.in/
4. http://www.cvc.nic.in/
5. https://www.india.gov.in/my-government/whos-who/lt-governors-administrators

* TE – Theory Exam, LE – Lab Exam

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	70		-	20	10	-	100

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**TAMIL**		Programme: **B.Sc. Chemistry**					
Semester	**II**		Course Category Code: **AEC**			*End Semester Exam Type: **TE**		
Course Code	**A23TAT202C**		Periods/Week			Credit	Maximum Marks	
			L	T	P	C	CAM	ESE	TM
Course Name	**TAMIL – II**		**4**	**0**	**0**	**2**	**25**	**75**	**100**
(Common to **B.A, B.Sc., BBA., B.COM., BCA., B.COM CS.,**)									
Prerequisite	பன்னிரெண்டாம் வகுப்பில் தமிழை ஒரு பாடமாகப் பயின்றிருக்க வேண்டும்.							
Course Objectives	• செவ்விலக்கிய தன்மை கொண்ட தமிழ் மொழியின் சிறப்பினை எடுத்துரைப்பதாக இப்பாடத்திட்டம் அமைக்கப்பட்டுள்ளது.							
	• இரண்டாயிரம் ஆண்டுகாலத் தமிழின் தொன்மையையும் வரலாற்றையும் அதன் விழுமியங்களையும் பண்பாட்டையும் எடுத்துரைப்பதாக இப்பாடத்திட்டம் அமைக்கப்பட்டுள்ளது.							
	• தமிழ் இலக்கியம் உள்ளடக்கத்திலும், வடிவத்திலும் பெற்றமாற்றங்கள்,அதன் சிந்தனைகள்,அடையாளங்கள் ஆகியவற்றைக் காலந்தோறும் எழுதப்பட்ட இக்கியங்களின் வழியாகக் கூறுவதற்கு இப்பாடத்திட்டம் அமைக்கப்பட்டுள்ளது.							
	• வாழ்வியல் சிந்தனைகள்,ஒழுக்கவியல் கோட்பாடுகள்,சமத்துவம், சூழலியல் எனப் பல கூறுகளைமாணவர்களுக்கு எடுத்துரைக்கும் விதத்தில் இப்பாடத்திட்டம் உருவாக்கப்பட்டுள்ளது.							
	• சிந்தனை ஆற்றலைப் பெருக்குவதற்குத் தாய்மொழியின் பங்களிப்பினை உணர்த்த இப்பாடத்திட்டம் அமைக்கப்பட்டுள்ளது.							
Course Outcome	**On completion of the course, the students will be able to**						BT Mapping (Highest Level)	
	CO1	இலக்கியங்கள் உணர்த்தும் வாழ்வியல் நெறிமுறைகளைப் பேணிநடத்தல்.					**K3**	
	CO2	நமது எண்ணத்தை வெளிப்படுத்தும் கருவியாகத் தாய்மொழியைப் பயன்படுத்துதல்.					**K3**	
	CO3	தகவல் தெடர்புக்குத் தாய்மொழியின் முக்கியத்துவத்தை உணர்தல்.					**K2**	
	CO4	தாய்மொழியின் சிறப்பை அறிதல்.					**K3**	
	CO5	இலக்கிய இன்பங்களை நுகரும் திறன்களை வளர்த்தல்.					**K3**	

UNIT-I	**காப்பியம்**	**Periods: 09**	
சிலப்பதிகாரம்	- வழக்குரைகாதை–காவியுகுநீரும்...முதல் தோற்றான் உயிர்வரை (8 வரிகள்)		**CO1**
மணிமேகலை	-பளிக்கறைபுக்ககாதை–மதுமலர்க் கூந்தல்...முதல் புறமறிப் பாராய் வரை(106-121வரிகள்)		
பெரியபுராணம்	-இளையான குடிமாறநாயனார் புராணம் - உள்ளம் அன்புகொண்டு...(17ஆவது பாடல் மட்டும்)		
கம்பராமாயணம்	- கும்பகர்ணவதைப்படலம் - உறங்குகின்ற கும்பகன்ன... (45ஆவதுபாடல் மட்டும்)		
தேம்பாவணி	-பாலமாட்சிப்படலம் - ஊட்டினார்அருள்...(229 பாடல் மட்டும்)		
சீறாப்புராணம்	- மழையழைப்பித்தப் படலம் - வேயினைமுறித்து எனத் தொடங்கும (15ஆவதுபாடல் மட்டும்)		
UNIT-II	**பதினெண் கீழ்க்கணக்கு நூல்கள்**	**Periods: 09**	
திருக்குறள்	- வலியறிதல் (48),நெஞ்சொடுகிளத்தல் (125)		**CO2**
நாலடியார்	- அரும்பெறல்...(பாடல் எண்:34)		
சிறுபஞ்சமூலம்	-பூவாதுகாய்க்கும்...(பாடல் எண்:22)		
ஐந்திணைஐம்பது	- சுனைவாய்ச் சிறுநீரை...(பாடல் எண்:38)		
கார்நாற்பது	- கருவிளைகண்மலர்போல் பூத்தன...(பாடல் எண்:34)		
களவழிநாற்பது	- ஞாட்பினுளெஞ்சிய (பாடல் எண்:2)		
UNIT-III	**சங்க இலக்கியம் - எட்டுத்தொகை**	**Periods: 09**	
ஐங்குறுநூறு	-பாடல் எண்:44 -தோழி கூற்று		**CO3**
குறுந்தொகை	- பாடல் எண்:224 - தலைவி கூற்று		
நற்றிணை	- பாடல் எண்:284 - தலைவன் கூற்று		
அகநானூறு	- பாடல் எண்:145 - செவிலி கூற்று		
புறநானூறு	- பாடல் எண்:102 -ஔவையார்		
பரிபாடல்	- பாடல் எண்:3 - திருமால் வாழ்த்து (1-11வரிகள்)		
UNIT-IV	**பத்துப்பாட்டு**	**Periods: 09**	
பொருநராற்றுப்படை- வாரியும் வடித்தும்...முதல் பெருந்தகுபாடினிவரை(25-47)			**CO4**
சிறுபாணாற்றுப்படை- பைந்தனைஅவரை...முதல் வென்றிவேலூர் எய்தின் வரை (164-173)			
பெரும்பாணாற்றுப்படை-பார்வையாத்த...முதல் பதம் மிகப் பருகுவீர்வரை (95-105)			
குறிஞ்சிப்பாட்டு	-அண்ணல் நெடுங்கோடு...முதல் சிவந்தகண்ணேம்வரை(54-61)		
மதுரைக்காஞ்சி	-மைபடுபெருந்தோள்...முதல் பெரும்பெயர்மதுரைவரை (687-699)		
நெடுநல்வாடை	-குளிர்காலக்காட்சி- கல்லென் துவலைத்...முதல் பண்ணுமுறைநிறுப்பவரை (64-70)		

UNIT-V	மொழிப்பயிற்சி,இலக்கிய வரலாறு	Periods: 09	
1.முதல்,கரு,உரிப்பொருள் அறிதல் 2.அலகிட்டுவாய்ப்பாடு 3.அணிகள் அறிதல் **இலக்கிய வரலாறு** காப்பியம்,அறஇலக்கியம்,சங்க இலக்கியம் குறித்தப் பாடப்பகுதியை ஒட்டிய இலக்கிய வரலாறு.			**CO5**
Lecture Periods: 45	**Tutorial Periods:-**	**Practical Periods:-**	**Total Periods:45**

Text Books

1. **சிவகுமார்,எஸ்., -கொங்குதேர்வாழ்க்கை,**பாடல் தொகுப்பு நூல் - தொகுதி -1,யுனைடெட் ரைட்டர்ஸ், சென்னை -86. முதற்பதிப்பு.2003.
2. **சாமிநாதையர் டாக்டர் உ.வே.குறுந்தொகை மூலமும் உரையும்,** டாக்டர்உ.வே.சாமிநாதையர் நூல் நிலையம், வெளியீட்டெண்: 277,பெசன்ட் நகர், சென்னை– 600 090.எட்டாம் பதிப்பு– 2020.
3. **வேங்கடராமன், வித்துவான்.ஹெச். (பதி.) - நற்றிணை மூலமும் உரையும்,**டாக்டர்உ.வே.சாமிநாதையர் நூல் நிலையம், வெளியீட்டெண்: 277, பெசன்ட் நகர், சென்னை– 600 090. எட்டாம் பதிப்பு– 2020.
4. **திருவள்ளுவர்- சேயோன் டாக்டர் - திருக்குறள்,**மயிலைத் திருவள்ளுவர்தமிழ்ச் சங்கம்,184,பிராட்வே,சென்னை 600 108
5. **வேங்கடசாமிநாட்டார்,ந.மு., - கார்நாற்பது,களவழிநாற்பது–**சாரதாபதிப்பகம்,சாந்திஅடுக்ககம், ஸ்ரீகிருஷ்ணபுரம் தெரு, இராயப்பேட்டை,சென்னை -14. முதற்பதிப்பு: 2005.

Reference Books

1. **சிற்பிபாலசுப்பிரமணியம் மற்றும் நீலபத்மநாபன் (ப.ஆசி.) –புதியதமிழ் இலக்கியவரலாறு, தொகுதி-1,2,3,**சாகித்திய அகாதெமி, புதுடெல்லி, 2013.
2. **பாக்கியமேரி, வகைமைநோக்கில் தமிழ் இலக்கியவரலாறு (செம்மை மற்றும் விரிவுப் பதிப்பு),**பாரிநிலையம். சென்னை,
3. **ஆனந்தன். சு. முனைவர்., - தமிழ் இலக்கியவரலாறு,** கண்மணிபதீப்பகம், திருச்சி-2. இருபத்தி மூன்றாம் பதிப்பு– 2015.
4. **பரந்தாமனார்,அ.கி.,நல்லதமிழ் எழுதவேண்டுமா,**பாரிநிலையம், சென்னை, 1998.
5. **சம்பத், இரா., (பதி) -தொல்காப்பியக் கவிதையியல் வடிவம்-பாடுபொருள்-உத்தி-வகைமை,**புதுச்சேரி மொழியியல் பண்பாட்டு ஆராய்ச்சி நிறுவனம், புதுச்சேரி-605 001. முதற்பதிப்பு–அக்டோபர் 2015.

Web References

1. http://www.tamilvu.org
2. http://www.tamilweb.com
3. http://www.tamilkodal.com
4. 4. www.store.tamillexican.com
5. 5.www.kala.tamilforu.blogspot.com
6. 6.www.noolagam.com

* TE – Theory Exam, LE – Lab Exam

COs/POs/PSOs Mapping

Cos	Program Outcomes (POs)					Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO 3
1	3	3	3	3	3	3	3	3
2	3	3	3	3	3	3	3	3
3	3	2	3	3	2	3	3	3
4	2	3	2	3	2	2	3	2
5	3	2	3	2	3	3	3	3

Correlation Level: 1:Low, 2:Moderate, 3:High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**French**	Programme: **B.Sc. Chemistry**						
Semester	**Second**	Course Category Code: **AEC**			*End Semester Exam Type: **TE**			
Course Code	**A23FRT202C**	Periods/Week			Credit	Maximum Marks		
		I	T	P	C	CAM	ESE	TM
Course Name	**FRENCH II**	**2**	**0**	**0**	**2**	**25**	**75**	**100**

(Common to B.A.., B.SC., AND BCA Branches)

Prerequisite	French-I

Course Objective	• To introduce the basics of French language to the students		
	• To enable the students to read, understand and write simple sentences		
	• To help them to learn the fundamentals of French grammar		
	• To make the students to formulate correct phrases		
	• To introduce them French and Francophone countries and their cultures		
Course Outcomes	***On completion of the course, the students will be able to***		BT Mapping (Highest Level)
	CO1	Have a general understanding of the language	**K3**
	CO2	Analyze and interpret simple phrases written in French	**K3**
	CO3	Have the basics of French grammar	**K3**
	CO4	Communicate and ask basic questions in French language	**K3**
	CO5	Appreciate the diversity and multiplicity of French and Francophone world	**K3**

UNIT-I		**Periods:09**
1. Qu'est-ce qu'on offre? 2. L'interro-négation. 3. On Solde 4. Le comparatif. 5. Les fêtes		**CO1**
UNIT-II		**Periods:09**
1. Découvrir Paris en bus avec l'open tour. 2. Les verbes pronominaux 3. Si vous gagnez, vous ferez quoi? 4. Le futur simple 5. Les superlatifs.		**CO2**
UNIT-III		**Periods:09**

1. Parasol ou parapluie 2. Le climat en France. 3. Quand il est midi à Paris? 4. L'emploi du temps:métro, boulot, restau. 5. Parler du temps qu'il fait.	**CO3**

UNIT-IV		**Periods:09**

1. Vous allez vivre à Paris? 2. Les régions de France 3. L'avenir du français. 4. La place des adjectifs. 5. Souvenirs d'enfance.	**CO4**

UNIT-V		**Periods:09**

1. J'ai fait mes études à Lyon. 2. Retour des Antilles 3. Raconter ses vacances. 4. Au voleur! Au voleur! 5. Les journaux en France.	**CO5**

Lecture Periods:45	**Tutorial Periods:**	**Practical Periods:-**	**Total Periods:45**

Text Books

1. Sylvie Poisson Quinton and Michèle Maheo, ***Festival 1 Méthode de Français***, CLE editions, 2009 (Leçon-13 to Leçon-24) (p.74-131)

Reference Books

1. Régine Mérieux and Yves Loiseau, *Latitudes 1*, Didier editions, 2017
2. Annie Berthet and Emmanuelle Daili, *Alter Ego + A1*, Hachette editions, 2012
3. Bruno Giradeau, *Réussir le Delf A1*, Didier editions, 2019

Web References

1. https://www.tv5monde.com
2. https://www.rfi.fr
3. https://www.lemonde.fr
4. https://www.frenchpodcasts.com
5. https://www.coursera.org

* TE – Theory Exam, LE – Lab Exam

COs/POs/PSOs Mapping

COs	Program Outcomes (PO)					Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3
1	3	3	3	3	3	1	2	3
2	3	3	3	3	3	1	2	3
3	3	3	3	3	3	1	2	3
4	2	3	3	3	3	1	2	3
5	1	2	1	1	1	1	2	3

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**ENGLISH**	Programme: **B.Sc. Chemistry**						
Semester	**II**	Course Category Code: **AEC**			End Semester Exam Type: **TE**			
Course Code	**A23GET201C**	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**GENERAL ENGLISH - II**	**2**	**0**	**0**	**2**	**25**	**75**	**100**
(Common to B.A.., B.SC., AND BCA Branches)								

Prerequisite	Basic part-two language and knowledge gained from Grammar and Composition	
Course Objectives	To train students to identify poetic forms and issues related to contexts	
	To enable the student in the skill of reading for ideas	
	To enable the students to enjoy the literature through the work of great writer	
	To introduce drama as a social product and a literary form	
	To hone composition skills in students	
Course Outcomes	***On completion of the course, the students will be able to***	BT Mapping (Highest Level)
	CO1 comprehend and discuss the various facets of selected poems	**K3**
	CO2 evaluate and Criticize the prose texts.	**K3**
	CO3 illustrate various reflections and instances in short stories with personal experiences	**K3**
	CO4 develop critical appreciation based on the understanding of the prescribed texts	**K3**
	CO5 enhance the writing skills for specific purposes	**K3**

UNIT-I	**POETRY**	**Periods:09**
1. Nissim Ezekiel -*Minority Poem* 2. Sarojini Naidu – *Indian Weaver* 3. Walt Whitman – *O Captain My Captain* 4. William Blake – *Tyger* 5. Rabindranath Tagore – *Paper Boat*		**CO1**
UNIT-II	**PROSE**	**Periods:09**
1. Jawaharlal Nehru – *A Tryst With Destiny* 2. Martin Luther King – *I have a dream* 3. Swami Vivekananda – *Speech at world Parliament of Religion Chicago*		**CO2**
UNIT-III	**SHORT STORIES**	**Periods:09**
1. Arthur Canon Doyle – *A Scandal in Bohemia* 2. Stephen Crane – *The Open Boat*		**CO3**
UNIT-IV	**DRAMA**	**Periods:09**
1. Cedric Mount Short – *The Never Never Nest* 2. Fritz Karinthy – *Refund*		**CO4**
UNIT-V	**GRAMMAR AND COMPOSITION**	**Periods:09**
1. Cause and Effect Analysis 2. Note Making 3. Picture Comprehension 4. Sentence Pattern 5. Sentence Punctuation		**CO5**

Lecture Periods: 45	**Tutorial Periods: 0**	**Practical Periods:-**	**Total Periods: 45**

Text Books

1. Pegasus, *Scandal in Bohemia & Other Stories*, B Jain Publisher, 2016.
2. Stephen Crane, *The Open Boat and Other Stories*, Createspace Independent Publisher, 2017.
3. Wren & Martin, *Primary School English Grammar and Composition*, Generics Publication, 2023.

Reference Books

1. Anjli Sehrawat, *Mother's Day : Bhagat Phoolsingh Women's University,* Notion Press Publication, 2022.
2. Martin Luther, Heming Daoudi, *Martin Luther King's I have a dream speech*, Kindle Edition, 2020.
3. Stephen Crane, *The Open Boat Stephen Crane*, Createspace Independent Publication, 2013.
4. Rabindranath Tagore, William Radice, *Selected Poems: Rabindranath Tagore*, Penguin Publication, 2000.
5. Swami Tapasyananda, *Swami Vivekananda his life and Legacy*, Ramakrishna Math Publication, 2008.

Web References

1. https://allpoetry.com/Minority-Poem
2. http://www.sourcecodeonline.com/list?q=the_never_never_nest_author_cedric_mount
3. https://www.cam.ac.uk/files/a-tryst-with-destiny/index.html
4. https://poets.org/poem/tyger
5. https://www.poetryfoundation.org/poems/45474/o-captain-my-captain

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)					Program Specific Outcomes (PSOs)		
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3
1	3	2	3	2	3	3	3	3
2	2	3	3	3	2	2	2	2
3	3	2	2	3	1	3	2	3
4	2	3	3	2	1	2	3	2
5	3	3	3	3	3	2	2	3

Correlation Level

High	Moderate	Low
3	2	1

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**Chemistry**			Programme: B.Sc., Chemistry				
Semester	**Second**			Course Category Code: **MJD**		*End Semester Exam Type: **TE**		
Course Code	**A23CHT203D**			Periods/Week		Credit	Maximum Marks	
				L	T	P	C	CAM	ESE	TM
Course Name	**GENERAL CHEMISTRY - II**			**4**	**-**	**-**	**4**	**25**	**75**	**100**
Pre requisite	Higher Secondary Chemistry Book									
Course Objectives	• To know the basic concepts of chemical bonding and hybridization									
	• To explain behavior of "S" block elements									
	• To outline Boron family elements									
	• To understand alkanes and cycloalkanes									
	• To know about basic concepts of aromatic compounds									
Course Outcome	**On completion of the course, the students will be able to**							BT Mapping (Highest Level)		
	CO1	Explain the basic concepts bonding and hybridization						**K3**		
	CO2	Analyze bahaviour of S block elements						**K3**		
	CO3	Understand General Characteristics of boron family						**K3**		
	CO4	Illustrate nomenclature, physical and chemical properties of alkanes and cycloalkane.						**K3**		
	CO5	Outline the chemistry of aromaticity and other chemical properties						**K2**		

UNIT-I	**CHEMICAL BONDING AND HYBRIDIZATION**	**Periods:12**
Chemical bond - definition, types of chemical bonds. Ionic or electrovalent bond - Definition, Illustration of the formation of ionic bond (Examples: NaCl, CaF_2), Born Haber cycle. Covalent bond: Definition, types of covalent bond (single, double and triple), Illustration of the formation of covalent bond (Example: HF, H_2O). Coordinate bond: Definition, Illustration of the formation of coordinate bond (Example: H_2O_2, SO_2).Hydrogen bond: Definition, properties, types and significance of hydrogen bonding. Hybridization – concept - VB theory-sp, sp^2, sp^3, spd, spd^2 -VSEPR theory-Geometry of $SnCl_2$, NH_3.Molecular Orbital Theory- Homonuclear (H_2, Li_2) and Heteronuclear (CO, NO) diatomic molecules.		**CO1**

UNIT-II	**S -BLOCK ELEMENTS**	**Periods:12**
General characteristics - anomalous behaviour of lithium and beryllium – diagonal relationships of lithium with magnesium and beryllium with aluminium. Preparation, properties and uses of lithium hydride, sodium peroxide, potassium iodide, BeO, $BeCl_2$, calcium carbide, $CaCl_2$, super phosphate of lime, Plaster of Paris and lithopone- Biological importance		**CO2**

UNIT-III	**P- BLOCK ELEMENTS (BORON GROUP)**	**Periods:12**
Group 13 (boron group): General Characteristics, extraction of boron, Anomalous behaviour of Boron, Diagonal relationship of boron with silicon, reaction of B with other elements, water, air, acids, alkali, metals and non-metals. Preparation, Properties and structure of diborane. Structure of borazine, boric acid, borohydrides- Hydroboration- Ultramarine. Anomalous behaviour of Aluminium, Inert pair effect of Thallium.		**CO3**

UNIT-IV	**ALKANES AND CYCLOALKANES**	**Periods:12**
Alkanes: Preparation (Catalytic hydrogenation, from alkyl halide, By Wurtz reaction, By Corey- House synthesis), Physical and chemical properties (free radical halogenations reaction). Cycloalkanes: Definition, nomenclature, symbols of cycloalkanes Stability: Baeyer's strain theory and its limitations, Sache-Mohr theory. Conformations of cyclohexane.		**CO4**

UNIT-V	**AROMATIC COMPOUNDS**	**Periods:12**
Criteria for aromaticity – Huckel's rule– aromatic hydrocarbons – cations and anions – annulenes –heterocyclic compounds – consequences of aromaticity: pKa, solubility and dipole moment – molecular orbital description of aromaticity and anti–aromaticity. Electrophilic aromatic substitution– general mechanism – reaction coordinate diagram – mechanism of halogenation, nitration, sulphonation – principle of microscopic reversibility– Friedel–Craft's acylation – acylation followed by Clemmensen and Wolff–Kishner reductions – Gatterman– Koch carbonylation and Friedel–Craft's alkylation – Stille and Suzuki reactions.		**CO5**

Lecture Periods:60	Tutorial Periods: -	Practical Periods:-	Total Periods:60

Text Books

1. Principles of Inorganic Chemistry, B. R. Puri, L. R. Sharma and K. C. Kalia, Shoban Lal Nagin Chand and Co., New Delhi, 2018.
2. R. T. Morrison and R. N. Boyd, Organic Chemistry, 7th edn., Printice-Hall of India Limited, New Delhi, 2010.
3. Principles of Physical Chemistry, B.R Puri, L.R Sharma, M.S. Pathania, 47 th edition, 2016, Vishal publishing

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Reference Books

1. Inorganic Chemistry, D. F. Shriver, P. W. Atkins, W. H. Freeman and Co, London, 2010.
2. Inorganic Chemistry, J. E. Huheey, E. A. Kieter and R. L. Keiter, Harper Collins, New York,
2006, 4th edn.
3. Madan R.D., "Modern Inorganic Chemistry", S. Chand & Company, New Delhi, 2nd Edition, 2004.

Web References

1.https://www.utdallas.edu/~scortes/ochem/OChem1_Lecture/Class_Materials/05_orbitals_hybrid_geom.pdf

2. https://universe.bits-pilani.ac.in/uploads/Dubai/rusalraj/Aromatic%20Compounds.pdf

3. https://colapret.cm.utexas.edu/courses/Chap2.pdf

* TE – Theory Exam, LE – Lab Exam

COs/POs/PSOs Mapping

Cos	Program Outcomes (POs)					Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3
1	1	3	3	2	3	3	3	2
2	2	2	2	3	2	2	2	2
3	3	3	3	2	3	3	3	3
4	2	3	3	3	2	3	2	2
5	3	2	3	2	2	2	2	3

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Assessment Pattern as per Bloom's Taxonomy

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**Chemistry**			Programme: B.Sc., Chemistry				
Semester	**Second**			Course Category Code: **MJD**		*End Semester Exam Type: **TE**		
Course Code	**A23CHT204D**	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**PHYSICAL CHEMISTRY- I**	**4**	**-**	**-**	**4**	**25**	**75**	**100**
Pre requisite	Higher Secondary Chemistry Book							
Course Objectives	• To analyze the basic concepts of nuclear chemistry • To explain Nernst distribution law with application • To outline catalysis process • To understand physical properties like distribution, polarization, magnetism, etc • To know about chemistry of polymer							

Course Outcome	**On completion of the course, the students will be able to**	BT Mapping (Highest Level)
	CO1 Explain the basic concepts of nuclear chemistry	**K3**
	CO2 Analyze Nernst distribution law and its applications	**K3**
	CO3 Relate the functions, types and reaction mechanism of catalysts	**K3**
	CO4 Illustrate physical properties of molecules like distribution, polarization, magnetism etc.	**K3**
	CO5 Outline the chemistry of polymer	**K2**

UNIT-I	**NUCLEAR CHEMISTRY & NATURAL RADIOACTIVITY**	**Periods:12**
NUCLEAR CHEMISTRY: Composition of the nucleus - Nuclear forces, Mass defect -'Binding energy – Binding energy per nucleon (Problems related to this) Nuclear stability and Binding energy. NATURAL RADIOACTIVITY: Types of radioactive rays, Detection and measurement of radioactivity - GM counter method and Wilson cloud chamber method, Fajan's - Russell - Soddy group displacement law – illustration, Laws of radioactive disintegration - derivation of radioactive disintegration constant, average life and half-life period (related simple problems).		**CO1**

UNIT-II	**DISTRIBUTION LAW**	**Periods:12**
Nernst Distribution law - thermodynamic derivation – limitations, association of solute in one of the solvent, dissociation of solute in one of the solvent, solute enters into chemical combination with one of the solvent - Applications of Nernst distribution law.		**CO2**

UNIT-III	**CATALYSIS**	**Periods:12**
Definition- different types of catalysts – homogenous and heterogeneous catalysis, acid-base catalysis, enzyme catalysis- Michaelis-Menton mechanism, auto catalysis- catalytic poisoning- promoters.		**CO3**

UNIT-IV	**MOLECULAR PROPERTIES AND STRUCTURE**	**Periods:12**
Electrical properties of molecules - polarization of a molecule in an electric field, Derivation of Clausius - Mosotti equation, Dipole moments and molecular structure, Magnetic properties of molecules - Magnetic permeability - Magnetic susceptibility - Measurement of magnetic susceptibility, Diamagnetism, Paramagnetism, Ferro magnetism and Anti-Ferromagnetism		**CO4**

UNIT-V	**POLYMER CHEMISTRY**	**Periods:12**
Classification of polymers – Functionality – Tacticity, addition and condensation polymerization, Thermoplastic resin and thermosetting resin, number average and weight average molecular weights, Moulding of polymers – injection and compression.		**CO5**

Lecture Periods:60	**Tutorial Periods: -**	**Practical Periods:-**	**Total Periods:60**

Text Books

1. Puri B.R., Sharma L.R. and Pathania M.S., "Principles of Physical chemistry", Vishal publication, Jalandhar-Delhi, India, 30th Edition, 2007.

2. Billmeyer Jr., F.W, "A text book of Polymer Chemistry", John Willey and Sons, UK. 3rd Edition,1984.
3. Glasstone S. A., "Text book of Physical Chemistry", McMillan India Ltd., 1st Edition, 1999..

Reference Books

1. Bahl B.S., Tuli G.D. and ArunBahl, "Essential of Physical chemistry", S.Chand publications, Ram nagar, New Delhi, India. 1st Edition,2004.
2. Arnikar H.J.,"Essentials of Nuclear Chemistry", New Age international (P) Ltd., New Delhi, India. 4th Edition,2005.
3. Gowarikar V., et al., "Polymer Science", Willey Eastern Limited, New York, USA. 1st Edition, 1986.

Web References

1. https://web.gccaz.edu/~lisys52871/00152note/nuclearchangnotes.pdf
2. https://chemistryonline.guru/distribution-law/
3. https://nptel.ac.in/content/storage2/courses/103103026/pdf/mod1.pdf

* TE – Theory Exam, LE – Lab Exam

COs/POs/PSOs Mapping

Cos	Program Outcomes (POs)					Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3
1	1	3	2	2	3	3	2	2
2	3	2	3	3	2	3	2	2
3	3	3	3	2	3	2	2	3
4	2	3	3	3	2	3	2	3
5	3	2	3	2	2	2	3	3

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Assessment Pattern as per Bloom's Taxonomy

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**MATHEMATICS**			Programme: **B.Sc. Chemistry**				
Semester	**II**			Course Category Code: MID			*End Semester Exam Type: **TE**	
Course Code	**A23MAD206C**			Periods / Week			Credit	Maximum Marks
				L	T	P	C	CAM	ESE	TM
Course Name	**ALLIED MATHEMATICS II**			**3**	**1**	**0**	**4**	**25**	**75**	**100**
(Common to B.Sc. Physics and B.Sc. Chemistry Branches)										
Prerequisite	Basic Mathematics Knowledge									
Course Objectives	To find solutions of Solenoidal and Irrotational.									
	To bring the knowledge of vector calculus and its application in theorems									
	To understand the concept of complete integrals and general integrals.									
	To learn linear differential equations of higher order with constant coefficients									
	To introduce the concept of correlation and regression.									
Course Outcome	**On completion of the course, the students will be able to**									BT Mapping (Highest Level)
	CO1	Understand the concept of Scalar point functions and Vector point functions								**K3**
	CO2	Apply the various techniques of vector integration in solving Line and surface integrals.								**K3**
	CO3	Understand the use of Lagrange's equations								**K3**
	CO4	Solve higher order differential equations.								**K3**
	CO5	Solve problems related to central tendency and measures of dispersion.								**K2**
UNIT-I	**VECTOR ANALYSIS**						**Periods:12**			
Scalar point functions - Vector point functions – Gradient, divergence and curl - Directional derivatives - Unit to normal to a surface – Solenoidal and Irrotational vector field.										**CO1**
UNIT-II	**VECTOR ANALYSIS (continued)**						**Periods:12**			
Line and surface integrals – Gauss Divergence theorem, Stoke's theorem and Green's theorems (without proofs) - Simple problem based on these Theorems.										**CO2**
UNIT-III	**PARTIAL DIFFERENTIAL EQUATION**						**Periods:12**			
Formation of partial differential equation - complete integrals and general integrals - Equations solvable for p, equations solvable for y and equations solvable for x - Lagrange's equations.										**CO3**
UNIT-IV	**PARTIAL DIFFERENTIAL EQUATION(continued)**						**Periods:12**			
Partial derivatives - Total derivatives - Differentiation of implicit functions - Maxima and Minima of two variables - Partial differential equations of higher order with constant coefficients.										**CO4**
UNIT-V	**STATISTICS**						**Periods:12**			
Measures of central tendency – Arithmetic Mean, Median and Mode – Measures of dispersion – Range and its Coefficient, Standard deviation –Measures of Skewness – Pearson's coefficient of Skewness – Correlation – Rank correlation and regression.										**CO5**
Lecture Periods:45		**Tutorial Periods:15**		**Practical Periods:-**			**Total Periods:60**			

Text Books

1. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley, Tenth edition, 2019
2. P. Duraipandian and S. Udayabaskaran, (1997) Allied Mathematics, Vol. I &II. Muhil Publishers, Chennai
3. B.V.Ramana," Higher Engineering Mathematics", Tata McGraw-Hill, New Delhi, Sixth edition 2018.
4. N.P. Bali and Manish Goyal," A Text Book of Engineering Mathematics", Lakshmi Publications, New Delhi, Ninth Edition, 2018

Reference Books

1. P. Balasubramanian and K.G.Subramanian, (1997)Ancillary Mathematics. Vol. I & II. Tata McGraw Hill, New Delhi.
2. S.P.Rajagopalan and R.Sattanathan, (2005) Allied Mathematics, Vol. I & IIVikas Publications, New Delhi.
3. P.R.Vittal, (2003). Allied Mathematics, Marghan Publications, Chennai.
4. P.Kandasamy, K. Thilagavathy, (2003) Allied Mathematics Vol-I, II SChand& company Ltd., New Delhi-55.

5. Isaac, Allied Mathematics. New Gamma Publishing House, Palayamkottai.

Web References

1. http://www.yorku.ca/yaoguo/math1025/slides/chapter/kuttler-linearalgebra –slidesSystemsofquation-handout.pdf
2. https://nptel.ac.in/courses/122/104/122104017/
3. https://nptel.ac.in/courses/111/105/111105122/
4. https://www.khanacademy.org/math/statistics-probability
5. https://www.khanacademy.org/math/precalculus/x9e81a4f98389efdf:trig/x9e81a4f98389efdf:inverse-trig/v/inverse-trig-functions-arcsin

COs/POs/PSOs Mapping

Cos	Program Outcomes (POs)					Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3
1	2	2	3	2	3	2	3	2
2	3	3	3	3	1	3	3	1
3	2	3	2	3	3	2	2	2
4	2	3	2	3	3	2	2	2
5	3	2	3	2	1	3	2	1

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**Chemistry**			Programme: B.Sc., Chemistry				
Semester	**Second**			Course Category Code: **SEC**		*End Semester Exam Type: **PE**		
Course Code	A23CHL202D	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**ORGANIC QUALITATIVE ANALYSIS PRACTICAL**	**0**	**0**	**4**	**3**	**50**	**50**	**100**
Pre requisite	Higher Secondary Chemistry Book							
Course Objectives	• To identify the functional groups of unknown organic compounds.							
	• To know the elements present in the compounds							
	• To understand saturated / unsaturated compounds							
	• To realize the nature of aliphatic / aromatic compounds							
	• To visualize confirmatory tests of various functional groups							
Course Outcome	**On completion of the course, the students will be able to**						BT Mapping (Highest Level)	
	CO1	Learn to approach a problem systematically and to interpret the result logically					**K2**	
	CO2	Detect various functional groups present in an organic compound					**K3**	
	CO3	Understand about Saturation and unsaturation nature of compounds					**K3**	
	CO4	Identify aliphatic and aromatic compounds					**K3**	
	CO5	Visualize confirmatory tests of various functional groups					**K2**	
	List of Experiments				**Periods: 30**			

ANALYSIS OF ORGANIC COMPOUNDS

- Preliminary tests
- Detection of elements present
- Aromatic or Aliphatic
- Saturated or Unsaturated
- Nature of the functional group
- Confirmatory tests and Preparation of derivatives for the functional groups.

THE FOLLOWING FUNCTIONAL GROUP COMPOUNDS MAY BE GIVEN:

Aldehydes, Ketones, Amines, Amides, Diamide, Carbohydrates, Phenols, Acids, Esters and Nitro compounds.

Lecture Periods:	**Tutorial Periods:**	**Practical Periods:-30**	**Total Periods:30**

Text Books

1. Rageeb Md. Usman, Dr. Sunila T, "Practical Hand Book of Systematic Organic Qualitative Analysis", Unicorn Publication Pvt. Ltd,1st Edition, 2015.
2. Israel Arthur Vogel , "Vogel's Textbook of Practical Organic Chemistry", Wiley Edition: 1st Edition, 1989.
3. Arthur Israel Vogel, "Elementary Practical Organic Chemistry"Prentice Hall Press; 3rd Edition, 1980.

Reference Books

1. Venkateswaran. V, Veeraswmay. R, Kulandaivelu. A.R., "Basic Principles of Practical Chemistry", New Delhi, Sultan Chand and Sons.2nd Edition, 1997.
2. Mendham. J, Denney. R.C, Bames. J.D, and Thomas, M. "Vogel's Text book of Quantitative Analysis", Pearson Education,1st Edition,1989.
3. Gopalan.R, Subramaniam.P.S and Rengarajan.K, "Elements of Analytical Chemistry", Sultan Chand and Sons,1st Edition, 2004.

Web References

1. https://assets.cambridge.org/97805212/91125/frontmatter/9780521291125_frontmatter.pdf
2. https://www.csub.edu/chemistry/organic/manual/Lab14_QualitativeAnalysis.pdf
3. http://rushim.ru/books/praktikum/Mann.pdf

* TE – Theory Exam, LE – Lab Exam

COs/POs/PSOs Mapping

Cos	Program Outcomes (POs)					Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3
1	3	3	2	2	1	3	2	3
2	2	2	3	3	1	2	2	2
3	3	3	3	2	1	2	2	2
4	2	1	2	1	-	1	2	3
5	3	3	3	1	2	3	3	1

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)			End Semester Examination (ESE) Marks	Total Marks
	Model Exam	Record	Attendance		
Marks	30	10	10	50	100

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	ENGLISH	Programme: **B.Sc Chemistry.**						
Semester	II	Course Category Code: **MLD**			End Semester Exam Type:-**TE**			
Course Code	**A23ENSA01C**	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**COMMUNICATION SKILLS**	**3**	**0**	**0**	**3**	**25**	**75**	**100**

Prerequisite	Knowledge gained from Communication and New paper reading	
Course Objectives	To improve the skill of rapid reading and communicate efficiently	
	To decode and impart speaking skills with confidence	
	To train students in analyzing articles and Newspaper	
	To enhance the sense of social responsibility and accountability of the students	
	To expound the significance in Managerial skills	
Course Outcomes	***On completion of the course, the students will be able to***	BT Mapping (Highest Level)
	CO1 understand the pattern to communicate effectively	**K3**
	CO2 impart Speaking skills with self-confidence	**K3**
	CO3 enhance their strategies in analyzing articles and Newspaper	**K3**
	CO4 the sense of social responsibility and accountability of the students	**K3**
	CO5 expertise in Managerial skills	**K3**

UNIT-I	**COMMUNICATION SKILLS - SPEAKING**	**Periods:06**
1. Aspects of speaking 2. Process of effective Speech 3. Techniques for effectual Presentation		**CO1**
UNIT-II	**SELF-MANAGEMENT SKILLS**	**Periods:06**
1. Time Management 2. Stress Management 3. Emotional Management		**CO2**
UNIT-III	**COMMUNICATION SKILLS - READING**	**Periods:06**
1. Article analysis 2. Comprehension 3. Skimming and Scanning		**CO3**
UNIT-IV	**SOCIAL SKILLS**	**Periods:06**
1. Leadership 2. Teamwork 3. Decision making		**CO4**
UNIT-V	**PUBLIC SPEAKING AND PRESENTATION**	**Periods:06**
1. Rules and Techniques for Public Speaking 2. Practice session (both, Public Speaking and Presentation)		**CO5**

Lecture Periods:-	**Tutorial Periods:-**	**Practical Periods:30**	**Total Periods:30**

Text Books

1. Barun K. Mitra, Personality Development and Soft skills, Oxford University Press, 2nd Edition, 2016.
2. Syamala, V, Effective English Communication for you, Chennai: Emerald Publisher, 1st Edition, 2002.
3. Sanjay Kumar &PusphLata. Communication Skills, Oxford University Press, 2nd Edition, 2015.

Reference Books

1.Murphy, John J, Pulling Together: 10 Rules for High-Performance Teamwork, Simple Truth Publication, 1st Edition, 2010.
2. Balasubramanian, T, A Textbook of English Phonetics for Indian Students, Trinity Press, 1st Ed, 1981.
3. Sardana,C.K, The Challenge of Public Relations, New Delhi: Harnand Publication,1st Edition, 1995.
4.Sabina Pillai, Agna Fernandez, Soft Skills and Employability Skills, Cambridge University Press, 2017.
5.Jeff Butterfield, Soft Skills for Everyone, Cengage India Private Limited, 2nd Edition, 2020.

Web References

1. https://blog.dce.harvard.edu/professional-development/10-tips-improving-your-public-speaking-skills
2. https://corporatefinanceinstitute.com/resources/careers/soft-skills/management-skills/
3. https://zety.com/blog/how-to-introduce-yourself
4. https://www.butte.edu/departments/cas/tipsheets/readingstrategies/skimming_scanning.html
5. https://www.mayoclinic.org/tests-procedures/stress-management/about/pac-20384898

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)					Program Specific Outcomes (PSOs)		
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3
1	3	3	3	2	3	1	3	3
2	3	3	3	2	3	1	3	2
3	3	3	3	2	2	1	3	2
4	3	3	3	3	3	1	3	2
5	3	3	2	2	2	1	2	2

Correlation Level

High	Moderate	Low
3	2	1

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	80		-	10	10	-	100

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**Chemistry**	**Programme: B.Sc. Chemistry**						
Semester	**II**	Course Category Code: **VAC**			End Semester Exam Type:			
Course Code	**23AETA02C**	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**ENVIRONMENTAL STUDIES**	**2**	**0**	**0**	**2**	**100**	**0**	**100**
Prerequisite	Environmental issues and natural resources							

Course Objectives	To gain knowledge on the importance of natural resources and energy	
	To understand the structure and function of an ecosystem	
	To imbibe an aesthetic value with respect to biodiversity, understand the threats and its conservation and appreciate the concept of interdependence	
	To understand the causes of types of pollution and disaster management	
	To observe and discover the surrounding environment through field work	

Course Outcomes	***On completion of the course, the students will be able to***		BT Mapping (Highest Level)
	CO1	Realize the importance of natural resources and various energy resources	**K1**
	CO2	Learn about the biodiversity	**K1**
	CO3	Learn the different types of pollution and to prevent the pollution	**K2**
	CO4	know about the pollution Act and social issues	**K1**
	CO5	understand Human related issued and environment	

UNIT-I	**INTRODUCTION TO NATURAL RESOURCES/ENERGY**	**Periods:06**	
Natural Resources – Definition – Scope and Importance – Need for Public Awareness Renewable and Non-renewable Resources: Natural resources and associated problems. Forest resources and over-exploitation – Water resources and over- utilization – Mineral resource extraction and its effects - Food resources - food problems and Modern agriculture - Energy resources and its future.			**CO1**
UNIT-II	**ECOSYSTEMS**	**Periods:06**	
Concept of an ecosystem-structure and function of an ecosystem-producers, consumers and decomposers-ecological succession- food chains(any 2 Examples)- food webs(any 2 Examples)-ecological pyramids.			**CO2**
UNIT-III	**ENVIRONMENTAL POLLUTION /DISASTER MANAGEMENT**	**Periods:06**	
Definition-causes, effects and control measures of Air, Water and Soil pollution- e- waste management- Disaster management: Natural and manmade- food/earthquake/cyclone, tsunami and landslides.			**CO3**
UNIT-IV	**SOCIAL ISSUES AND THE ENVIRONMENT**	**Periods:06**	
Sustainable development- Climate change: global warming, acid rain, ozone layer depletion and nuclear radiation- Environment Protection Act (any 2) air, water, wildlife and forest.			**CO5**
UNIT-V	**HUMAN POPULATION AND THE ENVIRONMENT**	**Periods:06**	
Population growth, variation among nations - Population explosion-Family Welfare Programme - Environment and human health - Human rights - Value education - HIV/AIDS - Women and Child Welfare Role of Information Technology in environment and human health			**CO5**

Lecture Periods:30	**Tutorial Periods:-**	**Practical Periods:**	**Total Periods:30**

Text Books

1. K. De, "Environmental chemistry" 9th Ed; New age international (P) Ltd, New Delhi, 2010.
2. K. Raghavan Nambiar, "Text Book of Environmental Studies" 2ndEd, Scitech Publications (India) Pvt Ltd, India, 2010.
3. G. S. Sodhi, Fundamental concepts of environmental chemistry, I Ed, Alpha Science International Ltd, India, 2000.

Reference Books

1. B.K. Sharma, “Environmental chemistry” 11th Ed, Krishna Prakashan Media (P) Ltd, Meerut, 2009.2. S.S.Dara, and 2.
2. D.D. Mishra “A text book of environmental chemistry and pollution control, 5th Ed, S.Chandand Company Ltd, New Delhi, 2012.
3. Richard T. Wright, Environmental Science: Toward a Sustainable Future, 10thedition, Prentice Hall, 2008

Web References

1. www.ifpri.org/topic/environment-and-natural-resources
2. https://www.iucn.org/content/biodiversity
3. http://www.world.org/weo/pollution

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	70		-	20	10	0	100

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**Chemistry**	Programme: B.Sc., Chemistry						
Semester	**Third**	Course Category Code: **MJD**			*End Semester Exam Type: **TE**			
Course Code	**A23CHT305D**	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**ORGANIC CHEMISTRY - I**	**4**	**-**	**-**	**4**	**25**	**75**	**100**
Pre requisite	Higher Secondary Chemistry Book							
Course Objectives	• To understand the chemistry of unsaturated hydrocarbons • To understand the chemistry of alkyl halides • To remember the preparation and properties of different types of alcohols • To understand the Nomenclature, preparation and properties ethers and epoxides • To analyze the chemical reactions of aliphatic aldehydes and ketones							

Course Outcome	**On completion of the course, the students will be able to**	BT Mapping (Highest Level)
	CO1 Apply the knowledge on preparation and properties alkenes and alkynes	**K3**
	CO2 Gain knowledge on preparation and properties of alkyl halides	**K3**
	CO3 Apply the knowledge on preparation and properties of different types of alcohols	**K3**
	CO4 Understand the Nomenclature, preparation and properties ethers and epoxides	**K3**
	CO5 Use the methods of preparation and properties of aliphatic aldehydes and ketones	**K2**

UNIT-I	**UNSATURATE DHYDROCARBONS**	**Periods:12**
Alkenes: Methods of preparation (Catalytic hydrogenation, Birch reduction, Saytzeffs and Hofmann's rule) **–** addition reactions: Markovnikov and anti-Markovnikov addition-mechanism of addition to conjugated dienes. **Alkynes:** Preparation and Acidity of alkynes – chemical reaction (Nucleophilic and electrophilic addition reactions)		**CO1**
UNIT-II	**ALKYLHALIDES**	**Periods:12**
Haloalkanes: Introduction – Methods of Preparation (from alkanes, alkenes, alcohols, Finkelstein reaction). Chemical properties: Substitution reactions (SN_1, SN_2 and SN_i mechanism) – Elimination reactions ($E_1$and E_2 mechanism). Unsaturated alkyl halides: Vinyl and allyl chlorides		**CO2**
UNIT-III	**ALCOHOLS**	**Periods:12**
Monohydric alcohols: Classification (1^0, 2^0 and 3^0) – Ethanol: preparation (from alkenes, alkanes, Grignard reagent) – Physical properties, acidic nature of alcohols, chemical reactions and uses. Dihydric alcohol: Ethylene glycol: Preparation, chemical properties and uses. Trihydric alcohol: Glycerol: Preparation, chemical properties and uses.		**CO3**
UNIT-IV	**ETHERS, THIO ETHER AND EPOXIDES**	**Periods:12**
Ethers: Nomenclature – General methods of preparation, Williamson's Synthesis - Properties-Estimation of number of alkoxy groups– Ziesel's method. Thioethers**:** Nomenclature-General methods of preparation– properties- mustard gas. Epoxides**:** Synthesis–reactions–acid and base-catalyzed ring opening of epoxides– (Symmetrical epoxides only).		**CO4**
UNIT-V	**ALIPHATIC ALDEHYDES AND KETONES**	**Periods:12**
General methods of preparation of carbonyl compounds (by oxidation reactions, By heating calcium salts of carboxylic acids) –Reactivity of carbonyl compounds: Nucleophilic addition reactions (Reaction with HCN, Wittings reaction, Reformsky reaction, Baeyer-Villiger rearrangement, Reactions with NH_3 and their derivatives) – Oxidation reactions, Reduction reactions (Meerwein – Ponndorf - Verley reduction, Wolf-Kishner reduction,		**CO5**

Clemmensen reduction), Aldol Condensation reactions – Cannizaro reaction – Distinguishing aldehydes and ketones

Lecture Periods:60	Tutorial Periods: -	Practical Periods:-	Total Periods:60

Text Books

1.Bhupinder Mehta, Manju Mehta, "Organic Chemistry", Prentice Hall of India Pvt Ltd,.New Delhi, 1st Edition, 2015.
2.B.S.Bahl and Arun Bahl, " Advanced Organic Chemistry", S. Chand and Company Ltd, New Delhi, 1st Edition, 1998.
3.P.L.Soni, "Text Book of Organic Chemistry", Sultan Chand, New Delhi, 1st Edition, 2005

Reference Books

1. I.L.Finar, "Organic chemistry",Vol1, Pearson Edition, Singapore, 6th Edition, 2005.
2. R.T.Morrision and R.N.Boyd, "Organic chemistry", Prentice Hall Private Limited, New Delhi, 6th Edition, 1997.
3. K.S.Tewari, N.K.Vishil and S.N.Mehotra, "A text book of Organic Chemistry" ,,Vikas Publishing House Pvt Ltd, New Delhi, 1st Edition, 2001.

Web References

1. http://www.chem.latech.edu/~upali/chem121/Notes-C13-121.pdf
2. https://alevelchemistry.co.uk/notes/reactions-of-alkyl-halides/
3. https://www.slideshare.net/mizakamaruzzaman/chapter-1-alcohols

* TE – Theory Exam, LE – Lab Exam

COs/POs/PSOs Mapping

Cos	Program Outcomes (POs)					Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3
1	1	3	3	2	3	3	3	2
2	2	2	2	3	2	2	2	2
3	3	3	3	2	3	3	3	3
4	2	3	3	3	2	3	2	2
5	3	2	3	2	2	2	2	3

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Assessment Pattern as per Bloom's Taxonomy

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**Chemistry**	Programme: B.Sc., Chemistry						
Semester	**Third**	Course Category Code: **MJD**			*End Semester Exam Type: **TE**			
Course Code	**A23CHT306D**	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**INORGANIC CHEMISTRY - I**	**4**	**-**	**-**	**4**	**25**	**75**	**100**
Pre requisite	Higher Secondary Chemistry Book							
Course Objectives	• To provide the basic concept on carbon family • To acquire the knowledge on preparation, properties and uses of nitrogen group compounds • To spell the importance of oxygen, oxyhalides and oxyacids of sulphur and biologically important • To compare and evaluate the properties and uses of halogens, oxy acids and noble gases. • To apply the basic concepts and theories of acids and bases and their properties							

Course Outcome		**On completion of the course, the students will be able to**	BT Mapping (Highest Level)
	CO1	Comprehend the properties and structure of allotropes of carbon, silicates and oxides and chlorides of carbon compounds	**K3**
	CO2	Acquire the knowledge on preparation, properties and uses of nitrogen group compounds	**K3**
	CO3	Spell the importance of oxygen, oxyhalides and oxyacids of sulphur and biologically important sulphur compounds	**K3**
	CO4	Compare and evaluate the properties and uses of halogens, oxy acids and noble gases	**K3**
	CO5	Apply the basic concepts and theories of acids and bases and their properties.	**K2**

UNIT-I	**P- BLOCK ELEMENTS (CARBON GROUP)**	**Periods:12**
Group 14 (carbon group): catenation and heterocatenation, allotropy of carbon- Structure of diamond, graphite and fullerenes; Metal carbides, Applications of carbides in industry. Properties and structure of Silicates (ortho-, pyro-, cyclic-, chain-, sheet-, three dimensional silicates)- oxides and chlorides of carbon(CO, CO_2, $COCl_2$, CCl_4), $SiCl_4$, bonding in $(SiH_3)_3N$, Pigments of Lead.		**CO1**
UNIT-II	**P-BLOCK ELEMENTS (NITROGEN GROUP)**	**Periods:12**
Group 15 (nitrogen group): General Characteristics- difference between nitrogen and the rest of the family members. Preparation, properties, structure and uses of hydrazine, hydrazoic acid hydroxylamine. Preparation and structure of ammonia, dinitrogen trioxide, dinitrogen pentoxide, nitrogen dioxide, nitrous oxide, nitric acid, phosphinic acid, phosphonic acid, hypo phosphorus acid, ortho, pyro and meta phosphoric acid – oxides and sulphides of phosphorus- Allotrophy of phosphorus, Arsenic, Antimony and Bismuth. Preparation and uses of sodium bismuthate, As_2O_3, Scheele's green, tartaremetic. Preparation and uses of Urea, triple superphosphate, potassium nitrate		**CO2**
UNIT-III	**P-BLOCK ELEMENTS (OXYGEN GROUP)**	**Periods:12**
Group 16 (oxygen group): structure and allotropy of elements- preparation, properties and structure of ozone, oxides and oxyacids of Sulphur. Halides and oxyhalides of Sulphur, Thionic acids, thionyl chloride, permono and perdi sulphuric acid. Biologically important sulphur compounds – sulphur bridged Molybdenum V dimeric complexes.		**CO3**
UNIT-IV	**HALOGENS**	**Periods:12**
Group 17 (halogens): General characteristics, comparison of oxidizing action of halogens. Nomenclature and structure of oxy acids of halogens. Acid strength of HX- Preparation, properties and structure of Interhalogen and Psuedohalogens compounds: xenon hexafluoride, xenon oxyfluoride and xenon trioxide, ClF, ICl; ClF_3, BrF_3; ClF_5, BrF_5, IF_5, IF_7, $HClO_4$, I_2O_5, Fluorocarbons- structure and properties. Isolation of noble gases from the atmosphere- Uses of noble gases		**CO4**
UNIT-V	**ACIDS AND BASES**	**Periods:12**

Arrehenius concept, proton transfer theory – concept of Lowry and Bronsted – Luxflood concept – the solvent system concept – Lewis concept – Classification of solvents. Relative strength of acids and bases – effect of solvent – leveling effect – effect of polarity and dielectric constant – effect of substituents – factors influencing relative strengths of acids and bases.	**CO5**

Lecture Periods:60	**Tutorial Periods: -**	**Practical Periods:-**	**Total Periods:60**

Text Books

1. Puri.B.R., Sharma.L.R., and Kalia.K.C 2004., "Principles of Inorganic Chemistry", Vallabh Publication, New Delhi, 28th Edition, 2004.
2. Sharma.B.K., "Instrumental methods of chemical analysis", Goel publication, Meerut, 5th Edition, 1996
3. Skoog D.A, James F. Hollar and .Niemans T.A, "Principles of industrial analysis", Thomson Books Cole, Singapore, 5th Edition, 2004.

Reference Books

1. Madan.R.D., "Modern Inorganic Chemistry", S. Chand & Company, New Delhi, 2nd Edition, 2002
2. Albert.F.A., Cotton, "Advanced Inorganic Chemistry", John Wiley & Sons, Inc. New York, 1st Edition, 1998.
3. Huheey J.E and Ellen Keiter A., Richard Keiter L, "Inorganic Chemistry", Pearson Education Pvt Ltd, 4th Edition, 2004.

Web References

* TE – Theory Exam, LE – Lab Exam

COs/POs/PSOs Mapping

Cos	Program Outcomes (POs)					Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3
1	1	3	3	2	3	3	3	2
2	2	2	2	3	2	2	2	2
3	3	3	3	2	3	3	3	3
4	2	3	3	3	2	3	2	2
5	3	2	3	2	2	2	2	3

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Assessment Pattern as per Bloom's Taxonomy

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**Physics**	Programme: B.Sc., Chemistry						
Semester	**Third**	Course Category Code: **MID**			*End Semester Exam Type: **TE**			
Course Code	**A23PHD317C**	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**ALLIED PHYSICS – I**	**4**	**-**	**-**	**4**	**25**	**75**	**100**
Pre requisite	Higher Secondary Physics Book							
Course Objectives	• The course presents an introduction to the physics of the objects whose sizes span from atomic dimensions to macroscopic, human scale dimensions, and beyond: atoms, molecules, gases, liquids, and solids							
	• The aim is to show how the properties of macroscopic bodies can be derived from the knowledge that matter is made up from atoms.							
	• Recognize the difference between physical and chemical properties.							
	• Distinguish between extensive and intensive properties							

Course Outcome	**On completion of the course, the students will be able to**	BT Mapping (Highest Level)
	CO1 To describe the various phenomenon of Kinematics, Mechanics of Solids.	**K3**
	CO2 To describe the various phenomenons of Sound & Acoustics of different structures.	**K3**
	CO3 The relationships between physics on the atomic scale and the properties of matter. Techniques for finding appropriate averages to predict macroscopic behavior.	**K3**
	CO4 To describe the relationship and thermal behavior of various systems	**K3**
	CO5 To describe various concepts of Optics, spectroscopy, Application of light, Fiber Optics etc.,.	**K2**

UNIT-I	**MECHANICS**	**Periods:12**
Center of gravity of a solid hemisphere – Hollow hemisphere – solid cone. Stability of floating bodies- Meta center – Determination of Meta centric height of a ship.		**CO1**
UNIT-II	**SOUND**	**Periods:12**
Simple harmonic motion – composition of two simple harmonic motion – along a straight line – At right angle to each other Lissa Jou's figures and their application – Acoustics of buildings reverberation – reverberation time Sabine's formula – conditions for good acoustics. Decibel – phonon – Intensity measurements by hotwire microscope method		**CO2**
UNIT-III	**PROPERTIES OF MATTER**	**Periods:12**
Diffusion: Fick's law – Coefficients of diffusion – experimental determination of coefficient of diffusion –application. Osmosis: Laws of osmotic pressure Berkeley and Hartley method of determining osmotic pressure –elimination of boiling point and depression of freezing point – application.		**CO3**
UNIT-IV	**THERMAL PHYSICS**	**Periods:12**
Newton's law of cooling –verification – specific heat capacity of liquid by cooling – bomb calorie meter. Conduction: Coefficient of thermal conductivity –good and bad conductor – Stefan's law of radiation – solar constant – Angstrom'sphyro heliometer – temperature of the sun		**CO4**
UNIT-V	**OPTICS**	**Periods:12**
Electromagnetic spectrum – spectral responds of human eye – UV and IR spectroscopy – Raman Effect – Experimental arrangement – application of Raman effect. Fiber optic communication: Introduction – optic fiber – numerical aperture – coherent bundle – fiber optic communication system and its advantage – multimode fiber optic sensors.		**CO5**

Lecture Periods:60	**Tutorial Periods: -**	**Practical Periods:-**	**Total Periods:60**

Text Books

1. Saigal, S, “Sound” Chand & Co, 1st Edition, 1996.
2. D.S. Mathur, “Mechanics”, S. Chand & Co, 1st Edition, 2000.
3. Brijlal Subramaniyam “Properties of Matter”, , S.Chand & Co, 1st Edition, 2002.

Reference Books

1. Resnick Halliday& Walker, “Fundamentals of Physics”, Wiley Publishing Co, 10th Edition, 2013.
2. Resnick Halliday& Walker, “Principles of Physics”, Wiley Publishing Co, 10th Edition, 2015.
3. Brijlal Subramaniyam, “Heat and thermodynamics”, S. Chand & Co, 1st Edition, 2001.

Web References

1. https://ocw.mit.edu/courses/physics/
2. https://www.einstein-online.info/en/category/elementary/
3. https://www.physicsclassroom.com/

COs/POs/PSOs Mapping

Cos	Program Outcomes (POs)					Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3
1	1	3	3	3	3	3	3	3
2	2	2	2	3	2	2	3	3
3	2	2	2	2	2	3	3	2
4	2	3	3	2	2	2	3	2
5	2	3	3	2	2	2	2	3

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Assessment Pattern as per Bloom’s Taxonomy

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**English**	Programme: **B. A.**						
Semester	**Third**	Course Category Code: **MLD**			End Semester Exam Type: **TE**			
Course Code	**A23ENM305C**	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**CONTENT WRITING**	**3**	**0**	**0**	**3**	**25**	**75**	**100**
Prerequisite	Basic part-two language and book reading							

Course Objectives	To familiarize learners with the basic concepts of Content Writing	
	To brief them on the various styles and techniques of writing and editing	
	To sustain their creative faculty	
	To increase the employability of the learners	
	To generate industry-academia interface through institutional support	
Course Outcomes	***On completion of the course, the students will be able to***	BT Mapping (Highest Level)
	CO1 Understand the basic concepts of Content Writing	**K3**
	CO2 Learn the knowledge of various styles and techniques of writing and editing	**K3**
	CO3 Use of their professional skills in their corporate environment	**K3**
	CO4 Corroborate their employability in the field of media	**K3**
	CO5 Write plagiarism free sentences	**K3**

UNIT-I	**FUNDAMENTALS OF CONTENT WRITING**	**Periods: 09**
1. The Concept of Content Writing and its relevance 2. Role and Functions of Content Writers 3. Print and Web Content Writing 4. Scope and Types of Content Writing 5. Principles and processes of content writing		**CO1**
UNIT-II	**TYPES OF CONTENT WRITING**	**Periods: 09**
1. The process of Content Writing – getting the brief, ideating, researching, structuring, formatting 2. Editing and Proof-Reading—following company style sheet, grammar, copy flow, restructuring, 3. market research 4. Writing Styles - Non-fiction (Essays, Reports), Advertising, Newspapers 5. Writing blogs, case studies, white paper		**CO2**
UNIT-III	**CONTENT WRITING IN A CORPORATE ENVIRONMENT**	**Periods: 09**
1. Introduction to Corporate Content Writing: 2. Definition and scope of corporate content writing 3. Principles of Effective Writing 4. Different types of corporate content (blogs, reports, social media posts, press releases)		**CO3**
UNIT-IV	**MEDIA WRITING**	**Periods: 09**
1. Definition and importance of media writing 2. Differences between media writing and other forms of writing 3. The role of content writing in media 4. Principles of Effective Writing for Media		**CO4**
UNIT-V	**PLAGIARISM LAWS IN CONTENT WRITING**	**Periods: 09**
What is plagiarism – Types of plagiarism - Importance of plagiarism – Tips to avoid plagiarism – Plagiarism detection tools		**CO5**

Lecture Periods: 45	**Tutorial Periods: 0**	**Practical Periods: -**	**Total Periods: 45**

Text Books

1. Felder, Lynda. *Writing for the Web: Creating Compelling Web Content Using Words, Pictures, and Sound*. New Riders, CA, USA. ISBN-13: 978-0321794437, ISBN10: 797780321794437.
2. James, Anthony. *Blog Writing: The Content Creation Blueprint*. Amazon Digital Services LLDKDP print US, 2018.
3. Jones, Colleen. *Clout: The Art and Science of Influential Web Content*. New Riders, CA, USA. ISBN-13: 978-

0321733016, ISBN-10: 0321733010.

Reference Books

6. Nielsen, Jakob and Budiu, Raluca. *Mobile Usability*. New Riders, CA, USA. ISBN13: 978-0321884480, ISBN- 10: 0321884485.
7. Redish, Janice. *Letting Go of The Words: Writing Web Content That Works*. Morgan Kaufmann. ISBN: 0123859301.
8. Robinson Joseph. *Content Writing Step-by-step*. Amazon Digital Services LLC--KDP print US, 2020. ISBN: 9798603871929.
9. Williams, Andy. *How To Write Great Website Content in 2019*. Independently published. ISBN: 1731384467.

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1. https://www.mindler.com/blog/how-to-become-a-content-writer-in-india/ https://www.clearvoice.com/blog/10- types-content-writers-use/ https://study.com/articles/What_is_a_Content_Writer.html
2. https://www.entrepreneur.com/article/247908 https://www.locationrebel.com/b2b-writing/
3. https://wordpress.com/support/prevent-content-theft/
4. https://blog.unisquareconcepts.com/content-writing/what- is-plagiarism-why-is-itimportant-for-blog-writing/

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)						Program Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
1	2	2	2	2	2	2	2	2	2	2	2	2
2	2	2	2	2	2	2	2	2	2	2	2	1
3	1	2	2	2	2	1	1	1	1	1	1	1
4	1	1	1	1	1	2	2	2	2	2	2	1
5	1	2	2	2	2	2	2	2	2	1	1	1

Correlation Level

High	Moderate	Low
3	2	1

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**Chemistry**	Programme: B.Sc., Chemistry						
Semester	**Third Year**	Course Category Code: **SEC** *End Semester Exam Type: **TE**						
Course Code	**A23CHL303D**	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**INORGANIC QUALITATIVE ANALYSIS – I**	**0**	**0**	**6**	**3**	**50**	**50**	**100**
Pre requisite	Higher Secondary Chemistry Book							
Course Objectives	• To enable the students to develop analytical skills in inorganic qualitative analysis							
	• To identify and detect various anions and cations through coloured reactions of metal ions							
	• To develop the skill of semi micro analysis							
	• To enable the students to identify the interfering radicals							
	• To understand the complete mechanism of the inorganic qualitative analysis and preparation of inorganic complex							

Course Outcome	**On completion of the course, the students will be able to**	BT Mapping (Highest Level)
	CO1 Enable the students to develop analytical skills in inorganic qualitative analysis	**K2**
	CO2 Identify and detect various anions and cations through coloured reactions of metal ions	**K3**
	CO3 Develop the skill of semi micro analysis	**K3**
	CO4 Enable the students to identify the interfering radicals	**K3**
	CO5 Understand the complete mechanism of the inorganic qualitative analysis and preparation of inorganic complex	**K2**

List of Experiments **Periods: 45**

Qualitative analysis of simple salt containing one anion and one cation.

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Anions: Carbonate, sulphate, halides, nitrate, borate, chromate, fluoride, oxalate, tartrate, and phosphate.

Cations: Lead, bismuth, copper, cadmium, antimony, iron, zinc, cobalt, nickel, manganese, calcium, strontium, barium, & ammonium.

Preparation of the following inorganic complex

i) Preparation of Prussian Blue

ii) Preparation of Tetrammine copper(II) sulphate Tetrahydrate

iii) Preparation of Tetrammine copper(II) Sulphate

iv) Preparation of tristhiourea copper (II) Chloride

v) Preparation of tristhiourea copper(I) sulphate.

Lecture Periods:	**Tutorial Periods:**	**Practical Periods:-45**	**Total Periods:45**

Text Books

1. Vogel's "Text Book of Inorganic Qualitative Analysis", ELBS, London, 4th Edition, 1974.
2. S.P. Bhutani , A. Chhikara , "Practical Organic Chemistry: Qualitative Analysis" ANE Books 1st Edition, 2009.
3. Ahluwalia , "Comprehensive Practical Organic Chemistry: Qualitative Analysis" Universities Press 1st Edition 2000

Reference Books

1. V.V. Ramanujam, “Inorganic Semi Micro Qualitative Analysis”, The National Publishing Company, Chennai, 3rd Edition, 1974.
2. V.Venkateswaran, R.Veerasamy and A.R. Kulandaivelu, “Basic principles of Practical Chemistry”, Sultan Chand & Sons, New Delhi, 2nd Edition, 1997.
3. J. N. Gurtu and R. Kapoor, “Advanced Experimental Chemistry”, S. Chand and Co. 6th Edition, 2010.

Web References

1. http://wwwchem.uwimona.edu.jm/lab_manuals/c10expt25.html
2. https://rushim.ru/books/praktikum/Mann.pdf
3. http://www.iscnagpur.ac.in/study_material/dept_chemistry/3.1_MIS_and_NJS_Manual_for_Qrganic_Qualitative_Analysis.pdf

* TE – Theory Exam, LE – Lab Exam

COs/POs/PSOs Mapping

Cos	Program Outcomes (POs)					Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3
1	3	3	2	2	1	3	2	3
2	2	2	3	3	1	2	2	2
3	3	3	3	2	1	2	2	2
4	2	1	2	1	-	1	2	3
5	3	3	3	1	2	3	3	1

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)			End Semester Examination (ESE) Marks	Total Marks
	Model Exam	Record	Attendance		
Marks	30	10	10	50	100

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**Food Science**	Programme: **B.Sc Nutrition and Dietetics**					
Semester	**Third**	Course Category Code: **VAC**			End Semester Exam Type: **TE**		
Course Code	**A23VAC303D**	Periods / Week			Credit	Maximum Marks	
		L	T	P	C	CAM	ESE	TM
Course Name	**HEALTH AND WELLNESS, YOGA EDUCATION, SPORTS AND FITNESS**	**2**	**0**	**0**	**2**	**100**	**0**	**100**

Prerequisite	**Concept of Health and well-being**
Course Objectives	To learn the basic concept of well -being, Health & Wellness programs and services offered how to access them, and their value to their well-being
	To demonstrate how to get healthy and stay healthy using multiple strategies
	To Identify healthy behaviours and practices that help to avoid and reduce health risks
	Yoga education to practice mental hygiene and Yoga education to integrate moral values
	Yoga education to possess emotional stability and learn the physical fitness management

Course Outcomes	***On completion of the course, the students will be able to***	BT Mapping (Highest Level)
	CO1 Understand the basic concept of well-being, Health & Wellness programs with nutrition values	**K3**
	CO2 Identify the strategies of healthy living	**K3**
	CO3 Have a comprehend knowledge on healthy behaviours and factors affecting health risks.	**K4**
	CO4 practice mental hygiene and Yoga education to integrate moral values	**K3**
	CO5 possess emotional stability and learn the physical fitness management.	**K4**

UNIT-I	**HEALTH & WELLNESS**	**Periods: 06**	
Define and differentiate health and wellness Components of health wellness and their relationship between physical activity Local, demographic, societal issues and factors affecting health and wellness. Diet and nutrition for health & wellness - Essential components of balanced diet for healthy living with specific reference to the role of carbohydrates, proteins, fats, vitamins & minerals - malnutrition, under nutrition and over nutrition.			**CO1**
UNIT-II	**MANAGEMENT OF HEALTH AND WELLNESS**	**Periods: 06**	
Meaning & importance of various dimensions of wellness. Relationship of physical fitness in achieving wellness. Drugs, doping and wellness. Role of diet and exercise in health management			**CO2**
UNIT-III	**YOGA EDUCATION**	**Periods: 06**	
Meaning and definition of yoga and its aims and objectives - Basic principles of yoga and its importance in our daily life Yoga for mental attitude Mind, body, breath and emotional level for higher plan of living			**CO3**
UNIT-IV	**YOGA PRACTICES**	**Periods: 06**	
Types and limbs of yoga , Asana Breathing Practices, Pranayama, Yoga postures Relaxation-Meditation – Mudra.			**CO4**
UNIT-V	**FITNESS ACTIVITIES**	**Periods: 06**	
Types of fitness activities Outdoor activities Basic movement patterns. Indoor activity - Aerobics/Dance Fitness, Resistance Training for fitness.			**CO5**

Lecture Periods: 30	**Tutorial Periods: 0**	**Practical Periods: 0**	**Total Periods: 30**

Text Books

1. Physical Activity and Health by Claude Bouchard, Steven N. Blair, William L. Haskell. 2. Mental Health Workbook by Emily Attached & Marzia Fernandez, 2021.
2. Mental Health Workbook for Women: Exercises to Transform Negative Thoughts and Improve Well Being by Nashay Lorick, 2022
3. Lifestyle Diseases: Lifestyle Disease Management, by C. Nyambichu & Jeff Lumiri, 2018.
4. Physical Activity and Mental Health by Angela Clow & Sarah Edmunds, 2013.
5. The Fitness Mindset by Brian Keane Health Promotion: Mobilizing Strengths to Enhance Health, Wellness, and

Well-being [1 ed.] F.A. Davis Company.
6. Yoga RX: A Step-by-Step Program to Promote Health, Wellness, and Healing for Common Ailments, Broadway.
7. Advanced Hatha Yoga: Classic Methods of Physical Education and Concentration [1 ed.), Inner Traditions.
8. Yoga and Physical Education, National Council of Educational Research and Training (NCERT), India.

Reference Books

1. Wealth First: Winning at Weight Loss and Wellness.
2. Administration of Health and Physical Education Programme. Bucher, Charles A
3. Treaties of Hygiene and Public Health, Ghosh, B.N.
4. Principles of Public Health Administration 2003, Hanlon, John J. 14. The School Health and Health Education, Turner, C.E.
5. Health Education (National Education Associati of U.T.A.), Moss et. al.
6. The School Health Education (Harber and Brothers, New York), Nemir A. 17. Nutrition Encyclopedia, edited by Delores C.S. James, The Gale Group, Inc.
7. The Stone Age Health Programme: Diet andExercise as Nature Intended. Angus and Robertson, Boyd-Eaton S. et al (1989).
8. Stress, How Your Diet can Help: The Practical Guideto Positive Health Using Diet, Vitamins, Minerals, Herbs and Amino Acids, Thorons, Terras S. (1994).

Web References

1. https://www.weljii.com/blog/what-are-the-5-components-of-health-and-wellness/#:~:text=Health%20and%20wellness%20can%20be,%2C%20intellectual%2C%20social%20and%20spiritual.
2. https://www.slideshare.net/slideshow/health-wellness-managementpptx/252295704
3. https://www.calm.com/blog/types-of-yoga

Evaluation Method

Marks Distribution	Assessment			ESE MARKS	TOTAL MARKS
	CAT I & CAT II	Report	Attendance		
	70	20	10	-	100

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**Chemistry**	Programme: B.Sc., Chemistry						
Semester	**Fourth**	Course Category Code: **MJD**			*End Semester Exam Type: **TE**			
Course Code	**A23CHT407D**	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**ORGANIC CHEMISTRY - II**	**4**	**-**	**-**	**4**	**25**	**75**	**100**
Pre requisite	Higher Secondary Chemistry Book							
Course Objectives	• To gain knowledge of carboxylic acid and their derivatives • To know the preparation and properties of aldehydic and ketonic acids • To gain knowledge on aliphatic nitrogen compounds • To understand preparation, properties and synthesis of organometallic reagents • To observe the classification and structure carbohydrates							

Course Outcome	**On completion of the course, the students will be able to**	BT Mapping (Highest Level)
	CO1 Tell the chemistry of saturated, unsaturated and substituted carboxylic acid	**K3**
	CO2 Comprehend the preparation, properties and synthetic applications of aldehydic and ketonic acid	**K3**
	CO3 Explain the preparation and chemical properties of aliphatic nitrogen compounds	**K3**
	CO4 Develop their knowledge on the chemistry of organometallic reagents	**K3**
	CO5 Apply the chemistry of carbohydrates like glucose, fructose, sucrose, starch and cellulose	**K2**

UNIT-I	**CARBOXYLIC ACID AND THEIR DERIVATIVES**	**Periods:12**
Saturated Monocarboxylic acids: Resonance structure of the carboxyl group – relative strength of acidity of carboxylic acids (effect of substituent effect). Acid derivatives (preparation and chemical properties): acid chlorides, anhydrides, amides and esters. Unsaturated monocarboxylic acids: Preparation and chemical reactions of acrylic and crotonic acids. Hydroxyl acids – alpha and beta hydroxyl acids – preparation and reactions – action of heat – chemistry of lactic and tartaric acids.		**CO1**
UNIT-II	**ALDEHYDIC AND KETONIC ACIDS**	**Periods:12**
Preparation and properties of glyoxalic acids, pyruvic and laevulic acid – Preparation and syntheticimportance of acetoacetic ester. Dicarboxylic acids: Preparation and properties of Oxalic acid, malonic acid, succinic acid, glutaric acids – reactions of reactive methylene group. Unsaturated dicarboxylic acid: Preparation and properties of fumaric and maleic acid.		**CO2**
UNIT-III	**ALIPHATIC NITROGEN COMPOUNDS**	**Periods:12**
Nitroalkanes: Preparation, properties, and structure of nitroalkanes – chemical reactions of nitroalkanes. Alkyl cyanides and isocyanides: Preparation and chemical reactions – Distinction between ethylcyanide and ethyl isocyanides. Aliphatic amines: Classification – Nomenclature - General methods of preparation, primary amine preparation (Lossen rearrangement, Hofmann degradation of amides, Curtius reaction) – Properties and reaction - separation of mixture of amines (Hofmann's method) – Basicity of amines - distinction between primary, secondary and tertiary amine. Aliphatic diazo compounds: Preparation and properties of diazomethane.		**CO3**
UNIT-IV	**ORGANOMETALLIC REAGENTS**	**Periods:12**
Organo magnesium halides: preparation, reactions and synthetic uses of Grignard reagents and its limitations. Organo lithiums: General methods of preparation, reactions, and synthetic applications. Lithium Dialkylcuprates (Gilman reagent): Preparation and synthetic uses. Tetra ethyl lead (TEL): preparation, reactions and synthetic uses		**CO4**
UNIT-V	**CARBHOYDRATES**	**Periods:12**

Introduction and classification — glucose – mutarotation – Killiani-Fischer synthesis – Ruff degradation - structure elucidation of glucose – Fructose: Structure elucidation of fructose - methods of interconversion between aldose and ketose – Disaccharides – sucrose – structure elucidation – Polysaccharides - starch and cellulose (classification and structure only).	**CO5**

Lecture Periods:60	**Tutorial Periods: -**	**Practical Periods:-**	**Total Periods:60**

Text Books

1. Bhupinder Mehta, Manju Mehta, "Organic Chemistry-ll", Prentice Hall of India Pvt Ltd, New Delhi, 1St Edition, 2015.
2. B.S. Bahl and Arun Bahl, "Advanced Organic Chemistry", S.Chand and Company Ltd, New Delhi, 1st Edition, 1998.
3. Arthur Winter, "Organic Chemistry - I", John Wiley & Sons, 1st Edition, 2005.

Reference Books

1. I. L. Finar, "Organic chemistry Vol I", Pearson Edition, Singapore ,6th Edition, 2005.
2. R.T. Morrision, and R.N. Boyd, "Organic chemistry", Prentice Hall Private Limited, New Delhi, 6th Edition, 1997.
3. P.L. Soni, "Text Book of Organic Chemistry", Sultan Chand, New Delhi, 7th Edition, 2005.

Web References

1. https://www.medicalnewstoday.com/articles/161547
2. https://www.britannica.com/science/carboxylic-acid
3. https://onlinelibrary.wiley.com/doi/abs/10.1002/0471435139.tox059.pub2

* TE – Theory Exam, LE – Lab Exam

COs/POs/PSOs Mapping

Cos	Program Outcomes (POs)					Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3
1	1	3	3	2	3	3	3	2
2	2	2	2	3	2	2	2	2
3	3	3	3	2	3	3	3	3
4	2	3	3	3	2	3	2	2
5	3	2	3	2	2	2	2	3

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Assessment Pattern as per Bloom's Taxonomy

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**Chemistry**	Programme: B.Sc., Chemistry						
Semester	**Fourth**	Course Category Code: **MJD** *End Semester Exam Type: **TE**						
Course Code	**A23CHT408D**	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**AGRICULTURAL CHEMISTRY**	**4**	**-**	**-**	**4**	**25**	**75**	**100**

Pre requisite	Higher Secondary Chemistry Book
Course Objectives	• To gain knowledge on soil, texture of soil and various properties of soil • To improve knowledge on importance of fertilizers • To get idea about manure and green manure • To study classification, uses and effects of pesticides • To improve the knowledge on genetically modified organisms

Course Outcome	**On completion of the course, the students will be able to**	BT Mapping (Highest Level)
	CO1 Understand soil, texture of soil and various properties of soil	**K3**
	CO2 Apply fertilizers on soil based on the requirement	**K3**
	CO3 Know the classification and preparation of manure	**K3**
	CO4 Understand classification, uses and effects of pesticides	**K3**
	CO5 Understand genetically modified organisms	**K2**

UNIT-I	**SOIL**	**Periods:12**
Introduction to soil – soil classifications & survey – properties of soil – soil texture – soil water – soil temperature – soil colloids – soil minerals – soil pH – acidity & alkalinity – Buffering of soil – soil fertility – soil formation		**CO1**
UNIT-II	**FERTILIZERS**	**Periods:12**
Definition – classification of fertilizer – nitrogenous – phosphate & potash fertilizers – effect of fertilizer on plant growth – commercial method of preparation of urea, Ammonium phosphate, Triple superphosphate – Secondary nutrients – micronutrients and their function in plants		**CO2**
UNIT-III	**MANURES**	**Periods:12**
Classification & importance of organic manures, properties & methods of preparation of bulky manures – Farm yard manure – fish manure – compost – Green manuring – night soil – Biogas- concentrated organic manure, importance of C: N ratio in rate of decomposition.		**CO3**
UNIT-IV	**PESTICIDES**	**Periods:12**
Historical background of pesticides – classification of Pesticides –methods of pest control – insecticides – DDT, BHC – Herbicides – 2, 4 D & 2, 4, 5, 7 – fungicides – borderaux mixture. Benefits of pesticides – Adverse effects of pesticides.		**CO4**
UNIT-V	**GENETICALLY MODIFIED ORGANISMS**	**Periods:12**
Genetically modified crops – Actualities & potential, Resistance to genetically modified foods – moral issues, political issue, health & environmental issues. Benefits of genetically modified food, organic foods.		**CO5**

Lecture Periods:60	**Tutorial Periods: -**	**Practical Periods:-**	**Total Periods:60**

Text Books

1. M. Subhashini "Agricultural Chemistry" –, 2017, Crystal publishers, Chennai, S
2nd Edition, 2017.
. Brady. N. C. The Nature & properties of soils- Emasia publishing. Housae (P) Ltd 4th Edition -2003
3. A. K. De "Environmental Chemistry" New Age Publisher International Pvt Ltd First Edition, 2016

Reference Books

1. B. A. Yagodin. Agricultural Chemistry, vol I & II Mir Publishers (Mos COW), 1976 new

century books (P) Ltd.
2. R. Cremlyn, Pesticides, Jhone Wiley New York 1978
3. Jayashree Ghost., Fundamental concept of Applied 72hem., S. Chand & CO Ltd.,

Web References

1. https://www.soils.org/files/about-soils/soils-overview.pdf
2. https://hidot.hawaii.gov/highways/files/2013/02/Landscape-ch11_FERTILIZERS.pdf
3. https://opjsrgh.in/Content/Worksheet/PRACTICE-WS/2021-2022/day32/12-AGRICULTURE.pdf

* TE – Theory Exam, LE – Lab Exam

COs/POs/PSOs Mapping

Cos	Program Outcomes (POs)					Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3
1	1	3	3	2	3	3	3	2
2	2	2	2	3	2	2	2	2
3	3	3	3	2	3	3	3	3
4	2	3	3	3	2	3	2	2
5	3	2	3	2	2	2	2	3

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Assessment Pattern as per Bloom's Taxonomy

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**Physics**	Programme: B.Sc., Chemistry						
Semester	**Fourth**	Course Category Code: **MID** *End Semester Exam Type: **TE**						
Course Code	**A23PHD418C**	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**ALLIED PHYSICS – II**	**4**	**-**	**-**	**4**	**25**	**75**	**100**

Pre requisite	Higher Secondary Chemistry Book	
Course Objectives	• The course presents an introduction to the physics of the objects whose sizes span from atomic	
	• The aim is to show how the properties of macroscopic bodies can be derived from the knowledge that matter is made up from atoms.	
	• Recognize the difference between physical and chemical properties.	
	• Distinguish between extensive and intensive properties.	
	• The course presents an introduction to the physics of the objects whose sizes span from atomic dimensions to macroscopic, human scale dimensions, and beyond: atoms, molecules, gases, liquids, and solids.	
Course Outcome	**On completion of the course, the students will be able to**	BT Mapping (Highest Level)
	CO1 To describe the concepts and phenomenon of Electrostatics, Charges and its energy etc	**K3**
	CO2 To describe the concepts of electricity, Solenoid, Induction etc.	**K3**
	CO3 To describe the concepts of Atomic structure, X-rays, Powder diffraction concepts etc	**K3**
	CO4 To describe the relationship and behavior of nucleus and its structure	**K3**
	CO5 To study the concepts of GATE circuits, types and binary calculations etc	**K2**

UNIT-I	**ELECTROSTATICS**	**Periods:12**
Coulomb's law – Gauss theorem its application Field due to an infinite long plane, sphere and cylinder Mechanical force on the surface of a charged conductor – Electrostatics energy in the Medium-Capacitors – Principles of a capacitor – Capacity of a capacitor – Capacity of an isolated sphere and cylinder – Energy of a charged capacitor – Sharing of charges and loss of energy.		**CO1**
UNIT-II	**ELECTRICITY**	**Periods:12**
Kirchhoff's law's and their applications to Whetstone's network – condition for bridge balance – Carey Foster's bridge – Laws of electromagnetic Induction – Expression for induced EMF – Self and Mutual Induction – Self Inductance of a Solenoid – Mutual Inductance of a Solenoid Inductor – Coefficient of coupling – Determination of coefficient of self inductance by Raleigh's Method.		**CO2**
UNIT-III	**ATOMIC PHYSICS**	**Periods:12**
Atom models: Somerfield's and Vector atom Models – Pauli's exclusion principle – various quantum numbers and quantization of orbits. **X-rays:** Continuous and characteristic X-ray – Mosley's Law and its importance Bragg's Law – Miller indices – Determination of Crystal structure by Laue's Powder photograph method.		**CO3**
UNIT-IV	**NUCLEAR PHYSICS**	**Periods:12**
Nucleus – Nuclear size – charge – Mass and spin – Liquid drop and Shell models.Nuclear Radiations and their properties, particle accelerators – Betatron and Proton Synchrotron, Particles and their classifications		**CO4**
UNIT-V	**DIGITAL ELECTRONICS**	**Periods:12**
Decimal – Binary – Octal and Hexa Decimal number systems and their Mutual conversions – 1's and 2's complement of a Binary number and Binary arithmetic (Addition, Subtraction, Multiplication and Division) – Binary subtraction by 1's and 2's complement methods – Basic logic gates – AND, OR, NOT, NOR, NAND AND EXOR Gates – NAND and NOR as universal building gates – Boolean Algebra – Laws of Boolean Algebra – De-Morgan's Theorems – Their		**CO5**

verifications using truth tables.

Lecture Periods:60	Tutorial Periods: -	Practical Periods:-	Total Periods:60

Text Books

1. Khare and Srivastava, "Magnetism and Electricity", Atma Ram and sons- New Delhi. 9th Edition, 1976.
2. R Murugeshan , Kiruthiga Sivaprasath, "Modern Physics", S. Chand and Co, 18th Edition, 2016.
3. Malvino and Leach "Digital principles and their applications", Tata McGraw Hill,8th Edition,1993

Reference Books

1. Resnick Halliday& Walker, "Fundamentals of Physics", Wiley Publishing Co, 10th Edition, 2013.
2. Resnick Halliday& Walker, "Principles of Physics", Wiley Publishing Co, 9th Edition, 2014.
3. HC Verma, "Concepts of Physics", Bharati Bhavan Publisher, 4th Edition, 1999.

Web References

1. https://ocw.mit.edu/courses/physics/
2. https://www.einstein-online.info/en/category/elementary/
3. https://www.physicsclassroom.com/

* TE – Theory Exam, LE – Lab Exam

COs/POs/PSOs Mapping

Cos	Program Outcomes (POs)					Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3
1	1	3	3	2	3	3	3	2
2	2	2	2	3	2	2	2	2
3	3	3	3	2	3	3	3	3
4	2	3	3	3	2	3	2	2
5	3	2	3	2	2	2	2	3

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Assessment Pattern as per Bloom's Taxonomy

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**Chemistry**	Programme: B.Sc., Chemistry						
Semester	**Fourth**	Course Category Code: **MJD** *End Semester Exam Type: **PE**						
Course Code	**A23CHL404D**	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**Inorganic Qualitative Analysis - II**	**0**	**0**	**6**	**3**	**50**	**50**	**100**
Pre requisite	Higher Secondary Chemistry Book							
Course Objectives	• To identify the acid radical in the inorganic compounds. • To know the special elements present in the inorganic compounds • To understand saturated / unsaturated complex salts. • To realize the interfering radicals mixture salts. • To visualize confirmatory tests for cations and anions.							

Course Outcome	**On completion of the course, the students will be able to**	BT Mapping (Highest Level)
	CO1 Analyse the acid radicals present in any given inorganic salt.	**K2**
	CO2 Eliminate the interfering acid radicals	**K3**
	CO3 Identify the basic radical and its group	**K3**
	CO4 Analyse the basic radical systematically	**K3**
	CO5 Develop their qualitative analysis skill of any given inorganic salt	**K2**

List of Experiments **Periods: 45**

Semi Micro Qualitative Analysis:

- Qualitative analysis of a mixture containing two anions and two cations.
- Analysis of a mixture containing two cations and two anions of which one will be an interfering ion.
- **Anions**: Carbonate, sulphate, chloride, nitrate, borate, chromate, oxalate, tartrate, and phosphate.
- **Cations**: Lead, bismuth, copper, cadmium, antimony, iron, zinc, cobalt, nickel, manganese, calcium, strontium, barium, & ammonium.

Lecture Periods:	**Tutorial Periods:**	**Practical Periods:-45**	**Total Periods:45**

Text Books

1. V.Venkateswaran, R.Veerasamy and A.R. Kulandaivelu, "Basic principles of Practical Chemistry", New Delhi, Sultan Chand & sons, 2nd Edition, 1997.
2. V.V Ramanujam, "Inorganic Semi Micro Qualitative Analysis", The National Publishing Company, Chennai, 3rd Edition,1974.
3. Vogel's "Text Book of Inorganic Qualitative Analysis", , ELBS, London, 4th Edition 1974.

Reference Books

1. J. N. Gurtu and R. Kapoor, "Advanced Experimental Chemistry", S. Chand and Co. 6th Edition, 2010.
2. Maharudra Chakraborty, "Handbook of Inorganic Qualitative Analysis", Independently Published. 2nd Edition, 2019.
3. Dr. K. R. Mahadik, "A Handbook of Practical Chemistry", Nirali Prakasam Publication, 1st Edition, 2018.

Web References

1. https://www.pragationline.com/a-handbook-of-practical-chemistry-inorganic-and-organic-mahadik-bhosale/
2. https://www.bol.com/nl/p/handbook-of-inorganic-qualitative-analysis/9200000112041728/
3. https://www.flipkart.com/chemistry-practical-handbook-semi-micro-qualitative-inorganic analysis/p/itm3e0f60847a5c4

* TE – Theory Exam, LE – Lab Exam

COs/POs/PSOs Mapping

Cos	Program Outcomes (POs)					Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3
1	3	3	2	2	1	3	2	3
2	2	2	3	3	1	2	2	2
3	3	3	3	2	1	2	2	2
4	2	1	2	1	-	1	2	3
5	3	3	3	1	2	3	3	1

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)			End Semester Examination (ESE) Marks	Total Marks
	Model Exam	Record	Attendance		
Marks	30	10	10	50	100

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**Chemistry**	Programme: **B.Sc. Chemistry**						
Semester	**Fourth**	Course Category Code: CES			*End Semester Exam Type: L**E**			
Course Code	**A23CHP401D**	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**Community Engagement Service(PROJECT)**	**0**	**0**	**4**	**2**	**100**	**0**	**100**

- As part of our curriculum requirement, our students have to engage in community service. The curricular component of community engagement and service' seeks to expose students to the socio-economic issues in society so that the theoretical learning can be supplemented by actual life experiences to generate solutions to real-life problems. Community Engagement shall be conducted for a minimum of 2 weeks.

Evaluation Method

	Continuous Assessment Marks (CAM)					**Total Marks**
Community Engagement Service	**REPORT**			**PRESENTATION**	**VIVA**	**100**
	Review 1	**Review 2**	**Review 3**	**40**	**10**	
	10	**20**	**20**			

Department	**Computational Studies**	Programme: **B.Sc. Chemistry**						
Semester	**Four**	Course Category Code: **VAC**			*End Semester Exam Type:			
Course Code	**A23VAC404C**	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**Digital Technologies**	**2**	**0**	**0**	**2**	**100**	**0**	**100**
Prerequisite	Basic Knowledge in digital India							

Course Outcome	*After the completion of this course, the students will be able to:*	BT Mapping (Highest Level)
	CO1 Get introduced to the digital systems and its building blocks	**K2**
	CO2 Understand how the Digital Communication happens and to Learn the advantages and disadvantages including Cyber security	**K2**
	CO3 Learn the day-to-day digital activities and the initiatives on Digital India	**K3**
	CO4 Acquire knowledge on current Technologies and Trends in Digital Space	**K4**
	CO5 Explore the applications on the state of the art in Digital Technologies	**K4**

UNIT-I	**INTRODUCTION**	**Periods: 6**
Digital Systems – Information & Communication Technology – ICT Tools. Computer Architecture – Software – Hardware – Operating System– Algorithms – Flowcharts		**CO 1**

UNIT-II	**COMMUNICATION SYSTEMS & CYBERSECURITY**	**Periods: 6**
Transmission Media – Computer Networks – Internet – Web Browsers – Search Engines – Messaging – Email – social media – Online Ethics Threats – Significance – Challenges – Precautions – Safety Measures – Cyber Crime Awareness		**CO 2**

UNIT-III	**DIGITAL INDIA & E-GOVERNANCE**	**Periods:6**
Initiatives - Unified Payment Interface – Aadhar online services – Credit / Debit Cards – e-Wallets – Mobile and Internet Banking – NEFT / RTGS / IMPS – Online Payments & PoS – Digital Accessibility		**CO 3**

UNIT-IV	**EMERGING TECHNOLOGIES & APPLICATIONS**	**Periods: 6**
Overview of Artificial Intelligence – Cloud Computing – Big Data – Internet of Things – Virtual Reality – 5G – 3D Printing		**CO 4**

UNIT-V	**CASE STUDIES**	**Periods: 6**
Any one case study on the emerging technologies and report submission by the candidates		**CO 5**

Lecture Periods: 30	**Tutorial Periods: -**	**Practical Periods: -**	**Total Periods: 30**

Text Books

1. Pramod Kumar, Anuradha Tomar, R. Sharmila, “Emerging Technologies in Computing - Theory, Practice, and Advances”, Chapman and Hall / CRC, First Edition, 2021, https://doi.org/10.1201/9781003121466.
2. V. Rajaraman, “Introduction to Information Technology”, PHI, Third Edition, 2018.

Reference Books

1. Rajkumar Buvya, James Broberg, and Andrzej Gosciniski, “Cloud Computing- Principals and Paradigms”, Wiley, 2011.
2. Stuart Russel and Peter Norvig, “Artificial Intelligence - A Modern Approach”, Pearson Education, Third Edition, 2010.
3. Samuel Greengard, “Internet of Things”, The MIT Press, 2015, https://doi.org/10.7551/mitpress/10277.001.0001.
4. C.S.V. Murthy, “E- Commerce – Concept, Models &Strategies”, Himalaya Publishing House, 2015.

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)					Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3
1	2	3	3	3	3	2	2	2
2	3	3	2	3	2	3	3	2
3	2	2	3	3	2	3	3	2
4	3	3	2	2	2	3	3	3
5	2	2	2	3	3	3	2	2

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)				Total Marks
	Exam	Report	Assignment*	Attendance	
Marks	70	10	10	10	100

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**Chemistry**	Programme: **B.Sc. Chemistry**						
Semester	**Four**	Course Category Code: **EEC**			*End Semester Exam Type:			
Course Code	A23CHC404D				Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	Java Programming	**0**	**0**	**4**	**0**	**100**	**0**	**100**
Prerequisite	Basic Computer knowledge							

IT SPECIALIST EXAM OBJECTIVES

CERTIPORT
A PEARSON VUE BUSINESS

Java

Candidates for this exam are application developers working with Java 6 SE or later, secondary and immediate-post-secondary students of software development, or entry-level software developers.

Candidates should have at least 150 hours of instruction or hands-on experience with Java, be familiar with its features and capabilities, and understand how to write, debug and maintain well-formed, well-documented Java code.

To be successful on the test, the candidate is also expected to have the following prerequisite knowledge and skills:

- 8th grade reading skills
- Algebra II
- Basic computer operating system skills
- Command-line interface experience

1. Java Fundamentals

1.1 Describe the use of main in a Java application

- Signature of main, how to consume an instance of your own class, command-line arguments

1.2 Perform basic input and output using standard packages

- Print statements, import and use the Scanner class

1.3 Evaluate the scope of a variable

- Declare a variable within a block, class, or method

1.4 Comment and document programs

- Evaluate the syntax of Javadocs, write syntactically correct code comments

2. Data Types, Variables, and Expressions

2.1 Declare and use primitive data type variables

- Data types, including byte, char, int, double, short, long, float, Boolean; identify when precision is lost; initialization; how primitives differ from wrapper object types such as Integer and Boolean

2.2 Construct and evaluate code that manipulates strings

- String class and string literals, comparisons, concatenation, case, and length; String.format methods; string operators; the immutable nature of strings; initialization; null

2.3 Construct and evaluate code that creates, iterates, and manipulates arrays and array lists

- One- and two-dimensional arrays, including initialization, null, size, iterating elements, accessing elements; array lists, including adding and removing elements, traversing the list

2.4 Construct and evaluate code that performs parsing, casting, and conversion

- Cast between primitive data types, convert primitive types to equivalent object types, parse strings to numbers, convert primitive data types to strings

INFORMATION TECHNOLOGY SPECIALIST

IT SPECIALIST EXAM OBJECTIVES

2.5 Construct and evaluate arithmetic expressions

- Arithmetic operators, assignment, compound assignment operators, operator precedence

3. Flow Control Implementation

3.1 Construct and evaluate code that uses branching statements

- if, else, else if, switch; single-line vs. block; nesting; logical and relational operators

3.2 Construct and evaluate code that uses loops

- while, for, for each, do while; break and continue; nesting; logical, relational, and unary operators

4. Object-Oriented Programming

4.1 Construct and evaluate class definitions

- Constructors, constructor overloading, one class per .java file, this keyword, basic inheritance and overriding

4.2 Declare, implement, and access data members in classes

- private, public, protected; instance data members; static data members; use static final to create constants; describe encapsulation

4.3 Declare, implement, and access methods

- private, public, protected; method parameters; return type; void; return value; instance methods; static methods; overloading

4.4 Instantiate and use class objects in programs

- Instantiation, initialization, null, access and modify data members, access methods, access and modify static members, import packages and classes

5. Code Compilation and Debugging

5.1 Troubleshoot syntax errors, logic errors, and runtime errors

- Print statements, javac command output, logic errors, console exceptions, stack trace evaluation

5.2 Implement exception handling

- try, catch, finally; Exception class; exception class types; display exception information

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