



SRI MANAKULA VINAYAGAR ENGINEERING COLLEGE

(An Autonomous Institution)

(Approved by AICTE, New Delhi & Affiliated to Pondicherry University)
(Accredited by NBA-AICTE, New Delhi, ISO 9001:2000 Certified Institution &
Accredited by NAAC with "A" Grade)

Madagadipet, Puducherry - 605 107



SCHOOL OF ARTS AND SCIENCE

BACHELOR OF SCIENCE IN CHEMISTRY

**ACADEMIC REGULATIONS 2020
(R2020)
COURSE 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.

B.Sc Chemistry

Dr. S. Deepa

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)	79
4	Discipline Specific Elective Courses (DSE)	15
5	Inter-Disciplinary courses (IDC)	20
6	Skill Enhancement Courses (SEC)	10
7	Employability Enhancement Courses (EEC*)	--
8	Ability Enhancement Compulsory Courses (AECC)	4
9	Open Elective (OE)	4
10	Extension Activity (EA)	1
Total		145

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	10	18	21	79
4	Discipline Specific Elective Courses (DSE)	-	-	4	4	4	3	15
5	Inter-disciplinary courses (IDC)	4	4	6	6	-	-	20
6	Skill Enhancement Courses (SEC)	2	2	2	2	2	-	10
7	Employability Enhancement Courses (EEC*)	-	-	-	-	-	-	-
8	Ability Enhancement Compulsory Courses (AECC)	2	2	-	-	-	-	04
9	Open Elective (OE)	-	-	2	2	-	-	04
10	Extension Activity (EA)	-	1	-	-	-	-	01
Total		24	25	24	24	24	24	145

* EEC will not be included for the computation of "Total of credits as well as CGPA".

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SEMESTER – I										
Sl. No.	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Theory										
1	A20XXT101	Language – I*	MIL	3	0	0	3	25	75	100
2	A20GET101	General English I	ENG	3	0	0	3	25	75	100
3	A20CHT101	Fundamental Concepts in Organic Chemistry	DSC	4	0	0	4	25	75	100
4	A20CHT102	Fundamental Concepts in Inorganic and Physical Chemistry	DSC	4	0	0	4	25	75	100
5	A20CHD101	Allied Mathematics- I	IDC	3	1	0	4	25	75	100
Practical										
6	A20CHL103	Volumetric analysis Practical	DSC	0	0	4	2	50	50	100
7	A20CHS101	Communication Skill Lab	SEC	0	0	4	2	100	0	100
Ability Enhancement Compulsory Course										
8	A20AET101	Environmental Studies	AECC	2	0	0	2	100	0	100
Employability Enhancement Course										
9	A20CHC101	MS office and Chem Draw	EEC	2	0	2	0	100	0	100
First Semester Total							24	475	425	900

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

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SEMESTER – II										
Sl. No.	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Theory										
1	A20XXT202	Language – II**	MIL	3	0	0	3	25	75	100
2	A20GET202	General English II	ENG	3	0	0	3	25	75	100
3	A20CHT204	Inorganic Chemistry - I	DSC	4	0	0	4	25	75	100
4	A20CHT205	Physical Chemistry - I	DSC	4	0	0	4	25	75	100
5	A20CHD202	Allied Mathematics- II	IDC	3	1	0	4	25	75	100
6	A20CHS202	Quantitative Aptitude and Logical Reasoning	SEC	2	0	0	2	100	0	100
Practical										
7	A20CHL206	Organic qualitative analysis Practical	DSC	0	0	4	2	50	50	100
Ability Enhancement Compulsory Course										
8	A20AET202	Public Administration	AECC	2	0	0	2	100	0	100
Employability Enhancement Course										
9	A20CHC202	Programming in C and C++	EEC	2	0	2	0	100	0	100
Extension Activity										
10	A20EAL201	National Service Scheme	EA	0	0	2	1	100	0	100
Second Semester Total							25	575	425	1000

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

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SEMESTER – III										
Sl. No.	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Theory										
1	A20CHT307	Inorganic Chemistry - II	DSC	4	0	0	4	25	75	100
2	A20CHT308	Organic Chemistry - I	DSC	4	0	0	4	25	75	100
3	A20CHD303	Allied Physics –I	IDC	3	1	0	4	25	75	100
4	A20CHE3XX	DSE - I*	DSE	4	0	0	4	25	75	100
Practical										
5	A20CHL309	Inorganic Qualitative Analysis –I and preparation of inorganic	DSC	0	0	4	2	50	50	100
6	A20CHD304	Allied Physics Laboratory-I	IDC	0	0	4	2	50	50	100
7	A20XXO3XX	Open Elective-I**	OE	0	0	4	2	50	50	100
Skill Enhancement Course										
8	A20CHS303	Mobile Servicing	SEC	0	0	2	2	100	0	100
Employability Enhancement Course										
9	A20CHC303	Embedded Systems Arduino Course	EEC	2	0	2	0	100	-	100
Third Semester Total							24	450	450	900

*Discipline Specific Electives are to be selected from the list given in Annexure II

** Open electives are to be selected from the list given in Annexure III

SEMESTER – IV										
Sl. No.	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Theory										
1	A20CHT410	Organic Chemistry - II	DSC	4	0	0	4	25	75	100
2	A20CHT411	Physical Chemistry - II	DSC	4	0	0	4	25	75	100
3	A20CHD405	Allied Physics –II	IDC	3	1	0	4	25	75	100
4	A20CHE4XX	DSE - II*	DSE	4	0	0	4	25	75	100
5	A20CHS404	Verbal Ability and Reasoning	SEC	2	0	0	2	100	-	100
Practical										
6	A20CHP412	Inorganic Qualitative Analysis – II Practical	DSC	0	0	4	2	50	50	100
7	A20CHD406	Allied Physics Laboratory – II	IDC	0	0	4	2	50	50	100
8	A20XXO4XX	Open Elective-II**	OE	0	0	4	2	50	50	100
Employability Enhancement Course										
9	A20CHC404	Web Designing	EEC	2	0	2	0	100	-	100
Fourth Semester Total							24	450	450	900

*Discipline Specific Electives are to be selected from the list given in Annexure II

** Open electives are to be selected from the list given in Annexure III

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SEMESTER – V										
Sl. No.	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Theory										
1	A20CHT513	Inorganic Chemistry - III	DSC	4	0	0	4	25	75	100
2	A20CHT514	Organic Chemistry - III	DSC	4	0	0	4	25	75	100
3	A20CHT515	Physical Chemistry - III	DSC	4	0	0	4	25	75	100
4	A20CHE5XX	DSE - III*	DSE	3	1	0	4	25	75	100
Practical										
5	A20CHL516	Gravimetric Analysis and Preparation of Organic Compounds (Practical)	DSC	0	0	6	3	50	50	100
6	A20CHL517	Physical Chemistry Practical –I (Non-electrical)	DSC	0	0	6	3	50	50	100
Skill Enhancement Course										
7	A20CHS505	Personality, Aptitude and Career Enhancement	SEC	0	0	4	2	100	-	100
Employability Enhancement Course										
8	A20CHC505	Gaussian Software	EEC	2	0	2	0	100	-	100
Fifth Semester Total							24	400	400	800

*Discipline Specific Electives are to be selected from the list given in Annexure II

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SEMESTER – VI										
Sl. No.	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Theory										
1	A20CHT618	Inorganic Chemistry and Computer Applications	DSC	4	0	0	4	25	75	100
2	A20CHT619	Organic Chemistry - IV	DSC	4	0	0	4	25	75	100
3	A20CHT620	Physical Chemistry - IV	DSC	4	0	0	4	25	75	100
4	A20CHE5XX	DSE - IV*	DSE	3	0	0	3	25	75	100
Practical										
5	A20CHL621	Physical Chemistry Practical	DSC	0	0	6	3	50	50	100
6	A20CHP622	Core Based Project	DSC	0	0	12	6	40	60	100
Employability Enhancement Course										
7	A20CHC606	Autodock Software	EEC	2	0	2	0	100	-	100
Sixth Semester Total							24	290	410	700

**Discipline Specific Electives are to be selected from the list given in Annexure II*



Annexure – I
MODERN INDIAN LANGUAGES (MIL)
(FOR THOSE WHO ARE ADMITTED FROM AY 2021-22)

Language I *- Offered in First Semester		
Sl. No.	Course Code	Course Title
1	A20FRT101	French – I
2	A20HNT101	Hindi – I
3	A20TAT101	Tamil – I
Language II ** – Offered in Second Semester		
Sl. No.	Course Code	Course Title
4	A20FRT202	French – II
5	A20HNT202	Hindi – II
6	A20TAT202	Tamil – II

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Annexure – II

DISCIPLINE ELECTIVE COURSES

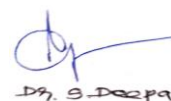
Discipline Specific Elective – I (Offered in Semester III)		
Sl. No.	Course Code	Course Title
1	A20CHE301	Food and Preservation Chemistry
2	A20CHE302	Nano and Green Chemistry
3	A20CHE303	Polymer Chemistry
Discipline Specific Elective – II (Offered in Semester IV)		
Sl. No.	Course Code	Course Title
1	A20CHE404	Industrial Chemistry
2	A20CHE405	Group Theory and Spectroscopy
3	A20CHE406	Applied chemistry
Discipline Specific Elective – III (Offered in Semester V)		
Sl. No.	Course Code	Course Title
1	A20CHE507	Pharmaceutical Chemistry
2	A20CHE508	Forensic Chemistry
3	A20CHE509	Bio-Inorganic Chemistry
Discipline Specific Elective – IV (Offered in Semester VI)		
Sl. No.	Course Code	Course Title
1	A20CHE610	Agricultural Chemistry
2	A20CHE611	Computer Aided Chemistry
3	A20CHE612	Dairy Chemistry

Annexure – III
OPEN ELECTIVE COURSES

Open Elective – I (Offered in Semester III)				
Sl. No	Course Code	Course Title	Offering Department	Permitted Departments
1	A20BTO301	Boon and Bane of Microbes	Bioscience	Chemistry, Food Science, Physics
2	A20BTO302	Microbial Technology for Entrepreneurship	Bioscience	Chemistry, Food Science, Physics
3	A20BTO303	Origin of Life	Bioscience	Chemistry, Food Science, Physics
4	A20CHO304	Food Analysis (Practical)	Chemistry	Bioscience, Computational Studies, Food Science, Mathematics, Physics
5	A20CHO305	Molecules of Life (Practical)	Chemistry	Bioscience, Computational Studies, Food Science, Mathematics, Physics
6	A20CHO306	Water Analysis (Practical)	Chemistry	Bioscience, Computational Studies, Food Science, Mathematics, Physics
7	A20CMO307	Fundamentals of Accounting and Finance	Commerce and Management	Bioscience, Chemistry, Computational Studies, English, Food Science, Mathematics, Media Studies, Physics
8	A20CMO308	Fundamentals of Management	Commerce and Management	Bioscience, Chemistry, Computational Studies, English, Food Science, Mathematics, Media Studies, Physics
9	A20CMO309	Fundamentals of Marketing	Commerce and Management	Bioscience, Chemistry, Computational Studies, English, Food Science, Mathematics, Media Studies, Physics
10	A20CPO310	Data Structures	Computational Studies	Mathematics
11	A20CPO311	Programming in C	Computational Studies	Commerce and Management, Mathematics, Media Studies
12	A20CPO312	Programming in Python	Computational Studies	Commerce and Management, Mathematics, Media Studies



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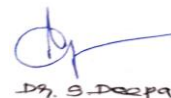
13	A20ENO313	Conversational Skills	English	Chemistry, Commerce and Management, Computational Studies, Media Studies, Mathematics, Physics
14	A20ENO314	Fine-tune your English	English	Chemistry, Commerce and Management, Computational Studies, Media Studies, Mathematics, Physics
15	A20ENO315	Interpersonal Skills	English	Chemistry, Commerce and Management, Computational Studies, Media Studies, Mathematics, Physics
16	A20MAO316	Mathematical Modelling	Mathematics	Chemistry, Commerce and Management, Computational Studies, Physics, Biotechnology, Nutrition and Dietetics
17	A20MAO317	Quantitative Aptitude - I	Mathematics	Chemistry, Commerce and Management, Computational Studies, Physics, Biotechnology, Nutrition and Dietetics
18	A20MAO318	Statistical Methods	Mathematics	Chemistry, Commerce and Management, Computational Studies, Physics, Biotechnology, Nutrition and Dietetics
19	A20VCO319	Event Management	Media Studies	Chemistry, Commerce and Management, Computational Studies, English, Mathematics, Physics
20	A20VCO320	Graphic Design	Media Studies	Chemistry, Commerce and Management, Computational Studies, English, Mathematics, Physics
21	A20VCO321	Role of social media	Media Studies	Chemistry, Commerce and Management, Computational Studies, English, Mathematics, Physics
22	A20NDO322	Basic Food Groups	Food Science	Bioscience, Chemistry, Commerce and Management, Computational Studies, English, Mathematics, Media Studies, Physics, Tamil



23	A20NDO323	Life Style Management	Food Science	Bioscience, Chemistry, Commerce and Management, Computational Studies, English, Mathematics, Media Studies, Physics, Tamil
24	A20NDO324	Nutritive Value of Foods	Food Science	Bioscience, Chemistry, Commerce and Management, Computational Studies, English, Mathematics, Media Studies, Physics, Tamil
25	A20PHO325	Astrophysics	Physics	Bioscience, Chemistry, Computational Studies, Mathematics, Media Studies
26	A20PHO326	Basic of Modern Communication System	Physics	Bioscience, Chemistry, Computational Studies, Mathematics, Media Studies
27	A20PHO327	Bio-Physics	Physics	Bioscience, Chemistry, Computational Studies, Mathematics, Media Studies
28	A20TMO328	அடிப்படைத்தமிழ்	Tamil	Bioscience, Chemistry, Commerce and Management, Computational Studies, English, Food Science, Mathematics, Media Studies, Physics
29	A20TMO329	வாழ்வியல் இலக்கணம்	Tamil	Bioscience, Chemistry, Commerce and Management, Computational Studies, English, Food Science, Mathematics, Media Studies, Physics
30	A20TMO330	புதுக்கவிதைப் பட்டறை	Tamil	Bioscience, Chemistry, Commerce and Management, Computational Studies, English, Food Science, Mathematics, Media Studies, Physics



Open Elective – II (Offered in Semester IV)				
Sl. No.	Course Code	Course Title	Offering Department	Permitted Departments
1	A20BTO401	Fermented Food	Bioscience	Chemistry, Food Science, Physics
2	A20BTO402	Herbal Technology	Bioscience	Chemistry, Food Science, Physics
3	A20BTO403	Self-Hygiene	Bioscience	Chemistry, Food Science, Physics
4	A20CHO404	C++ Programming and its Application to Chemistry	Chemistry	Computational Studies, Mathematics, Physics
5	A20CHO405	Computational Chemistry Practical	Chemistry	Computational Studies, Mathematics, Physics
6	A20CHO406	Instrumental Methods of Analysis	Chemistry	Computational Studies, Mathematics, Physics
7	A20CMO407	Essential Legal Awareness	Commerce and Management	Bioscience, Chemistry, Computational Studies, English, Food Science, Mathematics, Media Studies, Physics
8	A20CMO408	Essentials of Insurance	Commerce and Management	Bioscience, Chemistry, Computational Studies, English, Food Science, Mathematics, Media Studies, Physics
9	A20CMO409	Practical Banking	Commerce and Management	Bioscience, Chemistry, Computational Studies, English, Food Science, Mathematics, Media Studies, Physics
10	A20CPO410	Database Management Systems	Computational Studies	Commerce and Management, Media Studies, Mathematics
11	A20CPO411	Introduction to Data Science using Python	Computational Studies	Chemistry, Commerce and Management, English, Media Studies, Mathematics, Physics
12	A20CPO412	Web Development	Computational Studies	Commerce and Management, Media Studies, Mathematics

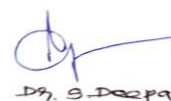



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13	A20ENO413	English for Competitive Exam	English	Chemistry, Commerce and Management, Computational Studies, Media Studies, Mathematics, Physics
14	A20ENO414	English Next-India	English	Chemistry, Commerce and Management, Computational Studies, Media Studies, Mathematics, Physics
15	A20ENO415	Functional English	English	Chemistry, Commerce and Management, Computational Studies, Media Studies, Mathematics, Physics
16	A20MAO416	Discrete mathematics	Mathematics	Chemistry, Computational Studies, Physics
17	A20MAO417	Operations Research	Mathematics	Chemistry, Commerce and Management, Computational Studies, Physics, Biotechnology, Nutrition and Dietetics
18	A20MAO418	Quantitative Aptitude - II	Mathematics	Chemistry, Commerce and Management, Computational Studies, Physics, Biotechnology, Nutrition and Dietetics
19	A20VCO419	Basics of News Reporting	Media Studies	Chemistry, Commerce and Management, Computational Studies, English, Mathematics, Physics
20	A20VCO420	Scripting for media	Media Studies	Chemistry, Commerce and Management, Computational Studies, English, Mathematics, Physics
21	A20VCO421	Video Editing	Media Studies	Chemistry, Commerce and Management, Computational Studies, English, Mathematics, Physics
22	A20NDO422	Food Labelling	Food Science	Bioscience, Chemistry, Commerce and Management, Computational Studies, English, Mathematics, Media Studies, Physics, Tamil



23	A20NDO423	Hygiene and Sanitation	Food Science	Bioscience, Chemistry, Commerce and Management, Computational Studies, English, Mathematics, Media Studies, Physics, Tamil
24	A20NDO424	Nutrition for Adolescent	Food Science	Bioscience, Chemistry, Commerce and Management, Computational Studies, English, Mathematics, Media Studies, Physics, Tamil
25	A20PHO425	Digital Electronics	Physics	Bioscience, Chemistry, Computational Studies, Mathematics, Media Studies
26	A20PHO426	Geo-Physics	Physics	Bioscience, Chemistry, Computational Studies, Mathematics, Media Studies
27	A20PHO427	Space Science	Physics	Bioscience, Chemistry, Computational Studies, Mathematics, Media Studies
28	A20TMO428	சிறுகதைப் பயிற்சி	Tamil	Bioscience, Chemistry, Commerce and Management, Computational Studies, English, Food Science, Mathematics, Media Studies, Physics
29	A20TMO429	செய்தி வாசிப்பு பயிற்சி	Tamil	Bioscience, Chemistry, Commerce and Management, Computational Studies, English, Food Science, Mathematics, Media Studies, Physics
30	A20TMO430	நிகழ்த்துக்கலை	Tamil	Bioscience, Chemistry, Commerce and Management, Computational Studies, English, Food Science, Mathematics, Media Studies, Physics

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A20TAT101

மொழித்தாள்

L T P C Hrs

தமிழ்-1

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(B.A., B.Sc., B.Com., B.B.A., & B.C.A., பாடப்பிரிவுகளுக்கும்மான வயதுத்தாள்)

பாடத்திட்டத்தின் நோக்கம்

- இரண்டாயிரம் ஆண்டுகால தமிழின் தொன்மையையும் வரலாற்றையும் அதன் விழுமியங்களையும் பண்பாட்டையும் எடுத்துரைப்பதாக இப்பாடத்திட்டம் அமைக்கப்பட்டுள்ளது.
- தமிழ் இலக்கியம் உள்ளடக்கத்திலும், வடிவத்திலும் பெற்ற மாற்றங்கள், அதன் சிந்தனைகள், அடையாளங்கள் ஆகியவற்றைக் காலந்தோறும் எழுதப்பட்ட இலக்கியங்களின் வழியாகக் கூறுவதற்கு இப்பாடத்திட்டம் அமைக்கப்பட்டுள்ளது.
- மொழியின் கட்டமைப்பைப் புரிந்து கொள்வதாக இப்பாடத்திட்டம் வடிவமைக்கப்பட்டுள்ளது.
- வாழ்வியல் சிந்தனைகள், ஒழுக்கவியல் கோட்பாடுகள், சமத்துவம், சூழலியல் எனப் பல சுவறுகளை மாணவர்களுக்கு எடுத்துரைக்கும் விதத்தில் இப்பாடத்திட்டம் உருவாக்கப்பட்டுள்ளது.
- சிந்தனை ஆற்றலைப் பெருக்குவதற்குத் தாய்மொழியின் பங்களிப்பினை உணர்த்த இப்பாடத்திட்டம் அமைக்கப்பட்டுள்ளது.

பாடத்திட்டத்தின் வெளிப்பாடுகள்

CO1-இலக்கியங்கள் காட்டும் வாழ்வியல் நெறிமுறைகளைப் பேணிநடத்தல்.

CO2-நமது எண்ணத்தை வெளிப்படுத்தும் கருவியாகத் தாய்மொழியைப் பயன்படுத்துதல்.

CO3-தகவல் தொட்புக்குத் தாய்மொழியின் முக்கியத்துவத்தை உணர்த்தல்.

CO4-தாய்மொழியின் சிறப்பை அறிதல்.

CO5-இலக்கிய இன்பங்களை நுகரும் திறன்களை வளர்த்தல்.

அலகு-1

(9 Hrs)

இக்காலக் கவிதைகள்-1

1. பாரதியார் - கண்ணன் என் சேவகன்
2. பாரதிதாசன் - தமிழ்ப்பேறு
3. அப்துல் ரகுமான் - அவதாரம்
4. மீரா - கனவுகள் + கற்பனைகள் = காகிதங்கள்
5. து.நரசிம்மன் - மன்னித்துவிடு மகனே

அலகு-2

(9 Hrs)

இக்காலக் கவிதைகள்-2

1. ராஜா சந்திரசேகர் - கைவிடப்பட்ட குழந்தை
2. அனார் - மேலும் சில இரத்தக் குறியீடுகள்
3. சுகிர்தராணி - அம்மா
4. நா.முத்துக்குமார் - தூர்

அலகு-3

(9 Hrs)

சிறுநிலக்கியங்கள்

1. கலிங்கத்துப் புராணி - பொருதடக்கை வாள் எங்கே... (பாடல்-485)
2. அழகர்களின்னைவிடு தூது - இதமாய் மனிதருடனே... (பாடல்-45)
3. நந்திக் கலம்பகம் - அம்வொன்று வில்லொடிதெல்... (பாடல்-77)
4. முக்சுடற் பள்ளு - பாயும் மருதஞ் செழிக்கவே... (பாடல்-47)
5. குற்றாலக் குறவஞ்சி - ஓடக் காண்பதுமே... (பாடல்-9)

B.Sc Chemistry

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காப்பியங்கள்

1. மணிமேகலை-உலகறவி புக்க காதை- 'மாசுஇல் வால்ஒளி! -இந்நாள் போலும் இளங்கொடி கெடுத்தனை'. (28 -அடிகள்)

அலகு-4

(9 Hrs)

தமிழ் இலக்கிய வரலாறு

1. சிற்றிலக்கியம்- தோற்றமும் வளர்ச்சியும்
2. புதுக்கவிதை- தோற்றமும் வளர்ச்சியும்
3. சிறுகதை -தோற்றமும் வளர்ச்சியும்
4. புதினம் -தோற்றமும் வளர்ச்சியும்
5. உரைநடை - தோற்றமும் வளர்ச்சியும்

அலகு 5

(9 Hrs)

மொழிப்பயிற்சி

1. கலைச்சொல்லாக்கம்
2. அகரவரிசைப்படுத்துதல்
3. மரபுத்தொடர்/பழமொழி
4. கலை விமர்சனம்
5. நேர்காணல்

உரைநடைப் பகுதி

1. உ.வே.சாமிநாதையர் - சிவதருமோத்திரச் சுவடி பெற்ற வரலாறு.
2. தஞ்சாவூர் - சவ்வாவின கோபம்.
3. இரா. பச்சியப்பன் - மால்ல மற்றையவை.

உரைநடை நூல்கள்

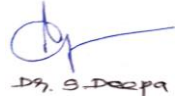
1. சக்திவேல், சு., தமிழ் மொழி வரலாறு, மாணிக்கவாசகர் பதிப்பகம், சிதம்பரம், 1988.
2. சிற்பி பாலசுப்ரமணியம் மற்றும் நீலபத்மநாபன், புதிய தமிழ் இலக்கிய வரலாறு, தொகுதி-1, 2, 3, சாகித்திய அகாட., புதுவடல்வி, 2013.
3. பாரதியார், பாரதியார் கவிதைகள், குமரன் பதிப்பகம், சென்னை, 2011.

பார்வை நூல்கள்

1. கைலாசபதி, சு., தமிழ் நாவல் இலக்கியம், குமரன் பதிப்பகம், வடபழனி, 1968.
2. சுந்தரராஜன், பே.கோ. சிவபாதசுந்தரம். சோ., தமிழில் சிறுகதை வரலாறும் வளர்ச்சியும், கீரியா, சென்னை, 1989.
3. பரந்தாமனார், அ.கி., நல்ல தமிழ் எழுத வேண்டுமா, பாரி நிலையம், சென்னை, 1998.
4. பாக்கியமேரி, வகைமை நோக்கில் தமிழ் இலக்கிய வரலாறு, என்.சி.எச். பதிப்பகம், சென்னை, 2011.
5. வல்லிக்கண்ணன், புதுக்கவிதையின் தோற்றமும் வளர்ச்சியும், அன்னம், சிவகங்கை, 1992.

இணையத்தளங்கள்

1. <http://www.tamilkodal.com>
2. <http://www.languageelab.com>
3. <http://www.tamilweb.com>

Dr. S. Deepa

A20FRT101**FRENCH - I**
(Common to B.A., B.Sc., B.Com., B.B.A. & B.C.A)**L T P C Hrs**
3 0 0 3 45**Course Objectives**

- To enable the students read, understand, and write simple sentences.
- To grasp relevant grammar for communication
- To learn about the land, people and culture of France.

UNITÉ – 1**(9 Hrs)**

Je m'appelle Elise. Et Vous ?

Vous Dansez ? D'accord

Monica, Yukiko et compagnie

UNITÉ – 2**(9 Hrs)**

Les Voisins de Sophie

Tu vas au Luxembourg ?

UNITÉ – 3**(9 Hrs)**

Nous Venons pour l'inscription

A Vélo, en tain, en avoin

Pardon, monsieur, le BHV s'il vous plait ?

UNITÉ – 4**(9 Hrs)**

Au marche

On déjeune ici ?

UNITÉ – 5**(9 Hrs)**

On va chez ma copine ?

Chez Susana

Text BookPrescribed Textbook : *FESTIVAL 1* - Méthode de Français

Authors : Sylvie POISSON-QUINTON

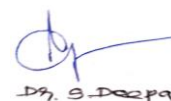
Michèle MAHEO-LE COADIC

Anne VERGNE-SIRIEYS

Edition : CLE International, Nouvelle Édition révisée : 2009.

Reference Book :

Festival 1

A20GET101**GENERAL ENGLISH I**
(Common to B.A., B.Sc., and BCA)**L T P C Hrs**
3 0 0 3 45**Course Objectives**

- To recognize the rhythms, metrics and other musical aspects of poetry
- 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 and frame sentences without grammatical error.
- To enable them understanding the intrinsic nuances of writing in English language

Course Outcomes*After completion of this course, the students will be able to***CO1-** Comprehend and discuss the various facets of selected poems**CO2-** Analyze and interpret texts written in English**CO3-** Read drama with graduate-level interpretive and analytical proficiency**CO4-** Improve the fluency and formation of grammatically correct sentence**CO5-** Enhance the writing skills for specific purposes**UNIT I POETRY****(9 Hrs)**

1. John Milton: On His Blindness
2. William Wordsworth: Daffodils
3. Percy Bysshe Shelley: Ozymandias
4. Emily Dickinson: Because I could not stop for Death
5. Sarojini Naidu: The Queen's Rival

UNIT II PROSE**(9 Hrs)**

1. Francis Bacon: Of Love
2. Charles Lamb: A Dissertation upon Roast Pig

UNIT III DRAMA**(9 Hrs)**

1. Oscar Wilde: Lady Windermere's Fan

UNIT IV GRAMMAR**(9 Hrs)**

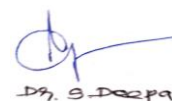
1. Parts of Speech
2. Tenses
3. Subject-Verb Agreement

UNIT V COMPOSITION**(9 Hrs)**

1. Essay Writing
2. Email

Text Books

1. James Barrett, "Brookside Musings: A Selection of Poems and Short Stories: Board of Editors", Orient Longman Limited, 1st Edition, 2009.
2. Wilde Oscar, "Lady Windermere's Fan. Published in The Importance of Being Earnest and Other Plays" London: Penguin, 1st Edition, 1940.
3. Wren & Martin, "High School English Grammar & Composition". Blackie ELT Books, 1st Edition, 2017.

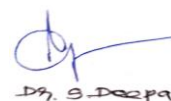
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Reference Books

1. Lalitha Natarajan and Sasikala Natesan, "English for Excellence: Poetry", Anuradha Publications, 2nd Edition, 2015.
2. Charles Lamb, "Selected Prose", Penguin Classics. United Kingdom, 1st Edition, 2013.
3. Usha Mahadevan, "Sunbeams: Empower with English", Emerald Publishers, Chennai. 1st Edition, 2016.

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1. <https://www.englishcharity.com/of-love-by-francis-bacon-explanation/>
2. https://www.poetry-archive.com/n/the_queens_rival.html
3. <https://www.gradesaver.com/lady-windermere-fan/study-guide/summary-act-i>
4. <https://www.english-grammar-revolution.com/parts-of-speech.html>
5. https://www.internationalstudent.com/essay_writing/essay_tips/


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A20CHT101	FUNDAMENTAL CONCEPTS IN ORGANIC CHEMISTRY	L T P C Hrs
		4 0 0 4 60

Course Objectives

- To gain knowledge of nomenclature, structure and shape of organic molecules
- To know the reaction mechanism and isomerism
- To gain knowledge on alkanes and cycloalkanes
- To understand stereochemistry of organic molecules
- To observe the methods of purification of organic compounds

Course Outcomes

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

CO1 -Apply the knowledge of nomenclature, structure and shape of organic molecules

CO2 -Gain required knowledge about reaction mechanism and isomerism

CO3 -Apply the knowledge on preparation and properties of alkanes and cycloalkanes in industries

CO4 -Understand stereochemistry of organic molecules

CO5 -Use the methods of purification for the various organic molecules in the industries

UNIT I IUPAC NOMENCLATURE, STRUCTURE AND PROPERTIES (12 Hrs)

Classification and nomenclature of organic compounds – IUPAC systems. Structure and shape of organic molecules: Hybridization – Definition, sp^3 hybridization of carbon (methane) – sp^2 hybridization in alkenes (ethene) and sp hybridization in alkynes (ethyne). Electronic Displacement Effects: Inductive Effect, Electromeric Effect, Resonance and Hyper conjugation. Reactive Intermediates: Carbocations, Carbanions, free radicals, carbenes and nitrenes (Structure and stability).

UNIT II REACTION MECHANISM AND ISOMERISM (12 Hrs)

Cleavage of Bonds: Homolysis and Heterolysis. Types of reagents: Electrophilic and Nucleophilic reagents – Definition and examples. Types of organic reactions (one example for each reaction; mechanism not required) – Energy profile of organic reactions. Isomerism (Definition and examples): Types of isomerism- structural isomerism – chain, position, functional – metamerism – tautomerism – stereo isomerism – Geometrical and optical isomerism.

UNIT III ALKANES AND CYCLOALKANES (12 Hrs)

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, Sachse-Mohr theory. Conformations of cyclohexane.

UNIT IV STEREOCHEMISTRY (12 Hrs)

Conformations of ethane and butane. Interconversion of Wedge Formula, Newmann, Sawhorse and Fischer representations. Concept of chirality (upto two carbon atoms). Configuration: Geometrical and Optical isomerism; Enantiomerism, Diastereomerism and Meso compounds. Threo and erythro; D and L; cis – trans nomenclature; CIP Rules: R/ S (for only one chiral carbon atoms) and E / Z Nomenclature (for ethene).

UNIT V PURIFICATION TECHNIQUES (12 Hrs)

Different methods of purification of organic substances – distillation: under reduced pressure – steam distillation - Soxhlet method – Crystallization – Sublimation - Fractional distillation. Chromatography - adsorption chromatography (column) - partition chromatography (paper) - Thin layer chromatography (TLC) – Gas chromatography (GC) – High Pressure Liquid Chromatography (HPLC).

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Text Books

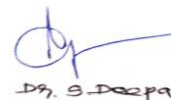
1. Bhupinder Mehta, Manju Mehta, "Organic Chemistry", Prentice Hall of India Pvt Ltd. New Delhi. 1st Edition, 2015.
2. B.S. Bahl and ArunBahl, "Advanced Organic Chemistry", S. Chand and Company Ltd, New Delhi. 1st Edition, 1998.
3. B.B.L Srinivasata, Amarnath Mishra, "Fundamental of Analytical Chemistry", IP Innovative Publication Pvt. Ltd., 1st Edition, 2016.

Reference Books

1. I.L.Finar, "Organic chemistry Vol 1", Pearson Edition, Singapore, 6th Edition, 2005.
2. R.T. Morrison 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, 1st Edition, 2005.

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1. <https://www2.chemistry.msu.edu/faculty/reusch/VirtTxtJml/nomen1.htm>
2. <https://www.toppr.com/guides/chemistry/organic-chemistry/isomerism/>
3. <https://www.chemguide.co.uk/organicprops/alkanes/background.html>



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A20CHT102	FUNDAMENTAL CONCEPTS IN INORGANIC AND PHYSICAL CHEMISTRY	L	T	P	C	Hrs
		4	0	0	4	60

Course Objectives

- To understand the fundamental concepts in framing the structure of an atom.
- To gain the knowledge on periodicity.
- To observe the methods of metallurgical processes.
- To gain the knowledge on physical properties of gases and liquids.
- To improve the knowledge on colligative properties of dilute solution.

Course Outcomes

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

CO1 - Spell the atomic structure of atom and related theories and concepts.

CO2 - Classify the elements and compare their periodic properties.

CO3 - Explain the metallurgical processes involved in the extraction of metals.

CO4 - Make use of the physical behavior of gases and liquids

CO5 – Apply the colligative properties of dilute solutions

UNIT I ATOMIC STRUCTURE**(12 Hrs)**

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 conceptual 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.

UNIT II PERIODICITY AND PERIODIC PROPERTIES**(12 Hrs)**

Periodic law and Cause of periodicity. Division of elements in to s, p, d and f blocks. General Properties of atoms: Atomic properties- Elementary ideas of Covalent radius - Van der Waals radius-Ionic radius and their periodic trends. Ionisation Energy, Electron affinity, Electronegativity- Pauling, Mulliken-Jaffe, Allred-Rochow definitions.

UNIT III METALLURGICAL PROCESSES**(12 Hrs)**

Definition for minerals and ores - ore dressing – gravity separation - froth flotation-magnetic separation - chemical separation- calcination and roasting- Thermodynamics of reduction processes- Ellingham diagram. Extraction of metal-chemical reduction-auto reduction-electrolytic reduction-metal displacement. Refining methods - distillation - fractional crystallization - Van Arkel method - electrolytic refining - vapour phase refining-ion exchange method-muffle furnace.

UNIT IV STATES OF MATTER (GAS AND LIQUID)**(12 Hrs)**

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.

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UNIT V COLLIGATIVE PROPERTIES OF DILUTE SOLUTION**(12 Hrs)**

Colligative Properties: Relative lowering of vapour pressure – elevation of boiling point – depression in freezing point – osmotic pressure – Applications in calculating molar masses of normal solutes in solution.

Dilute Solution: Lowering of vapour pressure – Raoult's and Henry's Law and their applications.

Text Books

1. Puri, B.R. Sharma L.R and Kalia.K.C. "Principles of Inorganic Chemistry", Vallabh Publication, New Delhi, 28th Edition, 2004.
2. Puri.B.R., Sharma L.R and Madan S.Pathania, "Principles of Physical chemistry", Vishal publication, Jalandhar-Delhi, 30th Edition, 2007.
3. G. D. Tuli, B. S. Bahl, Arun Bahl, "Essentials of Physical Chemistry", S.Chand Publication, 24th Edition, 2000.

Reference Books

1. Madan R.D., "Modern Inorganic Chemistry", S. Chand & Company, , New Delhi, 2nd Edition, 2004
2. Albert Cotton F.A, Kotz,, "Basic Inorganic Chemistry", Geofferey Wilkinson, Carlos, Murillo, Manfred Bochmann, John Wiley & Sons, Inc. New York, 2nd Edition, 1998.
3. Lee, J. D, "A New Concise Inorganic Chemistry", Blackwell Science Ltd., ELBS. London, 5th Edition, 2002.

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1. <https://www.britannica.com/science/atom>
2. <https://www.askiitians.com/revision-notes/chemistry/classification-of-elements-and-periodicity-in-properties/>
3. <https://byjus.com/chemistry/processes-of-metallurgy/>

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A20CHD101	ALLIED MATHEMATICS – I	L	T	P	C	Hrs
		3	1	0	4	60

Course Objectives

- To understand the concept of types of Integration.
- To introduce Double and Triple Integration.
- To explore the expansion of $\cos \theta$, $\sin \theta$ and $\tan \theta$
- To learn the concept of inverse trigonometry functions.
- To introduce the concept of correlation and regression.

Course Outcomes

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

CO1 – Understand the different types of integration.

CO2 - Solve double and Triple integral problems.

CO3 – Find expansion of trigonometric values and solution of trigonometric solutions.

CO4 - Identify the different types of Inverse trigonometry.

CO5 – learns different methods in solve statistics.

UNIT I DEFINITE INTEGRALS**(12 Hrs)**

Revision of all Integral models - Definite integrals – Integration by parts & Reduction formula.

UNIT II MULTIPLE INTEGRALS**(12 Hrs)**

Multiple Integrals, change of order of integration and change of variables in double integrals (Cartesian to polar). Applications: Areas by double integration and volumes by triple integration (Cartesian and polar).

UNIT III TRIGONOMETRY**(12 Hrs)**

Expansions of $\cos n\theta$, $\sin n\theta$ - Expansion of $\tan \theta$ in terms of $\tan \theta$ - Expansion of $\tan(A+B+C+\dots)$ - Formation of Equations. Powers of sines and cosines of θ in terms of functions of multiples of θ - expansions of $\sin \theta$ and $\cos \theta$ in a series of ascending powers of θ

UNIT IV INVERSE TRIGONOMETRY**(12 Hrs)**

Expansion of Inverse Circular Functions. Definition – Relation between Hyperbolic Functions - Inverse Hyperbolic Functions. Resolution into Factors - simple problems only –DeMoivre's Property on the Circle and Cote's Property on the Circle. Logarithm of complex quantities.

UNIT V STATISTICS**(12 Hrs)**

Measures of central tendency – Arithmetic Mean, Median and Mode – Measures of dispersion and Standard deviation – Skewness and Measures of Skewness – Pearson's coefficient of Skewness – Moments – Correlation – Rank correlation and regression.

Text Books

1. S. Duraipandian and Laxmi Duraipandian "Trigonometry", Emerald Publishers, Chennai. 1st Edition, 1984
2. N.P.Bali "Trigonometry". Krishna Prakashan Mandhir,9, Shivaji Road, Meerut (UP), 1st Edition, 1994.
3. Shanti Narayan, "Integral Calculus", S Chand & Co. New Delhi, 1st Edition, 2001.

Reference Books

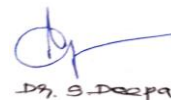
1. A.Singaravelu, "Algebra and Trigonometry", Vol.-I Meenakshi Agency, Chennai. 1st Edition, 2003.

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2. P.R.Vittal. "Trigonometry", Margham Publications, Chennai. 1st Edition, 2004.
3. P. Kandasamy, K. Thilagavathy, "Mathematics of B.SC", Vol I & II, S. Chand Company Ltd, New Delhi, 1st Edition 2004.

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1. <https://nptel.ac.in/courses/111/105/111105122/>
2. <https://www.khanacademy.org/math/trigonometry>
3. <https://www.khanacademy.org/math/statistics-probability>



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A20CHL103	VOLUMETRIC ANALYSIS PRACTICAL	L	T	P	C	Hrs
		0	0	4	2	30

Course Objectives

- To demonstrate the concept of quantitative volumetric analysis.
- To understand the various types of titrimetric analysis.
- To gain the knowledge on acidimetry
- To observe the permanganometry titration.
- To know about dichrometry and iodometry

Course Outcomes

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

CO1 - Gain the knowledge in principles of volumetric analysis.

CO2 - Estimating the amount of substances present in solutions.

CO3 - Learn to approach a problem systematically and to interpret the result logically

CO4 - Understand permanganometry titration.

CO5 - Know about dichrometry and iodometry titration.

TITRIMETRIC QUANTITATIVE ANALYSIS**ACIDIMETRY AND ALKALIMETRY**

1. Estimation of HCl by NaOH using a standard Oxalic acid solution **(3 Hrs)**
2. Estimation of Na₂CO₃ by HCl using a standard Na₂CO₃ Solution. **(3 Hrs)**

PERMANGANOMETRY

1. Estimation of Oxalic acid by KMnO₄ using a standard Oxalic acid solution **(4 Hrs)**
2. Estimation Iron (II) Sulphate by KMnO₄ using a standard Mohr's Salt solution **(4 Hrs)**
3. Estimation of calcium (ii) by KMnO₄ using standard oxalic acid solution **(4 Hrs)**

DICHROMETRY

1. Estimation of Iron (II) by potassium dichromate using standard Mohr's salt solution **(4 Hrs)**

IODOMETRY

1. Estimation of KMnO₄ by Thio using a standard Potassium dichromate Solution **(4 Hrs)**
2. Estimation of Copper (II) Sulphate by K₂Cr₂O₇ solution. **(4 Hrs)**

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.

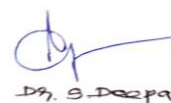
Reference Books

1. Venkateswaran. V, Veeraswamy. R, Kulandaivelu. A.R., "Basic Principles of Practical Chemistry", New Delhi, Sultan Chand and Sons., 1st Edition,1997.
2. Mendham. J, Denney. R.C, Barnes. 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.

Dr. S. Deepa

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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>



Dr. S. Deepa

A20CHS101	COMMUNICATION SKILLS LAB	L	T	P	C	Hrs
	(Common to B.A, B.Sc, BBA, B.Com and BCA)	0	0	4	2	30

Course Objectives

- To improve the skill of rapid reading and comprehending efficiently
- To decode the correspondence between sound and spelling in English
- To train students to organize, revise and edit ideas to write clearly and commendably
- To enhance the sense of social responsibility and accountability of the students
- To expound the significance of time and stress management

Course Outcomes

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

CO1- Understand the pattern to communicate effectively

CO2- Impart Speaking skills with self-confidence

CO3- Use writing strategies to improve their drafting skills and comprehending of articles

CO4- Demonstrate leadership qualities to Participate in Group Discussion and Interview efficiently

CO5- Expertise in Managerial skills

UNIT I COMMUNICATION SKILLS -SPEAKING**(6 Hrs)**

1. Aspects of speaking
2. Process and techniques of effective speech
3. Presentations
4. Topic to be given to students for short speech
5. Self-Introduction

UNIT II SELF-MANAGEMENT SKILLS**(6 Hrs)**

1. Time Management
2. Stress management
3. Perseverance
4. Resilience
5. Mind mapping
6. Self- confidence

UNIT III COMMUNICATION SKILLS - READING**(6 Hrs)**

1. Phonics
2. Vocabulary
3. Comprehension
4. Skimming and Scanning

UNIT IV SOCIAL SKILLS**(6 Hrs)**

1. Negotiation and Persuasion
2. Leadership
3. Teamwork
4. Problem solving
5. Empathy
6. Decision making

UNIT V COMMUNICATION SKILLS - WRITING**(6 Hrs)**

1. Descriptive
2. Narrative
3. Persuasive
4. Expository
5. Picture composition

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Text Books

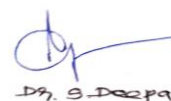
1. Syamala, V, "Effective English Communication for you", Chennai: Emerald Publishers, 1st Edition, 2002.
2. Balasubramanian, T, "A Textbook of English Phonetics for Indian Students", New Delhi: Trinity Press, 1st Edition, 1981.
3. Sardana, C.K., "The Challenge of Public Relations", New Delhi: Har- Anand Publications, 1st Edition, 1995.

Reference Books

1. Murphy, John J, "Pulling Together: 10 Rules for High-Performance Teamwork", Simple Truths, 1st Edition, 2016.
2. Sanjay Kumar, Pusph Lata. "Communication Skills". Oxford University Press, 1st Edition, 2015.
3. Barun K. Mitra, "Personality Development and Soft skills", Oxford University Press, 2nd Edition, 2016.

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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.thebalancecareers.com/problem-solving-skills-with-examples-2063764>
5. <https://positivepsychology.com/resilience-skills/>


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A20AET101	ENVIRONMENTAL STUDIES	L	T	P	C	Hrs
	(Common to B.A, B.Sc, BBA, B.Com and BCA)	2	0	0	2	30

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

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

CO1- Realize the importance of natural resources and various energy resources

CO2- Learn about the biodiversity

CO3- Learn the different types of pollution and to prevent the pollution

CO4- Know about the pollution Act and social issues

CO5- Understand Human related issued and environment

UNIT I INTRODUCTION TO NATURAL RESOURCES/ENERGY (6 Hrs)

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.

UNIT II ECOSYSTEMS (6 Hrs)

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.

UNIT III ENVIRONMENTAL POLLUTION /DISASTER MANAGEMENT (6 Hrs)

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.

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT (6 Hrs)

Sustainable development- Climate change: global warming, acid rain, ozone layer depletion and nuclear radiation- Environment Protection Act (any 2) air, water, wildlife and forest.

UNIT V HUMAN POPULATION AND THE ENVIRONMENT (6 Hrs)

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

Text Books

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

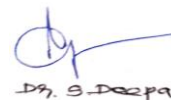
Dr. S. Deepa

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1. B.K. Sharma, "Environmental chemistry", Krishna Prakashan Media (P) Ltd, Meerut, 11th Edition, 2009.
2. S.S.Dara, and D.D. Mishra "A text book of environmental chemistry and pollution control", S. Chand and Company Ltd, New Delhi, 5th Edition, 2012.
3. Richard T. Wright, "Environmental Science: Toward a Sustainable Future", Prentice Hall, 10th Edition, 2008.

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



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A20TAT202

மொழித்தான்

L T P C Hrs

தமிழ்-II

3 0 0 3 45

(B.A., B.Sc., B.Com., B.B.A., & B.C.A., பாட்பிரிவுகளுக்கான பொதுத்தான்)

பாடத்திட்டத்தின் நோக்கம்

- இரண்டாயிரம் ஆண்டுகால தமிழின் தொன்மையையும் வரலாற்றையும் அதன் விழுமியங்களையும் பண்பாட்டையும் எடுத்துரைப்பதாக இப்பாடத்திட்டம் அமைக்கப்பட்டுள்ளது.
- தமிழ் இலக்கியம் உள்ளடக்கத்திலும், வடிவத்திலும் பெற்ற மாற்றங்கள், அதன் சிந்தனைகள், அடையாளங்கள் ஆகியவற்றைக் காலந்தோறும் எழுதப்பட்ட இலக்கியங்களின் வழியாகக் கூறுவதற்கு இப்பாடத்திட்டம் அமைக்கப்பட்டுள்ளது.
- மொழியின் கட்டமைப்பைப் புரிந்து கொள்வதாகவும் பாடத்திட்டம் வடிவமைக்கப்பட்டுள்ளது.
- வாழ்வியல் சிந்தனைகள், ஒழுக்கவியல் கோட்பாடுகள், சமத்துவம், சூழலியல் எனப் பல கூறுகளை மாணவர்களுக்கு எடுத்துரைக்கும் விதத்தில் இப்பாடத்திட்டம் உருவாக்கப்பட்டுள்ளது.
- சிந்தனை ஆற்றலைப் பெருக்குவதற்குத் தாய்மொழியின் பங்களிப்பினை உணர்த்த இப்பாடத்திட்டம் அமைக்கப்பட்டுள்ளது.

பாடத்திட்டத்தின் வெளிப்பாடுகள்

CO1-இலக்கியங்கள் காட்டும் வாழ்வியல் நெறிமுறைகளைப் பேணிநடத்தல்.

CO2-நமது எண்ணத்தை வெளிப்படுத்தும் கருவியாகத் தாய்மொழியைப் பயன்படுத்துதல்.

CO3-தகவல் தொடர்புக்குத் தாய்மொழியின் முக்கியத்துவத்தை உணர்தல்.

CO4-தாய்மொழியின் சிறப்பை அறிதல்.

CO5-இலக்கிய இன்பங்களை நுகரும் திறன்களை வளர்த்தல்.

அலகு-1

(9 Hrs)

எடுத்தொகை:

1. குறுந்தொகை (பாடல்-130).
2. நற்றிணை (பாடல்-27).
3. அகநானூறு (பாடல்-86)
4. ஐங்குறுநூறு (பாடல்-203)
5. கலித்தொகை- பாலைத்திணை (பாடல்-9)
6. புறநானூறு (பாடல்-235)

பத்துப்பாட்டு:

1. சிறுபாணாற்றுப்படை (அடிகள்-126-143)
2. முல்லைப்பாட்டு (6-21)

அலகு-2

(9 Hrs)

பதினெண் கீழ்க்கணக்கு:

1. திருக்குறள்- வெகுளாமை (அதிகாரம்-31), காதல் சிறப்புரைத்தல் (அதிகாரம்-113)
2. நாலடியார் - நல்லார் எனத்தான் (221)
3. திரிகடுகம்- கோலஞ்சி வாழும் குடியும் (33)
4. இனியவை நாற்பது- குழவி தளர்நடை (14)
5. கார் நாற்பது- நலமிகு கார்த்திகை (26)
6. களவழி நாற்பது-கவளங்கொள் யானை (14)

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அலகு-3

(9 Hrs)

சைவம்- பன்னிரு திருமுறைகள்

1. திருஞானசம்பந்தர் - வேபுறு தோளிபங்கள் (இரண்டாம் திருமுறை)
2. திருநாவுக்கரசர் - மனமெனும் தோணி (நான்காம் திருமுறை)
3. சுந்தரர் - ஏழிசையாய் இசைப்பயனாய் (ஏழாம் திருமுறை)
4. மாணிக்கவாசகர் - ஆதியும் அந்தமும் இல்லா (திருவெம்பாவை)
5. திருமூலர் - அன்பு சிவம் இரண்டு (திருமந்திரம்)

வைணவம் - நாலாயிரத் திவ்வியப் பிரபந்தம்

1. பேயாழ்வார் - திருக்கண்டேன் வொன்மேனி....
2. பெரியாழ்வார் - கருங்கண் தோகை மயிற் பீலி....
3. தொண்டரடிப்பொடிஆழ்வார் - பச்சைமாமலை போல்....
4. ஆண்டாள் - கருப்பூரம் நானுமோ? கமலப்பு....
5. திருமங்கையாழ்வார் - வாடினேன் வாடி வருந்தினேன்....

இஸ்லாமியம்

சீறாப்பூராணம்- பாடல் நின்ற வினை மானுக்குப்...5 பாடல்கள் (பாடல் எண்கள் 61-65)

கிறித்துவம்

இரட்சணிய யாதார்கம்- கடைதிறப்புப் படலம் -5 பாடல்கள் (பாடல் எண்கள்: 3,9,10,15,16)

அலகு - 4

(9 Hrs)

தமிழ் இலக்கிய வரலாறு

1. சங்க இலக்கியங்கள்
2. நீதி இலக்கியங்கள்
3. பக்தி இலக்கியங்கள்
4. காப்பியங்கள்

அலகு-5

(9 Hrs)

சிறுகதைகள்

1. புதுமைப்பித்தன் - அகலிகை
2. நா. பிச்சமூர்த்தி - வேப்பமரம்
3. அகிலன் - ஒரு வேளைச்சோறு
4. ஜி.நாகராஜன் - பச்சக் குதிரை
5. கி.ராஜநாராயணன் - கதவு
6. சா.கந்தசாமி - தக்கையின் மீது நான்கு கண்கள்
7. ஆண்டாள் பிரியதர்ஷினி - மாத்திரை
8. வண்ணதாசன் - ஒரு உல்லாசப் பயணம்
9. சு. தமிழ்ச்செல்வன் - வெயிலோடு போய்
10. பாரததேவி - மாப்பிள்ளை விருந்து

பார்வை நூல்கள் :

1. அரக, வீ., இருபதாம் நூற்றாண்டு சிறுகதைகள் நூறு, அடையாளம் பதிப்பகம், திருச்சி, 2013.
2. அருணாச்சலம், பா., பக்தி இலக்கியங்கள், பாரி நிலையம், சென்னை, 2010.
3. தமிழண்ணல், புதிய நோக்கில் தமிழ் இலக்கிய வரலாறு, மீனாட்சி புத்தக நிலையம், மதுரை, 2000.
4. பாக்கியமேரி, வகைமை நோக்கில் தமிழ் இலக்கிய வரலாறு, என்.சி.வி.எச். பதிப்பகம், சென்னை, 2011.
5. பசுபதி, மா. வே., செம்மொழித் தமிழ் இலக்கண இலக்கியங்கள், தமிழ்ப் பல்கலைக்கழகம், 2010 .

உரைநடை நூல்கள் :

Dr. S. Deepa

1. அன்பு, பா., மா.பொ.சி யின் ஒரு இலக்கிய நூல்கள் ஒரு மதிப்பீடு, உலகத் தமிழ் ஆராய்ச்சி நிறுவனம், சென்னை, 1983.
2. பிள்ளை, கே.கே., தமிழக வரலாறும் மக்களும் பண்பாடும், உலகத் தமிழ் ஆராய்ச்சி நிறுவனம், சென்னை, 2000.
3. ஜெயமோகன், நவீன இலக்கிய அறிமுகம், உயிர்மெய் பதிப்பகம், சென்னை, 1995.

இணையத்தளங்கள் :

1. <http://www.tamilkodal.com>
2. <http://www.languagelab.com>
3. <http://www.tamilweb.com>

55

A20FRT202**FRENCH - II**
(Common to B.A., B.Sc., B.Com., B.B.A. & B.C.A)**L T P C Hrs**
3 0 0 3 45**Course Objectives**

- To enable the students read, understand, and write simple sentences.
- To grasp relevant grammar for communication
- To learn about the land, people and culture of France.

UNITÉ – 1**(9 Hrs)**

Qu'est -ce qu'on leur offre ?

On solde !

Découvrir Paris en bus avec l'open Tour

UNITÉ – 2**(9 Hrs)**

Si vous gagne vous ferez quoi

Parasol ou parapluie ?

UNITÉ – 3**(9 Hrs)**

Quand il est midi à Paris

Vous allez Vivre

L'avenir du Français

UNITÉ – 4**(9 Hrs)**

Souvenirs d'enfance

j'ai fait mes études à Lyon 2

UNITÉ – 5**(9 Hrs)**

Retour des Antilles

Au voleur ! Au voleur

Text BooksPrescribed Text book : *FESTIVAL 1* - Méthode de Français

Authors : Sylvie POISSON-QUINTON

Michèle MAHEO-LE COADIC

Anne VERGNE-SIRIEYS

Edition : CLE International, Nouvelle Édition révisée : 2009.

Reference Book

Festival 1

B.Sc Chemistry

Dr. S. Daspa

A20GET202	GENERAL ENGLISH II (Common to B.A, B.Sc. and BCA)	L	T	P	C	Hrs
		3	0	0	3	45

Course Objectives

- To recognize poetry from a variety of cultures, languages and historic periods
- To develop the intensive study of language by critical reading
- To identify the various genres and analyze the works of writers in English
- To expand the basic understanding of targeted grammatical structures
- To understand the conventions of writing in English

Course Outcomes

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

CO1- Understand and appreciate poetry as a literary art form

CO2- Comprehend and recognize relationship between ideas, events and facts

CO3- Learn to explore characters and their conflicts, dilemmas and extend their response to stories

CO4- Apply grammatical structures meaningfully and appropriately in oral and written form

CO5- Write effectively and coherently

UNIT I POETRY**(9 Hrs)**

1. Lord Byron: She Walks in Beauty
2. Robert Frost: Stopping by Woods on a Snowy Evening
3. Nissim Ezekiel: Night of the Scorpion
4. Rabindranath Tagore: Where the Mind is Without Fear

UNIT II PROSE**(9 Hrs)**

1. Ernest Hemingway : A Day's Wait
2. Anton Chekhov : The Lottery Ticket

UNIT III FICTION**(9 Hrs)**

1. Jane Austen : Pride and Prejudice

UNIT IV GRAMMAR**(9 Hrs)**

1. Voice – Conditionals - Coherence

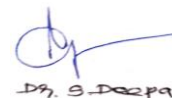
UNIT V COMPOSITION**(9 Hrs)**

1. Letter Writing
2. Report Writing

Text Books

1. Sharma, O.C, "The Approach to Life: A Selection of English Prose", Orient Longman Limited, 1st Edition, 2009.
2. Dipankar Purkayastha, DipenduDas, Jaydeep Chakrabarty, "Brookside Musings: A Selection of Poems and Short Stories: Board of Editors", Orient, Longman Limited, 1st Edition, 2009.
3. "Wisdom and Experience: An Anthology for Degree Classes". Board of Editors, Orient Longman Limited, 1st Edition, 2007.

Reference Books

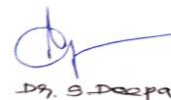


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1. Lalitha Natarajan and Sasikala Natesan, "English for Excellence: Poetry", Anuradha Publications Literary Pursuits: Board of Editors, Orient Longman Limited, 1st Edition, 2015.
2. Ernest Hemingway. "The Complete Short Stories of Earnest Hemingway". Scribner Publication, 1st Edition, 2003.
3. Rabindranath Tagore, "Where the mind is without fear", London: The India Society, 1st Edition, 1912.

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1. <https://www.litcharts.com/poetry/lord-byron/she-walks-in-beauty>
2. <https://americanliterature.com/author/anton-chekhov/short-story/the-lottery-ticket>
3. <https://www.cliffsnotes.com/literature/p/pride-and-prejudice/book-summary>
4. <https://studydriver.com/the-lottery-ticket-by-anton-chekhov/>
5. <https://learnenglish.britishcouncil.org/english-grammar-reference/active-and-passive-voice>



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A20CHT204

INORGANIC CHEMISTRY- I

L	T	P	C	Hrs
4	0	0	4	60

Course Objectives

- To gain knowledge on different types of chemical bonding
- To know hybridization and shape of covalent molecules
- To understand about "S" block element
- To study the basic idea about boron family
- To provide the basic concept on carbon family

Course Outcomes

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

- CO1-** Tell the formation of different types of chemical bonding and their significance.
- CO2-** Predict the hybridization and geometry of molecules based on VB and VSEPR theories and explain the molecular orbital theory(MOT) of homo and hetero nuclear diatomic molecules.
- CO3-** Outline the general characteristics of s block elements and the preparation, properties and uses of their compounds.
- CO4-** Tell the general characteristic of p-block elements especially Boron and preparation, properties and structure of their compounds.
- CO5-** Comprehend the properties and structure of allotropes of carbon, silicates and oxides and chlorides of carbon compounds.

UNIT I CHEMICAL BONDING**(12 Hrs)**

Chemical bond - definition, types of chemical bonds. Ionic or electrovalent bond - Definition, Illustration of the formation of ionic bond (Examples: NaCl, MgO, CaF₂, Al₂O₃ only), Condition for the formation of ionic compounds, Born Haber cycle. Covalent bond: Definition, types of covalent bond (single, double and triple), Illustration of the formation of covalent bond (Example: HF, H₂O, NH₃, O₂, N₂ only), factors favouring the formation of covalent compounds. Coordinate bond: Definition, Illustration of the formation of coordinate bond (Example: H₂O₂, SO₂, CO, NH₄, Al₂Cl₆ only), comparison between ionic, covalent and coordinate bond. Hydrogen bond: Definition, properties, types and significance of hydrogen bonding.

UNIT II HYBRIDIZATION AND SHAPE OF COVALENT MOLECULES**(12 Hrs)**

Hybridization – concept - VB theory-sp, sp², sp³, spd, spd² -VSEPR theory-Geometry of SnCl₂, NH₃, H₂O. ClF₃, IF₅. Formation of molecular orbitals from atomic orbitals. Molecular Orbital Theory- Homonuclear (H₂, Li₂, N₂, O₂) and Heteronuclear (CO and NO) diatomic molecules.

UNIT III S -BLOCK ELEMENTS**(12 Hrs)**

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, BeCl₂, calcium carbide, CaCl₂, super phosphate of lime, Plaster of Paris and lithopone- Biological importance.

UNIT IV P- BLOCK ELEMENTS (BORON GROUP)**(12 Hrs)**

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.

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UNIT V P- BLOCK ELEMENTS (CARBON GROUP)**(12 Hrs)**

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, CO₂, COCl₂, CCl₄), SiCl₄, bonding in (SiH₃)₃N, Pigments of Lead.

Text Books

1. Puri B.R, Sharma L.R, and Kalia K.C, "Principles of Inorganic Chemistry", Vallabh Publication, New Delhi. 28th Edition, 2004.
2. Madan R.D, "Modern Inorganic Chemistry", Chand S.& Company, New Delhi, 2nd Edition 2002.
3. P.L.Soni, "Textbook of Inorganic Chemistry", S.Chand & Sons., 1st Edition, 2013.

Reference Books

1. Albert Cotton F.A, "Advanced Inorganic Chemistry", Geoffrey Wilkinson, Carlos, Murillo, Manfred Bochmann, John Wiley & Sons, Inc. New York. 1st Edition, 1998.
2. Huheey J.E and Ellen Keiter A., Richard Keiter L. "Inorganic Chemistry", Pearson Education Pvt Ltd, Harper Collins College Publishers, Singapore. 4th Edition, 2004.
3. Malik, Tuli, Madan, "Selected Topics in Inorganic Chemistry", S. Chand & Co., New Delhi, 1st Edition, 2010.

Web References

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2. <https://www.calstatela.edu/sites/default/files/dept/chem/06winter/102/chapter9.pdf>
3. https://www.wlww.k12.or.us/cms/lib/OR01001812/Centricity/Domain/1338/NOTES%20-%206.1-6.3_Periodic%20Table_Trends_slideshow_2017.pdf

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A20CHT205	PHYSICAL CHEMISTRY- I	L	T	P	C	Hrs
		4	0	0	4	60

Course Objectives

- To analyse 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 Outcomes

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

- CO1-** Explain the basic concepts of nuclear chemistry
CO2- Analyze Nernst distribution law and its applications
CO3- Relate the functions, types and reaction mechanism of catalysts
CO4- Illustrate physical properties of molecules like distribution, polarization, magnetism etc.
CO5- Outline the chemistry of polymer.

UNIT I NUCLEAR CHEMISTRY & NATURAL RADIOACTIVITY (12 Hrs)

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).

UNIT II DISTRIBUTION LAW (12 Hrs)

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

UNIT III CATALYSIS (12 Hrs)

Definition- different types of catalysts – homogenous and heterogeneous catalysis, acid-base catalysis, enzyme catalysis- Michaelis-Menton mechanism, auto catalysis- catalytic poisoning-promoters.

UNIT IV MOLECULAR PROPERTIES AND STRUCTURE (12 Hrs)

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

UNIT V POLYMER CHEMISTRY (12 Hrs)

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.

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.

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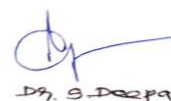
2. Billmeyer Jr., F.W, "A text book of Polymer Chemistry", John Willey and Sons, UK. 3rd Edition, 1984.
3. Glasstone S. A., "Text book of Physical Chemistry", McMillan India Ltd., 1st Edition, 1999.

Reference Books

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

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2. <https://chemistryonline.guru/distribution-law/>
3. <https://nptel.ac.in/content/storage2/courses/103103026/pdf/mod1.pdf>



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A20CHD202	ALLIED MATHEMATICS – II	L	T	P	C	Hrs
		3	0	0	4	60

Course Objectives

- To familiarize the concept of matrices.
- To introduce mathematical tools to solve first order differential equations.
- To learn linear differential equations of higher order with constant coefficients.
- To understand the concept of partial differentiation.
- To introduce the concepts of curl, divergence and integration of vectors in vector calculus.

Course Outcomes

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

CO 1 - Find eigen values and eigen vectors, diagonalization of a matrix.

CO 2 - Solve differential equations.

CO 3 - Solve higher order differential equations.

CO 4 - Solve different types of partial differential equation.

CO 5 - Understand the use of vector calculus.

UNIT I MATRICES

(12 Hrs)

Rank of a Matrix- Consistency of system of equations. Eigen values and Eigen vectors of a real matrix - Characteristic equation - Properties of Eigen values and Eigen vectors. Cayley-Hamilton Theorem.

UNIT II DIFFERENTIAL EQUATION

(12 Hrs)

Exact equations, First order linear equations, Bernoulli's equation, Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

UNIT III HIGHER ORDER DIFFERENTIAL EQUATION

(12 Hrs)

Linear differential equations of higher order with constant coefficients, the operator D, Euler's linear equation of higher order with variable coefficients, Solution by variation of parameter method.

UNIT IV PARTIAL DIFFERENTIAL EQUATION

(12 Hrs)

Partial derivatives, Total derivatives, Differentiation of implicit functions, Maxima and Minima of two variables. Partial differential equations of higher order with constant coefficients.

UNIT V VECTOR CALCULUS

(12Hrs)

Gradient, divergence and curl - Directional derivative- Irrotational and Solenoidal vector fields - Gauss Divergence Theorem and Stoke's Theorem.

Text Books

1. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley, Tenth Edition, 2019.
2. B.V.Ramana, "Higher Engineering Mathematics", Tata McGraw-Hill, New Delhi, Sixth Edition 2018.
3. N.P. Bali and Manish Goyal, "A Text Book of Engineering Mathematics", Lakshmi Publications, New Delhi, Ninth Edition, 2018.

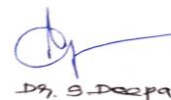
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Reference Books

1. C W. Evans, "Engineering Mathematics", A Programmed Approach, 3th Edition, 2019.
2. Singaravelu. A., "Engineering Mathematics - I", Meenakshi publications, Tamil Nadu, 2019.
3. M.K. Venkataraman, "Engineering Mathematics (Third Year-Part A)", The National Publishing Company, Madras, 2016.

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2. <https://nptel.ac.in/courses/111/105/111105122/>
3. <https://nptel.ac.in/courses/122/104/122104017/>



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A20CHS202	QUANTITATIVE APTITUDE AND LOGICAL REASONING	L	T	P	C	Hrs
		2	0	0	2	30

Course Objectives

- To enhance holistic development of students and improve their employability skills
- To know about classification of numbers, HCF, LCM, etc
- To find various interest calculation
- To improve probability problem
- To develop reasoning concepts, coding and decoding

Course Outcomes

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

CO1- Enhance holistic development and improve their employability

CO2- know about classification of numbers, HCF, LCM

CO3- Improve various interest calculations

CO4- understanding the concepts of probability problems

CO5- create knowledge about reasoning concepts, coding and decoding

UNIT I (6 Hrs)

Numbers: Classification of numbers – Test of divisibility – Unit digit – HCF and LCM – Remainder theorem – Progression – Simplification – Averages – Combined mean (simple problems)

UNIT II (6 Hrs)

Simple interest and compound interest – Word problems

UNIT III (6 Hrs)

Problems related to permutation and combination – Probability (simple problems)

UNIT IV (6 Hrs)

Reasoning (Analytical and logical): Odd man out – Word series – Number series – Direction test – Blood relationship – Coding and decoding – Seating arrangements

UNIT V (6 Hrs)

Problems related to clocks and calendar

Text Books

1. Dinesh Khattar, "The Pearson guide to quantitative aptitude for competitive examinations", 2nd Edition, 2013.
2. Dr. R.S. Agarwal, "Quantitative Aptitude for Competitive Examinations", S.Chand and Company Limited, 3rd Edition, 2017.
3. Abhijit Guha, "Quantitative Aptitude for Competitive Examinations", Tata Mcgraw Hill, 3rd Edition, 2011.

Reference Books

1. Edgar Thrope, "Test Of Reasoning for Competitive Examinations", Tata Mcgraw Hill, 7th Edition, 2020.
2. Aggarwal R. S, "A Modern Approach to Logical Reasoning - Includes Latest Questions and their Solutions", S. Chand, 2nd Edition 2018.
3. R.V.Praveen, "Quantitative Aptitude and Reasoning", Kindle Edition, 3rd Edition, 2017.

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Web References

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2. <https://sarkaripost.in/latest-quantitative-aptitude-and-reasoning-book-pdf/>
3. <https://www.mygknotes.com/2020/03/quantitative-aptitude-and-reasoning.html>



A20CHL206	ORGANIC QUALITATIVE ANALYSIS PRACTICAL	L	T	P	C	Hrs
		0	0	4	2	30

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 Outcomes

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

CO1- Learn to approach a problem systematically and to interpret the result logically

CO2- Detect various functional groups present in an organic compound.

CO3- Understand about Saturation and unsaturation nature of compounds

CO4- Identify aliphatic and aromatic compounds

CO5- Visualize confirmatory tests of various functional groups

ORGANIC ANALYSIS**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.

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, Veeraswamy. 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.

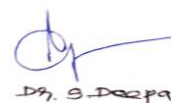
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2. https://www.csub.edu/chemistry/organic/manual/Lab14_QualitativeAnalysis.pdf
3. <http://rushim.ru/books/praktikum/Mann.pdf>



B.Sc Chemistry



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A20AET202	PUBLIC ADMINISTRATION	L	T	P	C	Hrs
		2	0	0	2	30

(Compulsory Course designed as per the directions issued by Government of India, MHRD, Department of Higher Education (Central University Bureau)

F.No.19-6.2014-Desk U Dated 19-05-2014)

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 Public Administration

Course Outcomes

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

CO1 – Understand the concepts and evolution of Public Administration.

CO2 – Be aware of what is happening in the Public Administration in the country

CO3 – Explain the Territory Administration in the State and the Centre

CO4 – Appreciate emerging issues in Indian Public Administration

UNIT I INTRODUCTION TO PUBLIC ADMINISTRATION

(7 Hrs)

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 and others - Evolution of Public Administration in India – Arthashastra – Colonial Administration upto 1947

UNIT II PUBLIC ADMINISTRATION IN INDIA

(8 Hrs)

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

UNIT III STATE AND UNION TERRITORY ADMINISTRATION

(8 Hrs)

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

UNIT IV EMERGING ISSUES IN INDIAN PUBLIC ADMINISTRATION

(7 Hrs)

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.

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.

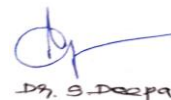
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1. Siuli Sarkar, "Public Administration in India", Prentice Hall of India, 2nd Edition, 2018.
2. M. Laxmikanth, "Public Administration", McGraw Hill Education, 1st Edition, 2011.
3. R.B.Jain, "Public Administration in India: 21st Century Challenges for Good Governance", Deep and Deep Publications, 1st Edition, 2002.

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3. <http://rti.gov.in/>
4. <http://www.cvc.nic.in/>
5. <https://www.india.gov.in/my-government/whos-who/lt-governors-administrators>



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A20EAL201	NATIONAL SERVICE SCHEME	L	T	P	C	Hrs
		0	0	2	1	30

Course Objectives

- To introduce about various activities carried out by national service scheme
- To gain life skills through community service
- To gain awareness about various service activities performed in higher educational institutions.
- To give exposure about the use of technology to uplift the living standards of rural community.
- To induce the feeling of oneness through harmony of self and society

Course Outcomes

After end of the course, the students will able to

CO1 – Recognize the importance of national service in community development.

CO2 – Convert existing skills into socially relevant life skills.

CO3 – Differentiate various schemes provided by the government for the social development

CO4 – Identify the relevant technology to solve the problems of rural community.

CO5 – Associate the importance harmony of nation with long term development

UNIT I INTRODUCTION TO NATIONAL SERVICE SCHEME (6 Hrs)

History and objectives, NSS symbol, Regular activities, Special camping activities, Village adaptation programme, Days of National and International Importance, Hierarchy of NSS unit in college. Social survey method and Data Analysis. NSS awards and recognition. Importance of Awareness about Environment, Health, Safety, Gender issues, Government schemes for social development and inclusion policy etc.,

UNIT II LIFE SKILLS AND SERVICE LEARNING OF VOLUNTEER (6 Hrs)

Communication and rapport building, problem solving, critical thinking, effective communication skills, decision making, creative thinking, interpersonal relationship skills, self- awareness building skills, empathy, coping with stress and coping with emotions. Understanding the concept and application of core skills in social work practice, Team work, Leadership, Event organizing, resource planning and management, time management, gender equality, understanding rural community and channelizing the power of youth.

UNIT III EXTENSION ACTIVITIES FOR HIGHER EDUCATIONAL INSTITUTIONS (6 Hrs)

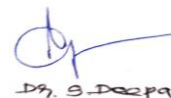
Objective and functions of Red Ribbon Club, Swatchh Bharath Abhiyan, Unnat Bharat Abhiyan, Jal Shakthi Abhiyan, Road Safety Club, Environmental club and Electoral literacy club.

UNIT IV USE OF TECHNOLOGY IN SOLVING ISSUES OF RURAL INDIA (6 Hrs)

Understanding community issues, economic development through technological development. Selection of appropriate technology, Understanding issues in agriculture, fishing, artisans, domestic animals, health and environment.

UNIT V NATIONAL INTEGRATION AND COMMUNAL HARMONY (6 Hrs)

The role of Youth organizations in national integration, NGOs, Diversity of Indian Nation, Importance of National integration communal harmony for the development of nation , Indian Constitution, Building Ethical human Relationships, Universal Human Values, Harmony of self and Harmony of nation.

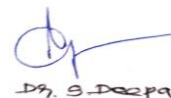
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Reference Books

1. Joseph, Siby K and Mahodaya Bharat, "Essays on Conflict Resolution, Institute of Gandhian Studies", Wardha , 1st Edition 2007.
2. Barman Prateeti and Goswami Triveni "Document on Peace Education", Akansha Publishing House, New Delhi, 1st Edition: 2009.
3. Sharma Anand, Gandhian Way, Academic Foundation, Myers G.Davi, "Social Psychology" Tata Mc.Graw Hill, 1st Edition: 2007.
4. Taylor E.Shelly et.al , Social Psychology, New Delhi, Pearson Prentice Hall Singh,12th Edition, 2006
5. Madhu , "Understanding Life Skills, background paper prepared for education for all: The leap to equality", Government of India report, New Delhi. 1st, Edition: 2003
6. Sandhan, "Life Skilss Education, Training Module, Society for education and development, Jaipur. Radakrishnan Nair and Sunitha Rajan, Life Skill Education: Evidences form the field", RGNIYD publication, Sriperumbudur 1st Edition, 2012
7. National Service Scheme Manual (Revised), Government of India, Ministry of Youth Affairs and Sports, New Delhi 1st Edition.
8. National Service Scheme in India: A Case study of Karnataka, M. B. Dishad, Trust Publications, 1st Edition, 2001

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2. <http://en.wikipedia.org/wiki/national-service-scheme> 19=<http://nss.nic.in/adminstruct>
3. <http://nss.nic.in/propexpan>
4. <http://nss.nic.in>
5. <http://socialworknss.org/about.html>


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A20CHT307	INORGANIC CHEMISTRY -II	L	T	P	C	Hrs
		4	0	0	4	60

Course Objectives

- 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 sulphur compounds
- 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
- To develop the knowledge to identify and rectify the various errors occurred in experiments and also to adopt safety methods in laboratory

Course Outcomes

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

- CO1-** Acquire the knowledge on preparation, properties and uses of nitrogen group compounds
CO2- Spell the importance of oxygen, oxyhalides and oxyacids of sulphur and biologically important sulphur compounds
CO3- Compare and evaluate the properties and uses of halogens, oxy acids and noble gases.
CO4- Apply the basic concepts and theories of acids and bases and their properties.
CO5- Develop the knowledge to identify and rectify the various errors occurred in experiments and also to adopt safety methods in laboratory

UNIT I P-BLOCK ELEMENTS (NITROGEN GROUP) (12 Hrs)

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 hydroxyl amine. 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- Allotropy 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.

UNIT II P-BLOCK ELEMENTS (OXYGEN GROUP) (12 Hrs)

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.

UNIT III HALOGENS (12 Hrs)

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.

UNIT IV ACIDS AND BASES (12 hrs)

Arrhenius 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

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bases – effect of solvent – leveling effect – effect of polarity and dielectric constant – effect of substituents – factors influencing relative strengths of acids and bases.

UNIT V: LABORATORY SAFETY AND ERROR ANALYSIS (12 Hrs)

i. Laboratory Safety

Storage and handling of corrosive, toxic and poisonous chemicals-simple first aid procedure for acid and alkali in eye, acid and alkali burns, heat burns and cut by glasses.

ii. Error Analysis

Accuracy, precision, classification of errors, minimization of errors, significant figures, mean and standard deviation – method of least squares – student Q test.

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. Holler and .Nieman T.A, “Principles of industrial analysis”, Thomson Books Cole, Singapore, 5th Edition, 2004.

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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.

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1. <https://www.clearitmedical.com/2019/04/chemistry-notes-p-block-elements-nitrogen-family.html>
2. <https://www.vedantu.com/chemistry/p-block-elements-group-16-elements>
3. <https://www.britannica.com/science/halogen>

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A20CHT308	ORGANIC CHEMISTRY - I	L	T	P	C	Hrs
		4	0	0	4	60

Course Objectives

- To gain knowledge of nomenclature, structure and shape of organic molecules
- To know the reaction mechanism and isomerism
- To gain knowledge on alkanes and cycloalkanes
- To understand stereochemistry of organic molecules
- To observe the methods of purification of organic compounds

Course Outcomes

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

CO1 -Apply the knowledge of nomenclature, structure and shape of organic molecules

CO2 -Gain required knowledge about reaction mechanism and isomerism

CO3 -Apply the knowledge on preparation and properties of alkanes and cycloalkanes in industries

CO4 -Understand stereochemistry of organic molecules

CO5 -Use the methods of purification for the various organic molecules in the industries

UNIT I UNSATURATED HYDROCARBONS (12 Hrs)

Alkenes: Methods of preparation (Catalytic hydrogenation, Birch reduction, Saytzeffs and Hofmann's rule) – addition reactions: Markonikov and anti-Markonikov mechanism of addition to conjugated dienes.

Alkynes: Preparation and Acidity of alkynes – chemical reaction (Nucleophilic and electrophilic addition reactions).

UNIT II ALKYL HALIDES (12 Hrs)

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

UNIT III ALCOHOLS (12 Hrs)

Monohydric alcohols: Classification (1° , 2° and 3°) – 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.

UNIT IV ETHERS, THIOETHER AND EPOXIDES (12 Hrs)

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).

UNIT V ALDEHYDES AND KETONES (12 Hrs)

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, Wittigs reaction, Reformsky reaction, Baeyer-Villiger rearrangement, Reactions with NH_3 and their derivatives) – Oxidation reactions, Reduction reactions (Meerwein- Ponndorf-Verley reduction, Wolf-Kishner reduction, Clemmensen reduction), Aldol Condensation reactions – Cannizaro reaction – Distinguishing aldehydes and ketones – Chemistry of acrolein and crotonaldehyde.

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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", Vol 1, Pearson Edition, Singapore, 6th Edition, 2005.
2. R.T. Morrison 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>



ALLIED PHYSICS – I		L	T	P	C	Hrs
A20CHD303	(Common to B. Sc., Mathematics & B. Sc., Chemistry)	3	1	0	4	60

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 Outcomes

On Completion successful students will be able to demonstrate an understanding of:

CO1 –To describe the various phenomenon of Kinematics, Mechanics of Solids.

CO2 –To describe the various phenomenons of Sound & Acoustics of different structures.

CO3 –The relationships between physics on the atomic scale and the properties of matter. Techniques for finding appropriate averages to predict macroscopic behavior.

CO4 –To describe the relationship and thermal behavior of various systems.

CO5 –To describe various concepts of Optics, spectroscopy, Application of light, Fiber Optics etc.,.

UNIT I MECHANICS**(12 Hrs)**

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.

UNIT II SOUND**(12 Hrs)**

Simple harmonic motion – composition of two simple harmonic motion – along a straight line – At right angle to each other Lissajou'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.

UNIT III PROPERTIES OF MATTER**(12 Hrs)**

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.

UNIT IV THERMAL PHYSICS**(12 Hrs)**

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's phyro heliometer – temperature of the sun.

UNIT V OPTICS**(12 Hrs)**

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.

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Text Books

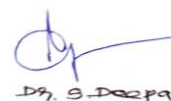
1. Saigal, S, "Sound" Chand & Co, 1st Edition, 1996.
2. D.S. Mathur, "Mechanics", S. Chand & Co, 1st Edition, 2000.
3. Brijlal Subramaniam "Properties of Matter", , S.Chand & Co, 1st Edition, 2002.

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 Subramaniam, "Heat and thermodynamics", S. Chand & Co, 1st Edition, 2001.

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



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A20CHE301	FOOD AND PRESERVATION CHEMISTRY	L	T	P	C	Hrs
		4	0	0	4	60

Course Objectives

- To understand the various aspects of food with respect to their nutritional value and their impact on human health
- To understand the role of common vitamins and minerals in normal physiology and disease
- To understand the importance of Balanced Diet and its components.
- To familiarize the students on food spoilage and preservation
- To acquire knowledge on food adulteration

Course Outcomes

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

CO1 - Understand the food groups their nutritive value.

CO2 - Understand the role of Vitamins and minerals in our daily diet

CO3 - Understand the importance of all nutrients for different age groups and the role of diet in disease conditions.

CO4 - Understand the effects of fermentation in food production and its influence on the microbiological quality and status of the food product.

CO5 - Understand the concept of adulteration in food products

UNIT I INTRODUCTION**(12 Hrs)**

Food: Definition –classification based on nutritional values, nutritive values of cereals, nuts as oil seeds and milk as milk products. Carbohydrates: sources, biological functions, deficiency disease and RDA. Protein: sources, biological functions, deficiency diseases and RDA. Fat: sources, biological functions, deficiency and RDA.

UNIT II MINERALS AND VITAMINS**(12 Hrs)**

Minerals: Dietary sources, functions, Effects of deficiency and requirements of calcium, phosphorous, iron, fluorine, iodine, sodium and potassium. Vitamins: Classification, fat and water soluble vitamin, their food sources, effects of deficiency and RDA.

UNIT III DIET PLAN**(12 Hrs)**

Meal planning for various age groups: Importance of meal planning –Importance of mother's milk – Diets for school children - adolescents - pregnant and lactating women. Diet during fever, dysentery, anemia, blood pressure, obesity and diabetes.

UNIT IV FOOD SPOILAGE AND PRESERVATION**(12 Hrs)**

Food spoilage: – Food Spoilage – Causes of food spoilage – Fermentation, rancidity, autolysis and putrefaction – food poisoning.

Food Preservation: principle and importance-method of freezing, canning, pickling, salting, smoking, bottling, sterilization, refrigeration, dehydration, heating, radiation and preservative agents.

UNIT V FOOD ADULTERATION**(12 Hrs)**

Food adulteration: Definition, classification – Common adulteration in food and their ill effects – Packing hazards-food additives. Practical rules for good sanitation of food: Food laws and standards – Bureau of Indian Standards – AGMARK – Consumer Protection act.

Text Books

1. Dr.M. Swaminathan, "Handbook of food and Nutrition", Bangalore Printing and Publishing Co Ltd, Bangalore, 5th Ed, 2007.
2. K. Bagavathi Sundari, "Applied Chemistry", MJP Publishers, Chennai, 1st Ed, 2006.
3. M.Raheena Begum, "A Text Book of Foods, Nutrition and Dietetics", Sterling Publishers, Delhi,

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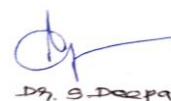
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Reference Books

1. B. Srilakshmi, "Food Science", New Age International (P) Ltd, New Delhi, 3rd Ed, 2005.
2. Jayashree Ghose, "Fundamental Concepts of Applied Chemistry", S.Chand and Company (P) Ltd, New Delhi, 1st Ed., 2006.
3. Morris B. Jacobs, "The Chemical Analysis of Foods and Food Products", CBS Publishers and Distributors, New Delhi, 3rd Ed., 1993.

Web References

1. http://www.internetchemistry.com/chemistry/food_chemistry.htm
2. <http://www.slideshare.net/sanathoibasingha/notes-for-the-subject-food-analysis>
3. <http://www.fao.org/3/AM808E/AM808E.pdf>



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A20CHE302	NANO AND GREEN CHEMISTRY	L	T	P	C	Hrs
		4	0	0	4	60

Course Objectives

- To understand the basics of Nano Chemistry
- To know the methods to prepare Nano materials
- To have an idea about Green Chemistry and its limitations
- To gain knowledge about Green solvents in laboratory and also in
- To study the Reactions and applications of Green Chemistry

Course Outcomes

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

CO1 - Understand the basics of Nano Chemistry

CO2 - Know the methods to prepare Nano materials

CO3 - Have an idea about Green Chemistry and its limitations

CO4 - Gain knowledge about Green solvents in laboratory and also in Industry

CO5 - Study the Reactions and applications of Green Chemistry

UNIT – I INTRODUCTION TO NANOSCIENCE (12 Hrs)

Definition of Nanomaterials – classification (1D, 2D and 3D) with examples - Synthesis top down and Bottom up Approach - Carbon Nanotubes – Types, properties and uses.

UNIT- II PREPARATION OF NANOMATERIALS (12 Hrs)

Co-precipitation- sol- gel - chemical reduction- photochemical reduction –hydrothermal and solvo thermal synthesis.

UNIT III GREEN CHEMISTRY (12 Hrs)

Introduction-definition-Need for green chemistry- Goals - Limitations –Progress of Green Chemistry - principles of green chemistry- Concept of Atom economy- Concept of Selectivity.

UNIT IV GREEN SOLVENTS 12 Hrs)

Green solvents – super critical carbondioxide, ionic liquids - Water as greener solvent- reactions in ionic-liquid, solvent free reaction. Solvent less reaction – Microwave reactions – sonications.

UNIT-V GREEN REACTIONS (12 Hrs)

Green reactions-Aldol condensation (Acid catalyst, Crossed aldol), Claisen rearrangement, Clemmensen reduction, Diels-Alder reaction.

Text Books

1. "Nanotechnology", S. Shanmugam, M.J.P. Publishers, Chennai, 1st Edition, 2010.
2. V. Kumar, "An Introduction to Green Chemistry", Vishal Publishing Co., 1st Edition, 2008.
3. V.K. Ahluwalia, "Green Chemistry", Ane Books India, New Delhi, 1st Edition, 2006.

Reference Books

1. G. Cao, "Nanostructures & Nano Materials", Imperial College Press, U.K, 1st Edition, 2004.
2. Geoffrey A Ozin, André Arsenault, "Nanotechnology, A Chemical Approach to Nanomaterials" Royal Society of Chemistry, 2nd Edition, 2015.
3. Matlack, A.S. "Introduction to Green Chemistry", Marcel Dekker, 1st Edition, 2001.

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1. <https://web.pdx.edu/~pmoeck/phy381/intro-nanotech.pdf>
2. https://www.researchgate.net/publication/332548741_Synthesis_techniques_for_preparation_of_nanomaterials
3. <http://www.rsc.org/suppdata/cs/c1/c1cs15219j/c1cs15219j.pdf>



A20CHE303**POLYMER CHEMISTRY**

L	T	P	C	Hrs
4	0	0	4	60

Course Objectives

- To gain knowledge in synthesis of polymers and its applications.
- To know the structure and properties of polymers.
- To gain knowledge processing and polymerization techniques.
- To understand characterization of polymers.
- To observe advances in polymers

Course Outcomes

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

CO1 - Classify different types of polymers and polymerization techniques.

CO2 - Distinguish between thermo and thermosetting plastics.

CO3 - Tell the knowledge on preparation, properties and uses of commercial polymers such as Polythene, PVC, polystyrene and PAN.

CO4 - Apply the chemistry of polymers viz, polyurethanes, phenol, formaldehyde composites etc.

CO5 - Understand the biopolymer and biodegradable polymers in medical field.

UNIT – I INTRODUCTION TO POLYMER AND ITS SYNTHESIS (12 Hrs)

Definition – Monomer- polymer- polymerization and degree of polymerization. Classification of polymers based on architecture- structure- thermal behavior synthesis and tacticity. Synthesis of high polymers- step growth polymerization- chain growth polymerization - free radical- ionic- coordination polymerization. Special Topics in polymer synthesis – metathesis- group transfer polymerization and macromers in polymer synthesis.

UNIT – II STRUCTURE AND PROPERTIES OF POLYMERS (12 Hrs)

Molecular weight- structure- properties- physical properties- solubility- viscosity density, crystallinity. Chemical properties, thermal properties- glass transition temperature, heat distortion temperature. Electrical properties- optical properties mechanical properties- rheological properties and magnetic properties.

UNIT – III POLYMERIZATION TECHNIQUES AND PROCESSING (12 Hrs)

Techniques of Polymerization – Bulk, solution, suspension, emulsion techniques. Other techniques – Interfacial polymerization technique and plasma polymerization technique. Processing of Polymers – principles of processing-melt- rubbery stage solution- emulsion and suspension. Techniques for polymer processing compression, extrusion-spinning- casting- transfer and injection.

UNIT – IV CHARACTERIZATION OF POLYMERS (12 Hrs)

Techniques for determination of molecular weight – Gel Permeation Chromatography. Techniques for determination of Morphology -X-Ray diffractometer- electron microscope- atomic force microscopy and scanning tunneling microscopy- scanning electron microscopy and transmission electron microscope. Techniques for determination of thermal behavior of polymers – thermo gravimetric analysis differential thermal analysis- differential scanning calorimetry- dynamic mechanical analysis and thermo mechanical analysis.

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UNIT – V ADVANCES IN POLYMERS**(12 Hrs)**

Biopolymers and biodegradable polymers in medical field- high temperature and fire resistant polymers- silicones. Application of polymers in solar cells- conducting polymers and composites (basic idea only).

Text Books


1. Fred. W. Billmeyer, "Textbook of Polymer Science", Wiley India, Delhi, 3rd Edition, 2008.
2. Jeol R. Fried, "Polymer Science and Technology", Prentice Hall of India Private Limited, New Delhi, 1st Edition, 1999.
3. V. R. Gowariker, N.V. Viswanathan, Jayadev Sreedhar, "Polymer Science", New Age International (P) Limited, Publishers, New Delhi, 1st Edition, 2009.

Reference Books

1. Premamoy Ghosh, "Polymer Science and Technology", McGraw Hill Education (India) Private Limited, 3rd Edition, 2011.
2. Niranjana Karak, "Fundamentals of Polymers Raw Materials to Finish Products", PHI Learning Private Limited, New Delhi, 2nd Edition, 2009.
3. M.G. Arora, M. Singh and M.S. Yadav "Polymer Chemistry", , Anmol Publications Private Ltd., New Delhi, 2nd Revised Edition, 1989.

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1. <https://www.azom.com/article.aspx?ArticleID=7887>
2. <https://www.hindawi.com/journals/apt/>
3. <https://web.stanford.edu/class/cheme160/lectures/lecture13.pdf>


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	INORGANIC QUALITATIVE ANALYSIS -I AND PREPARATION OF INORGANIC COMPOUNDS	L	T	P	C	Hrs
A20CHL309		0	0	4	2	30

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

Course Outcomes

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

CO1 - Enable the students to develop analytical skills in inorganic qualitative analysis

CO2 - Identify and detect various anions and cations through coloured reactions of metal ions.

CO3 - Develop the skill of semi micro analysis

CO4 - Enable the students to identify the interfering radicals

CO5 - Understand the complete mechanism of the inorganic qualitative analysis

SEMI MICRO QUALITATIVE ANALYSIS:

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

Semi micro qualitative analysis of inorganic salt mixtures containing one interfering acid radical.

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.

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.Veerasingam 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.

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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_Organic_Qualitative_Analysis.pdf

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	ALLIED PHYSICS LABORATORY- I	L	T	P	C	Hrs
A20CHD304	(Common to B. Sc., Mathematics & B. Sc., Chemistry)	0	0	4	2	30

Course Objectives

- To provide a practical understanding of some of the concepts learnt in the theory course on Physics.
- Evaluate the process and outcomes of an experiment quantitatively and qualitatively.
- Extend the scope of an investigation whether or not results come out as expected.
- Conduct an experiment collaboratively and ethically.
- Collect data and revise an experimental procedure iteratively and reflectively.

Course Outcomes

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

- CO1** - Ability to characteristics the Semiconductor devices. Capable of handling screw gauge, vernier Caliper and Polarimeter to find the surface tension.
- CO2** - Acquired basic knowledge about Potentiometer and magnetic field due to a current carrying coil.
- CO3** - Ability to prepare formal laboratory reports describing the results of experiments and to interpret the data from the experiments
- CO4** - Ability to prepare formal laboratory reports describing the results of experiments and to interpret the data from the experiments.

List of Experiments

1. Semiconductor diode characteristics.
2. Surface tension – Drop weight method.
3. Meter Bridge – Determination of resistance.
4. Post office Box – Resistance.
5. Non uniform Bending – Young's modulus
6. Potentiometer – Voltmeter Calibration.
7. Sonometer – Verification of Laws.
8. Spectrometer – Determination of refractive index.
9. Bridge rectifier.
10. Basic logic gates –Discrete components.

Text Books

1. CL Arora, "B.Sc Practical Physics", S Chand & Co, 2nd Edition, 2010.
2. M.N. Srinivasan, "Practical Physics", Sultan son Pub 3rd Edition, 2015.
3. V Y Rajopadhye and V L Purohit, "Textbook of experimental Physics", 2nd Edition, 2015.

Reference Books

1. CL Arora, "Physics for Degree Students", S.Chand & Co, 2nd Edition, 2010.
2. Harnam Singh, "B.Sc Practical physics", S. Chand & Co, 1st Edition, 1963
3. Paul Zbar, "Basic Electronics: A text Lab manual", McGraw Hill Publishing Co, 2nd Edition, 1989

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1. http://www.iiserpune.ac.in/~bhasbapat/phy221_files/Gratings%20and%20Prism%20Spectrometer.pdf
2. <https://www.tec-science.com/thermodynamics/heat/experimental-setup-for-determining-the-thermal-conductivity/>
3. <https://spark.iop.org/interference-air-wedge#gref>



A20CHO304**FOOD ANALYSIS**

L	T	P	C	Hrs
0	0	4	2	30

Course Objectives

- To get a basic idea about the food chemistry
- To provide the practical knowledge to students in characterizing the properties of food
- To provide training to students in characterizing the properties of food
- To familiarize the students on food chemistry and food poisons.
- To acquire knowledge on food additives

Course Outcomes

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

CO1- Get a basic idea about the food chemistry

CO2- Provide the practical knowledge to students in characterizing the properties of food

CO3- Provide training to students in characterizing the properties of food

CO4- Familiarize the students on food chemistry and food poisons.

CO5- Acquire knowledge on food additives

LIST OF EXPERIMENTS

1. Estimation of Nitrogen (protein) by Kjeldhal method.
2. Estimation of iodine value, acid value and RM value of edible oil.
3. Estimation of food colours (by colorimetric method).
4. Estimation of available carbon dioxide in baking powder.
5. Isolation of caesein and lactose from milk.
6. Estimation of glycine.
7. Isolation of natural food colours – Soxhelet extraction of chlorophyll.
8. Isolation of caffeine from tea dust.
9. Detection of adulterants in food stuffs.
10. Estimation of ascorbic acid.
11. Estimation of glucose.

Text Books

1. N. S. Gnanapragasam, G. Ramamurthy, "Organic Chemistry Lab Manual", S.Viswanathan printers and publishers Ltd., 2nd Edition, 2002.
2. H.K. Chopra, P.S.Panesar, "Food Chemistry", Narosa Publishing House, 2nd Edition, 2010.
3. Thanlamma Jacob, "Textbook of applied chemistry for home science and allied Science", MacMillan, 1st Edition, 1976.

Reference Books

1. Lilian Hoagland Meyer, "Food Chemistry", CBS Publishers & Distributors, 3rd Edition, 2004
2. S. Suzanne Nielsen, "Food Analysis Laboratory Manual", Springer US, 1st Edition, 2010.
3. Alessandra Gentili, Chiara Fanali, "Advances in Food Analysis", Publisher: MDPI AG, 1st Edition, 2019.

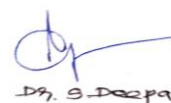
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1. <http://154.68.126.6/library/Food%20Science%20books/batch1/Food%20Analysis%20Fourth%20Edition.pdf>
2. <https://www.slideshare.net/SanathoibaSingha/notes-for-the-subject-food-analysis>
3. <http://www.fao.org/3/AM808E/AM808E.pdf>



B.Sc Chemistry



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A20CHO305	MOLECULES OF LIFE	L	T	P	C	Hrs
		0	0	4	2	30

Course Objectives

- To understand the properties of lipids
- To study the structure and properties of carbohydrates
- To know the structure and properties of protein
- To study the synthesis of a drug molecule
- To analyze the structure –activity relationships of drug molecule

Course Outcomes

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

- CO1-** Understand the properties of lipids
CO2- Study the structure and properties of carbohydrates
CO3- Know the structure and properties of protein
CO4- Study the synthesis of a drug molecule.
CO5- Analyze the structure –activity relationships of drug molecule

LIST OF EXPERIMENTS

1. To determine the saponification value of an oil/fat.
2. To determine the iodine value of an oil/fat
3. Differentiate between a reducing/ non-reducing sugar.
4. To synthesize aspirin by acetylation of salicylic acid
5. Preparation of glucosazone from glucose (Osazone formation)
6. Determination of cholesterol using Liebermann – Burchard reaction
7. Determination of protein by Biuret reaction
8. Carbohydrates – qualitative and quantitative determination.

Text Books

1. B.S.Furniss,A.J. Hannaford, V.Rogers, P.W.G Smith, Tatchell, A.R. “Vogel’s Textbook of Practical Organic Chemistry”, ELBS, 5th Edition, 1989.
2. V.K. Ahluwalia &R. Aggarwal, “Comprehensive Practical Organic Chemistry”, Universities Press, 2nd Edition, 2004.
3. R. T.Morrison & R. N.Boyd, “Organic Chemistry”, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education), 6th Edition, 1992.

Reference Books

1. I. L. Finar, “Organic Chemistry , Volume 2”, Dorling Kindersley (India) Pvt. Ltd. 6th Edition, 2012
2. John Kuriyan Boyana Konforti David Wemmer, “The Molecules of Life Physical and Chemical Principles”, W.W. Norton & Company, 1st Edition, 2012.
3. John Kuriyan, Boyana Konforti, David Wemmer, “ The molecules of life” W. W. Norton & Company, 1st Edition, 2012.

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1. <https://www.slideshare.net/eruder/molecules-of-life-intro>
2. <http://www.indians.k12.pa.us/cms/lib2/PA01001568/Centricity/Domain/934/The%20Molecules%20of%20Life%20and%20Carbohydrates.ppt>
3. [https://bio.libretexts.org/Bookshelves/Introductory_and_General_Biology/Book%3A_Biology_\(Kimball\)/02%3A_The_Molecules_of_Life](https://bio.libretexts.org/Bookshelves/Introductory_and_General_Biology/Book%3A_Biology_(Kimball)/02%3A_The_Molecules_of_Life)

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A20CHO306	WATER ANALYSIS	L	T	P	C	Hrs
		0	0	4	2	30

Course Objectives

- To analyze the TDS and hardness of any water samples
- To check the alkalinity levels, pH levels, turbidity levels of water samples
- To know the fluoride level and sulphate level of water samples
- To detect Na by Flame photometric estimation
- To determine the COD and BOD of water samples

Course Outcomes

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

- CO1-** Analyze the TDS and hardness of any water samples
CO2- Check the alkalinity levels, pH levels, turbidity levels of water samples
CO3- Know the fluoride level and sulphate level of water samples
CO4- Detect Na by Flame photometric estimation
CO5- Determine the COD and BOD of water samples

Experiments

1. Estimation of temporary and permanent hardness.
2. Estimation of calcium and magnesium hardness.
3. Estimation of chloride by Mohr's method.
4. Estimation of sulphate.
5. Spectro photometric estimation of fluoride.
6. Estimation of dissolved oxygen (DO).
7. Estimation of TDS.
8. Determination of Biological Oxygen Demand (BOD).
9. Determination of Chemical Oxygen Demand (COD).
10. Flame photometric estimation of sodium.

Text Books

1. Rajesh kumar Rai., " Water quality Analysis, Lab Manual" Create Space Independent Publishing Platform , 1st Edition, 2017.
2. Barbara Hauser, " Drinking water chemistry A lab manual", CRC Press, 1st Edition, 2018.
3. Leo M.L Nollet, Leen S. P. De Gelder , "Handbook of Water Analysis", Taylor & Francis, 3rd Edition, 2013.

Reference Books

1. V. Dean Adams, "Water and Wastewater Examination Manual", Taylor & Francis, 1st Edition, 1990.
2. Pradyot Patnaik, "Handbook of Environmental Analysis Chemical Pollutants in Air, Water, Soil, and Solid Wastes", 3rd Edition, CRC Press, 2017.
3. Fresenius, Wilhelm, Quentin, Karl E., Schneider, "Water Analysis" Springer-Verlag Berlin Heidelberg, 1st 1988.

Web References

1. <https://www.mpcb.gov.in/sites/default/files/water-quality/reports/LSD-NEERI%20Water%20Quality%20Analysis.pdf>
2. https://www.who.int/water_sanitation_health/dwq/2edvol3d.pdf
https://www.pseau.org/outils/ouvrages/cawst_introduction_to_drinking_water_quality_testing_2013.pdf

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A20CHS303	MOBILE SERVICING	L	T	P	C	Hrs
		0	0	2	-	30

Course Objectives

- Learn and identification of standard mobile components
- To understand and troubleshooting hardware and software related problems
- To study the various faults arising due to corrupt software
- To understand the various flasher boxes and Flashing software for various brands.
- To understand the troubleshooting of faults using advanced techniques

Course Outcomes

After completion of the course, the students are able to

CO1 - Infer the fundamental of standard mobile components.

CO2 –Demonstrate the mobile hardware and software related problems.

CO3 - Demonstrate various faults arising due to corrupt software

CO4 - Demonstrate different flasher boxes and Flashing software for various brands

CO5 –Demonstrate the troubleshooting of faults using advanced techniques

MODULE I: HARDWARE BASED EXPERIMENTS

1. Study of various tools and equipment used for mobile phone repairs.
2. Introduction of various Circuit of the Motherboard and Various Components used in mobile phone
3. Demonstrate the Assembling and disassembling of various models of mobile phones.
4. Demonstration of Identifying the fault and troubleshooting for repairing of various faults
5. Demonstration of Common repair procedure for hardware and software related faults.

MODULE II: SOFTWARE BASED EXPERIMENTS

1. Detailed study of various faults arising due to corrupt software
2. Introduction of various flasher boxes and Flashing software of various brands of hands.
3. Removing virus from infected phones and Unlocking of handsets through codes and/or software.
4. Demonstration of Common repair procedure for Water damaged repair techniques.
5. Use of internet for troubleshooting faults using advanced troubleshooting techniques.

Reference Books

1. ChukkyOparandu , “Mobile Phones and Tablets Repairs: A Complete Guide for Beginners and Professionals”, Mondraim Nig. Ltd, May 2016..
2. SanjibPandit , “Advance Mobile Repairing: Multicolor Circuits, Service Diagrams & Repairing”, Mondraim Nig. Ltd, December 2010.

Web References

1. <https://www.youtube.com/watch?v=OjxCeIVySi8>
2. <https://www.youtube.com/watch?v=jd8zBgwMfU0>
3. <https://in.pinterest.com/pin/862017184895958528/>
4. <https://fliphtml5.com/fgms/skao/basic>
5. <https://www.pinterest.com/smartphonesrepair/phone-repairing-manual-pdf-free-download/>

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A20CHT410	ORGANIC CHEMISTRY - II	L	T	P	C	Hrs
		4	0	0	4	60

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 Outcomes

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

CO1 - Tell the chemistry of saturated, unsaturated and substituted carboxylic acid

CO2 - Comprehend the preparation, properties and synthetic applications of aldehydic and ketonic acid.

CO3 - Explain the preparation and chemical properties of aliphatic nitrogen compounds.

CO4 - Develop their knowledge on the chemistry of organometallic reagents.

CO5 - Apply the chemistry of carbohydrates like glucose, fructose, sucrose, starch and cellulose.

UNIT I CARBOXYLIC ACID AND THEIR DERIVATIVES (12 Hrs)

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.

UNIT II ALDEHYDIC AND KETONIC ACIDS (12 Hrs)

Preparation and properties of glyoxalic acids, pyruvic and laevulic acid – Preparation and synthetic importance 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.

UNIT III ALIPHATIC NITROGEN COMPOUNDS (12 Hrs)

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.

UNIT IV ORGANOMETALLIC REAGENTS (12 Hrs)

Organo magnesium halides: preparation, reactions and synthetic uses of Grignard reagents and its limitations. Organolithiums: 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.

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UNIT V CARBHOYDRATES**(12 Hrs)**

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).

Text Books


1. Bhupinder Mehta, Manju Mehta, "Organic Chemistry-II", 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, 1st Edition, New Delhi, 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, 6th Edition, Singapore, 2005.
2. R.T. Morrison, and R.N. Boyd, "Organic chemistry", Prentice Hall Private Limited, 6th Edition, New Delhi, 1997.
3. P.L. Soni, "Text Book of Organic Chemistry", Sultan Chand, New Delhi, 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>


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	L	T	P	C	Hrs
A20CHT411					
PHYSICAL CHEMISTRY - II	4	0	0	4	60

Course Objectives

- To gain knowledge of Importance, different types of processes and Statement of first law of thermodynamics
- To know the needs, different forms of second law of thermodynamics
- To gain knowledge statement, experimental and exceptions to third law
- To understand enthalpy and bond energy and its applications
- To observe law of mass action, Relationship between K_p and K_c and its applications.

Course Outcomes

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

CO1 - Understand the fundamentals of first law of thermodynamics.

CO2 - Gain knowledge on the second law of thermodynamics and its applications.

CO3 - Acquire the concepts of third law of thermodynamics and its applications.

CO4 - Aware of the heat changes accompanying in chemical reactions.

CO5 - Understand the basic principles of chemical equilibrium.

UNIT I FIRST LAW OF THERMODYNAMICS (12 Hrs)

Importance of thermodynamics- limitations of thermodynamics-concepts of a system and surrounding, state variable- extensive and intensive properties, state function and their differential (exact and Inexact), different types of processes- Isothermal, Adiabatic, Isobaric, isochoric, reversible, irreversible and cyclic. Statement, Mathematical expression-enthalpy and energy of a system-Heat capacity at constant P & V-Correlation between C_p and C_v - Joule Thomson effect – inversion temperature.

UNIT II SECOND LAW OF THERMODYNAMICS (12 Hrs)

Need for second law- Different forms of second law, Carnot cycle-efficiency of Carnot engine and entropy a state function, Entropy changes in reversible and irreversible processes, calculation of entropy change of an ideal gas with change in P,V &T-Entropy of mixing, Physical significance of entropy- work function and free energy, variation of free energy change with temperature and pressure- Maxwell's relationships, The Gibbs-Helmholtz equation- Clausius Clapeyron equation- Application of Clausius- Clapeyron equation.

UNIT III THIRD LAW OF THERMODYNAMICS (12 Hrs)

Nernst heat theorem-Statement of third law of thermodynamics, determination of Absolute entropy of solid, liquids & gases, experimental verification of third law, entropy changes in chemical reaction- residual entropy- exceptions to third law-definition of zeroth law of thermodynamics.

UNIT IV THERMOCHEMISTRY (12 Hrs)

Enthalpy of combustion- Standard enthalpy of combustion, Bomb calorimeter- Enthalpy of formation- Standard enthalpy of formation – Bond energy and its applications, Enthalpy of neutralization, Hess's law of heat of summation and its application, Kirchoff's equation, flame and explosion temperature.

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UNIT V CHEMICAL EQUILIBRIUM**(12 Hrs)**

The law of mass action- Thermodynamic treatment of law of mass action, Relationship between K_p and K_c , Application of Law of mass action to Homogeneous system- dissociation of PCl_5 and N_2O_4 , application of Law of mass action to Heterogeneous system-Calcium carbonate - LeChatlier principle- LeChatlier principle and physical equilibria.

Text Books

1. Puri B.R., Sharma L.R. and Pathania M.S., "Principles of Physical chemistry", Vishal publication, 30th edition, Jalandhar-Delhi, India, 2007.
2. Jain P.C. and Jain M., "Engineering chemistry", 15th edition, Dhanpat Rai publishing company, New Delhi, India. 2005.
3. Atkins, "Physical Chemistry", International Eleventh Edition, Oxford University Press, 2018.

Reference Books

1. Atkins P., "Physical Chemistry", VII Edition, Oxford University Press, UK, 2002.
2. Bahl B.S., Tuli G.D. and Arun Bahl, "Essential of Physical chemistry" S. Chand publications, New Delhi, India, 2004.
3. Van Samuel Glasstone D., "Thermodynamics", 5th edition, Eastern Wiley Publication, London, UK. 2002.

Web References

1. https://en.wikipedia.org/wiki/First_law_of_thermodynamics
2. https://en.wikipedia.org/wiki/Second_law_of_thermodynamics
3. https://en.wikipedia.org/wiki/Third_law_of_thermodynamics

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ALLIED PHYSICS – II		L	T	P	C	Hrs
A20CHD405	(Common to B. Sc., Mathematics & B. Sc., Chemistry)	3	1	0	4	60

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 Outcomes

On Completion successful students will be able to demonstrate an understanding of:

CO1 –To describe the concepts and phenomenon of Electrostatics, Charges and its energy etc.,.

CO2 – To describe the concepts of electricity, Solenoid, Induction etc.,.

CO3 –To describe the concepts of Atomic structure, X-rays, Powder diffraction concepts etc.,.

CO4 – To describe the relationship and behavior of nucleus and its structure.

CO5 – To study the concepts of GATE circuits, types and binary calculations etc.,.

UNIT I ELECTROSTATICS**(12Hrs)**

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.

UNIT II ELECTRICITY**(12 Hrs)**

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.

UNIT III ATOMIC PHYSICS**(12 Hrs)**

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.

UNIT IV NUCLEAR PHYSICS**(12 Hrs)**

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.

UNIT V DIGITAL ELECTRONICS**(12 Hrs)**

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,

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NOT, NOR, NAND AND EXOR Gates – NAND and NOR as universal building gates – Boolean Algebra – Laws of Boolean Algebra – De-Morgan's Theorems – Their verifications using truth tables.

Text Books

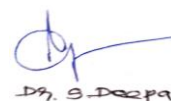
1. Khare and Srivastava, "Magnetism and Electricity", Atma Ram and sons- New Delhi. 9th Edition, 1976.
2. R Murugesan, Kiruthiga Sivaprasath, "Modern Physics", S. Chand and Co, 18th Edition, 2016.
3. Malvino and Leach "Digital principles and their applications", Tata McGraw Hill, 8th Edition, 1993

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/>



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A20CHE404	INDUSTRIAL CHEMISTRY	L	T	P	C	Hrs
		4	0	0	4	60

Course Objectives

- To acquire the knowledge on petroleum and fuel gases.
- To study the electrochemical devices.
- To know chemistry of paints, varnishes and soaps.
- To study the cement, glass and ceramics
- To analyse industrial hazards and its risk assessment.

Course Outcomes

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

CO1 - Understand various petrochemical processes.

CO2 - Understand the basics of Electrochemical cells & their application.

CO3 - Familiarize the chemistry of paints, varnishes and soaps.

CO4 - Understand the manufacture processes of cement, glass and ceramics & their physicochemical properties

CO5 - Understand the methods of hazard identification and preventive measures.

UNIT I PETROLEUM AND FUEL GASES (12 Hrs)

Petroleum: Origin, refining, cracking, reforming, knocking and octane number, LPG, synthetic gas, synthetic petrol. Fuel Gases: Large scale production, storage, hazards and uses of coal gas, water gas, producer gas, and oil gas.

UNIT II ELECTROCHEMICAL INDUSTRIES (12 Hrs)

Production of materials like chlorine, caustic soda, sodium chlorate, Batteries – primary and secondary cells, solar cells, fuel cells.

UNIT III PAINTS, VARNISHES AND SOAPS (12 Hrs)

Paints & Varnishes: Primary constituents of paints, Dispersion medium (solvent), binder Pigments, formulation of paints and varnishes. Requirements of a good paint. Soaps: manufacture of soaps by hot and cold process, classification of soap, cleansing of soap and classification of detergents (anionic and cationic)

UNIT IV CEMENT, GLASS AND CERAMICS (12 Hrs)

Cement: Manufacturing – Wet Process and Dry process, types, analysis of major constituents, setting of cement, reinforced concrete. Cement industries in India. Glass-Composition and manufacture of glass. Types of glasses- optical glass, coloured glasses and lead glass. Ceramics: Types- raw materials – white wares, manufacture and uses.

UNIT V INDUSTRIAL SAFETY MEASURES (12 Hrs)

Risk, Hazard, Chemical Hazard Symbols, Incompatible chemicals, Fire Classification; Occupational Health and Safety Administration, The Factories Act, Personal Protective Equipment (PPE).

Text Books

1. B.K. Sharma, "Industrial Chemistry", Goel publishing house, 6th Edition, 2011.
2. Joseph Henry Stephenson, "Industrial Chemistry", Leopold Classic Library, 1st Edition, 2015.
3. M Kelway Bambe, "A Text Book on the Chemistry and Agriculture of Tea", Franklin Classics Trade Press, 1st Edition, 2018.

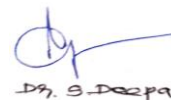
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1. B.N.Chakrabarty, "Industrial Chemistry", Oxford & IBH Publishing Co, New Delhi, 4th Edition, 1981.
2. P.P.Singh, T.M.Joseph, R.G.Dhavale, "College Industrial Chemistry", Himalaya Publishing House, Bombay, 4th Ed., 1983.
3. O.P. Veramani, A.K. Narula, "Industrial Chemistry", Galgotia publication Pvt. Ld, 1st Edition, 2004.

Web References

1. <https://www.toppr.com/guides/business-environment/scales-of-business/small-scale-industries/>
2. <https://www.britannica.com/science/pollution-environment>
3. <http://www.falzungroup.com/our-products-and-services/fuel-for-industry>



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A20CHE405	GROUP THEORY AND SPECTROSCOPY	L	T	P	C	Hrs
		3	1	0	4	60

Course Objectives

- To acquire the knowledge on Group theory.
- To study the molecular spectroscopy.
- To know the concept used in the Infrared Spectroscopy.
- To study the Raman Spectroscopy
- To Study about resonance spectroscopy.

Course Outcomes

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

CO1 - Understand various Group theory basic concepts.

CO2 - Understand the basics of molecular spectroscopy.

CO3 - Familiarize about Infrared Spectroscopy.

CO4 - Understand the Raman Spectroscopy

CO5 - Understand the about NMR and ESR Spectroscopy

UNIT I GROUP THEORY-I**(12 Hrs)**

Introduction - Symmetry elements and symmetry operations - Definition of mathematical group – four cardinal properties of a group – closure, associative, identity and inverse rule – cyclic group – Abelian group (H_2O only) and non-abelian group (NH_3 only) – Group multiplication table- C_{2v} and C_{3v} ; subgroup – similarity transformation – class of group –Point group – Assignment of point group of simple molecules – H_2O , NH_3 , HCl and H_2 . (i) Matrix-introduction - matrix representation of the symmetry operations – identity (E), Proper axis of rotation (C_n), Vertical reflection (σ_v), Improper axis of rotation (S_n) and Inverse (i); Representation definition – reducible and irreducible representation of a group.

UNIT II MOLECULAR SPECTROSCOPY**(12 Hrs)**

Electromagnetic Spectrum –different regions in electromagnetic spectrum-Molecular spectra-Types of molecular spectra. Microwave spectra –Classification of molecules –Rotational spectra of diatomic molecules –Rigid rotator-Selection rules-Relative intensities of spectral lines –effect of isotopic substitution –Application of microwave spectroscopy – Determination of bond distances in diatomic molecules. Electronic spectra –electronic spectra of diatomic molecules – Franck Cotton principle – vibronic transitions and vibrational progression – group frequencies and factors affecting band position and intensities.

UNIT III INFRA-RED SPECTROSCOPY**(12 Hrs)**

IR spectra - range - theory of IR spectroscopy- selection rule-Instrumentation - diatomic molecule as a harmonic oscillator - Diatomic molecule as anharmonic oscillator - Analysis of IR spectra on the basis of modes of vibrations of CO_2 , H_2O - Finger print region and Characteristic frequencies – Overtones-Finger print region.

UNIT IV RAMAN SPECTROSCOPY**(12 Hrs)**

Introduction – Difference between IR and Raman spectra –polarization of light –Raman effect – Stokes and antistokes- Rayleigh–Application of Raman effects to chemistry –Mutual exclusion principle –Instrumentation -advantages and limitations of Raman spectroscopy.

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UNIT-V RESONANCE SPECTROSCOPY**(12 Hrs)**

NMR: Introduction – Nuclear spin and magnetic moment - origin of NMR spectra - theory of NMR spectroscopy-Basic instrumentation – factor affecting chemical shift-spin-spin splitting, NMR spectrum of ethanol, acetone - coupling constant. ESR: ESR introduction –factors affecting the g value-difference between ESR and NMR-basic instrumentation-Hyperfine interactions –Applications of ESR-hydrogen radical and methyl radical.

Text Books

1. Puri B. R., Sharma L.R, Physical chemistry, Vishal Puplications, NewDelhi, India, 33rd Edition 2003,
2. Cotton F.A., “Chemical applications of group theory”, Wiley eastern Ltd., UK. 3rd Edition, 1971.
3. Banwell C. M., “Fundamentals of Molecular spectroscopy”, TMH company limited, 4th Edition, 2005.

Reference Books

1. Gurudeep Chatwal R., Anand S. K, “Spectroscopy”, Himalaya Puplications, New Delhi , India, 5th Edition, 2002.
2. Raman K.V, “Group theory”, Tata McGraw Hill Publishing Limited, New Delhi, India, 1st Edition, 1990.
3. Y.R. Sharma, “Elementary Organic Spectroscopy, S.Chand and company Ltd., New Delhi, 5th Edition, 2010

Web References

1. http://poincare.matf.bg.ac.rs/~zarkom/Book_Shaums_Group_theory.pdf
2. <https://www.slideshare.net/dreamzchm/introction-to-molecular>
3. http://www.nku.edu/~russellk/courses/chm310/ho/ch11_141s.ppt

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A20CHE406	APPLIED CHEMISTRY	L	T	P	C	Hrs
		4	0	0	4	60

Course Objectives

- To gain knowledge of composition of milk, cream, butter and preparation of milk powder.
- To know the manufacturing of sugar, ethanol and paper.
- To gain knowledge in importance and future of green chemistry.
- To understand preparation of cosmetic products.
- To observe manufacturing of glass, cement and batteries.

Course Outcomes

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

CO1 - Tell the various ingredients present in the consumer products.

CO2 - Gain knowledge composition and manufacturing of sugar and by products.

CO3 - Explain the preparation of shampoos, colorants, tooth pastes and perfumes and colorants.

CO4 - Develop the skill of making cosmetics and consumer products.

CO5 - List the composition and uses of consumer products in everyday life.

UNIT I DAIRY CHEMISTRY**(12 Hrs)**

Milk definition, general composition-physico changes taking place in milk due to boiling, pasteurization, sterilization and homogenization explanation. Components of milk – lipids, proteins carbohydrates vitamins, ash and mineral matters names and functions. Definition and compositions of cream, butter, ghee, ice-cream, stabilizer and emulsifier. Milk powder, definition and need for making manufacture of whole milk powder by spray drying process.

UNIT II SUGAR AND PAPER INDUSTRY**(12 Hrs)**

Sugar industry: double sulphitation process, refining and grading of sugar. Saccharin synthesis and uses of sugar substitute. Ethanol: manufacture from molasses by fermentation. Paper industry: manufacture of paper: production of sulphite pulp and conversion to paper (bleaching, filling, sizing and calendaring)

UNIT III GREEN CHEMISTRY**(12 Hrs)**

What is green chemistry, Need for green chemistry, Green solvents- PEG, ionic liquids, supercritical fluids, how to compare greenness of solvents. Biocatalysis: importance of biocatalysis in green chemistry. Future trends in Green Chemistry - Oxidation reagents and catalysts, combinational green chemistry, Green chemistry in sustainable development.

UNIT IV COSMETIC CHEMISTRY**(12 Hrs)**

Soaps & detergents- Types of soaps, cleansing action of soaps, synthetic detergents face powder, Shampoos and Tooth paste –General methods of preparation and uses. Essential oils & their importance in cosmetic industry with respect to Geraniol, sandalwood oil, rose oil, Eucalyptus. Hazards of cosmetics.

UNIT V CHEMISTRY IN DAILY LIFE**(12 Hrs)**

Synthetic food Additives, Preservatives, colourants and flavours Water treatment: Domestic waste water treatment -Treatment by primary and secondary process. Glass: composition, manufacture and uses Cement: Manufacture: wet and dry process, composition and setting of cement Batteries: Primary and secondary batteries, Working of following batteries: Pb storage and Li – battery, Solar cell.

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Text Books

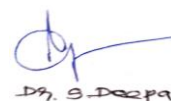
1. Jayshree Ghosh, "Fundamentals of Applied chemistry" Sultan Chand & co., 1st Edition, 2006.
2. B.K.Sharma, "Industrial Chemistry" Goel publishing house, 1st Edition, 2000.
3. R Gopalan, P.S Subramaniyan, "Elements of Analytical Chemistry" by Sultan & co, 1st Edition, 2010.

Reference Books

1. A.K., Biswas. "Frontiers in Applied Chemistry", Narosa publishing house, 2nd Edition, 1989.
2. Vermain, O.P, Narula A.C, "Applied Chemisry" Asain books Pvt Ltd. 4th Edition, 2004.
3. E. Stocchi, "Industrial Chemistry", Vol –I, Ellis Horwood Ltd. UK. 7th Edition, 1990.

Web References

1. <https://www.springer.com/gp/book/9783319148915>
2. <https://www.science.org.au/curious/people-medicine/chemistry-cosmetics>
3. <https://www.drishtias.com/to-the-points/paper3/sugar-industry>


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A20CHS404	VERBAL ABILITY AND REASONING	L	T	P	C	Hrs
		2	0	0	2	30

Course Objectives

- To gain knowledge spotting error, change of speech, change of voice
- To know the synonyms, antonyms, idioms, phrasal verbs, one word substitution
- To gain knowledge sentence improvement, sentence completion
- To understand sentence completion, odd word
- To observe reading comprehension, word analogy, para jumble

Course Outcomes

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

CO1 - Enable the students understand the syntax of English and develop their lexical skills

CO2 - Develop comprehension and interpretation skills

CO3 - Enhance vocabulary skills and improve repertoire of words

CO4 - Help the students succeed in competitive exams and placements

CO5 – Develop the student's skills in reading comprehension and word analogy.

UNIT - I

Spotting error, Change of speech, Change of voice

UNIT - II

Synonyms, Antonyms, Idioms, Phrasal verbs, one word substitution

UNIT - III

Sentence improvement, Sentence completion (Grammar based)

UNIT - IV

Sentence completion (Vocabulary based), Odd word

UNIT – V

Reading comprehension, Word analogy, Para jumble

Text Books

1. Raymond Murphy, "English Grammar in Use", Cambridge University Press; 5th Edition, 2019.
2. Hewings Martin, "Advanced English Grammar", Foundation Books, 5th Edition, 2018
3. C.J. Joseph, "A Comprehensive Grammar of Current English", Inter University Press Pvt. Ltd., 5th Edition, 2015.

Reference Books

1. Hari Mohan Prasad and Meenakshi Upadhyay, "Objective English for Competitive Examinations", McGraw Hill Education. 21st Edition, 2015.
2. Norman Lewis, "Word Power Made Easy New Revised and Expanded Edition", Goyal publication, 4th Edition, 2011.
3. Raymond Murphy, "Intermediate English Grammar", Cambridge University Press, 2nd Edition, 2007.

Web References

1. <http://studycopier.com/read/ibps/english/spotting-of-errors/rules-of-active-and-passive-voice.html>
2. <https://www.hitbullseye.com/Sentence-Completion-Tricks.php>
3. <https://www.handakafunda.com/cat-2017/verbal-ability-parajumble-the-process-of-handing-down/>

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A20CHP412	INORGANIC QUALITATIVE ANALYSIS –II	L	T	P	C	Hrs
		0	0	4	2	30

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 Outcomes

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

CO1- Analyse the acid radicals present in any given inorganic salt.

CO2- Eliminate the interfering acid radicals

CO3- Identify the basic radical and its group

CO4- Analyse the basic radical systematically

CO5- Develop their qualitative analysis skill of any given inorganic salt

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.

Test Books

1. V.Venkateswaran, R.Veerasingam 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>

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	ALLIED PHYSICS LABORATORY – II	L	T	P	C	Hrs
A20CHD405	(Common to B. Sc., Mathematics & B. Sc., Chemistry)	0	0	4	2	30

Course Objectives

- To provide a practical understanding of some of the concepts learnt in the theory course on Physics.
- Evaluate the process and outcomes of an experiment quantitatively and qualitatively.
- Extend the scope of an investigation whether or not results come out as expected.
- Conduct an experiment collaboratively and ethically.
- Collect data and revise an experimental procedure iteratively and reflectively.

Course Outcomes

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

CO1- Ability to characterise the basic electrical instruments like Potentiometer, Ammeter, Galvanometer, Carey-Foster bridge, Wheatstone bridge etc.,.

CO2- Ability to characterize the thermal experiments like Lee's Disc, Specific capacity, Thermal Conductivity etc.,.

List of Experiments

1. Figure of merit of Galvanometer.
2. Potentiometer – Ammeter Calibration.
3. Carey foster Bridge
4. Viscosity of liquid – Poiseuille's flow method
5. Lee's Disc – Thermal conductivity.
6. Specific capacity of a liquid by cooling.
7. Spectrometer – Wavelength determination using grating – normal incidence.
8. Meter bridge verification of serial and parallel connections of resistance wires.
9. Logic gates – IC version.
10. Zener diode characteristics.

Test Books

1. CL Arora "B.Sc Practical Physics", , S Chand & Co, 1st Edition, 2010
2. M.N. Srinivasan, "Practical Physics", Sultan son Publication, 2nd Edition, 2019.
3. V Y Rajopadhye and V L Purohit, "Textbook of experimental Physics", 1st Edition, 2014.

Reference Books

1. Practical Physics C.C Ouseph, V.J.Rao and V.Vijayendran
2. D P Khandelwal, Laboratory Manual of Physics for UG classes (Vani Pub. House, New Delhi)
3. Physics for Degree Students, CL Arora, S.Chand& Co, Sultan son Publication , 2nd Edition, 2010

Web References

1. <https://www.ptonline.com/cdn/cms/uploadedFiles/Microsoft%20PowerPoint%20-%20C9%20Lasky.pdf>
2. <https://www.slideserve.com/dragon/dr-carey-lisse-johns-hopkins-university-applied-physics-laboratory>
3. <https://www.slideserve.com/farren/applied-physics>

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A20CHO404	C ++ PROGRAMMING AND ITS APPLICATION TO CHEMISTRY	L	T	P	C	Hrs
		0	0	4	2	30

Course Objectives:

- To understand the basic fundamentals of C++ programming by learning various operators, arrays and functions.
- To construct simple programs using C++ programming language.
- To employ numerical methods in programming language.
- To solve problems in quantitative chemical analysis using C++ programming language.
- To calculate the bond energy using Born-Lande equation

Course Outcomes

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

- CO1-** Identify the pH of unknown solutions.
CO2- Understand the vibrational modes of linear and non-linear molecules.
CO3- Know the molarity, molality and normality of a solutions.
CO4- Analyse the pressure of ideal gases.
CO5- Develop their knowledge for converting Fahrenheit to Centigrade.

PRACTICAL C++ PROGRAMMING

1. Calculation of pH of a solution
2. Calculation of number of vibrational modes of linear and non-linear molecules
3. Calculation of RMS, Average and Most Probable velocity
4. Conversion of Fahrenheit to Centigrade and vice versa
5. Calculation of Molarity, Molality and Normality of a solution.
6. Calculation of pressure of ideal or Vander Waals gas
7. Calculation of bond energy using Born-Lande equation.

Text Books

1. E. Balagurusamy, "Programming in ANCI C", Tata Mc Graw- Hill, New Delhi, 1st Edition, 2004.
2. K.V. Raman, "Computers in Chemistry", Tata Mc Graw- Hill, New Delhi, 1st Edition, 1993.
3. S.M. Venit, "Programming in BASIC" Problem solving with structure and style, Jaico Publishing House: Delhi 2nd Edition, 1996.

Reference Books

1. Ramesh Kumari, "Computers and their Applications to Chemistry", 2nd Edition, 2014.
2. Venugopal and Prasad, "Programming with C", 11th Edition, 1971.
3. J. H. Noggle, "Physical Chemistry on a Microcomputer". Little Brown & Co. 2nd Edition, 1985.

Web References

1. <https://www.toppr.com/ask/en-in/question/calculate-the-root-mean-square-average-and-most-probable-speed/>
2. <https://www.omnicalculator.com/chemistry/ph>
3. <https://byjus.com/chemistry/molality/>

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A20CHO405	COMPUTATIONAL CHEMISTRY	L	T	P	C	Hrs
		0	0	4	2	30

Course Objectives:

- To understand the basic knowledge of molecular modelling techniques
- To learn computational and theoretical approaches to predict structure, stability and spectroscopy of molecular clusters using quantum chemical methods.
- To employ in Spectral Analysis: UV, IR, NMR and Aromaticity.
- To solve problems geometry optimizations and bond angle analysis.
- To understand crystal structure and information from CCDC.

Course Outcomes

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

CO1- know the operating system and software installation.

CO2- Analyse the geometry optimizations and bond angles.

CO3- Identify the geometry optimizations functional group.

CO4- Gain the knowledge atomization energy and proton affinities for small molecules and ions

CO5- Know the binding energy for small molecular clusters and surface

EXPERIMENTS

1. Introduction to operating system. Basics of software's installation and operating system (windows, UNIX, LINUX)
2. Generating molecular structure coordinates using Cartesian and Z-matrix for small molecules
3. Geometry optimizations and bond angle analysis
 - (a) Comparing the optimized bond angles of H₂O, H₂S and H₂Se.
 - (b) T-shaped molecular geometry (ClF₃, BrF₃)
 - (c) Linear, Trigonal Planar, Tetrahedral, Trigonal Bipyramidal and Octahedral
4. Geometry optimizations of following functional groups and calculated the dipole Moment
 - (a) alkyl halide (b) aldehyde (c) ketone (d) amine (e) ether (f) nitrile (g) thiol (h) carboxylic acid (i) ester (j) amide.
5. Compute the atomization energy, ionization potential and proton affinities for small molecules and ions
6. pKa prediction from hydration number for ions and molecules
7. Calculated the binding energy for small molecular clusters and surface
8. Reaction mechanism in organic molecule (Prediction of minimum energy pathway and Transition state).
9. Spectral Analysis: UV, IR, NMR and Aromaticity.
10. Understanding Crystal structure and information from CCDC.

Text Books

1. VMD, Mercury, "Software and Books: Gaussian, Molpro, Gauss View, Chemcraft", Material Studio, or any similar software's. 1st Edition, 2010.
2. J. B. Foresman, "Exploring Chemistry with Electronic Structure Methods", Gaussian Inc, 1st Edition, 1996.
3. Leach, A.R. "Molecular Modelling Principles and Application", Longman, 2nd Edition, 2001.

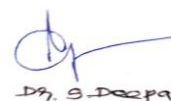
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1. Leszczynski, Jerzy, "Handbook of Computational Chemistry", Springer Netherlands, 1st Edition, 2012.
2. David B Cook, "Computational Quantum Chemistry", Dover Publications Inc. 1st Illustrated edition, 2005.
3. Tomasz Puzyn, Jerzy Leszczynski, "Recent Advances in QSAR Studies: Methods and Applications", Springer; 10th Edition, 2009.

Web References

1. <https://www.acs.org/content/acs/en/careers/college-to-career/chemistry-careers/computational-chemistry.html>
2. <https://www.sciencedirect.com/topics/chemistry/computational-chemistry>
3. <http://www.ccl.net/cca/documents/dyoung/topics-orig/compchem.html>


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	INSTRUMENTAL METHODS OF	L	T	P	C	Hrs
A20CHO406	ANALYSIS	0	0	4	2	30

Course Objectives

- To obtain basic knowledge about the principles of instrumental analysis.
- To develop skills in analytical methods to solve problems and to obtain precise, accurate and valid information.
- To learn the basic concepts of determination of organic compounds by UV and IR spectrophotometer.
- To educate students in chromatographic techniques.
- To determine the isoelectric pH of a protein.

Course Outcomes

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

- CO1-** Analyse the organic compound by UV spectrophotometer.
CO2- Determine the mixture of halides (Chloride + Iodide) by Potentiometric titrations
CO3- Identify the sodium, potassium and calcium by flame photometer.
CO4- Analyse the pure compounds by Thin Layer Chromatography
CO5- Gain the knowledge in Ferrocyanide / Ferricyanide redox couple by cyclic voltammetry

LIST OF EXPERIMENTS

1. Determination of Iron/Cobalt by UV-Vis spectrometry.
2. Analyzing the organic compounds using UV spectrophotometer
3. Titration of mixture of halides (Chloride + Iodide) by Potentiometric titrations.
4. Determination of R_f values of various organic compounds by gas chromatography.
5. Determination of sodium, potassium and calcium by flame photometer.
6. Analysis of pure compounds by Thin Layer Chromatography.
7. Determine the titration curve for an amino acid by pH meter.
8. IR absorption spectra – study of organic compounds.
9. Study of Ferrocyanide / Ferricyanide redox couple by cyclic voltammetry.
10. Determination of the isoelectric pH of a protein.

Text Books

1. D.A. Skoog, F.J. Holler and S R.Crouch, "Principles of Instrumental Analysis", Cengage Learning India, 6th Edition, 2006.
2. H.H. Willard, L.L. Merritt, J.Dean, and F.A. Settoe, "Instrumental Methods of Analysis", Wadsworth Publishing Company Ltd., Belmont, California, USA, 7th Edition, 1988.
3. Y.R. Sharma, "Elementary Organic Spectroscopy, S.Chand and company Ltd., New Delhi, 5th Edition, 2010.

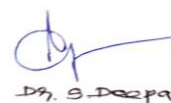
Reference Books

1. D.A. Skoog, D.M. West and F.J. Holler, "Analytical Chemistry: An Introduction", Saunders college publishing, Philadelphia, 5th Edition, 1990.
2. Pradyot Patnaik, "Analysis of Organic Pollutants by Gas Chromatography", 1st Edition, 2017.
3. Lloyd R. Snyder, Wiley, "Introduction to Modern Liquid Chromatography", 3rd Edition, 2011.

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Web References

1. <https://www.wiley.com/en-ar/Introduction+to+Modern+Liquid+Chromatography%2C+3rd+Edition-p-9780470167540>
2. <https://aip.scitation.org/doi/10.1063/1.1745157>
3. <https://pubs.acs.org/doi/10.1021/ac301569b>



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