

B.Sc. CHEMISTRY

SYLLABUS: 2011

CHOICE BASED CREDIT SYSTEM (CBCS)



St. JOSEPH'S COLLEGE (Autonomous)

Re-accredited with A+ Grade by NAAC

College with Potential for Excellence by UGC

TIRUCHIRAPPALLI - 620 002, TN

B. Sc CHEMISTRY: Course Detail – 2011

Sem.	Part	Code	Subject Title	Hr	Cr
I	I	11 UGT 110001	General Tamil I/Hindi I/French I	4	3
	II	11 UGE 120101	General English I	5	3
	III	11 UCH 130201	General Chemistry I	7	5
	III	@	Chemistry Practical I	3	-
	III	@	Chemistry Practical II	3	-
	III	11 UCH 130401	Allied: Mathematics for Chemists-I	6	5
	IV	11 UCE 140801	Communicative English	--	5
	IV	11 UFC 141001	Value Education – I : Essentials of Ethics, Yoga and Stress Management	2	2
			Total for semester I	30	23
II	I	11 UGT 210002	General Tamil-II/Hindi-II/French-II	4	3
	II	11 UGE 220102	General English II	5	3
	III	11 UCH 230202	General Chemistry II	5	5
	III	11 UCH 230203	Chemistry Practical I	3	3
	III	11 UCH 230204	Chemistry Practical II	3	3
	III	11 UCH 230402	Allied: Mathematics for Chemists - II	6	5
	IV	11 UCE 240802	Computer Literacy	2	2
	IV	11 UFC 241002	Value Education – II: Fundamentals of Human Rights	2	1
			Total for semester II	30	25
III	I	11 UGT 310003	General Tamil III / Hindi III / French III	4	3
	II	11 UGE 320103	General English III	5	3
	III	11 UCH 330205	General Chemistry III	6	4
	III	@	Chemistry Practical III	3	-
	III	11 UCH 330403A	Allied: Physics for Chemistry I (OR)	4	4
		11 UCH 330403B	Allied: Biochemistry – I	(4)	(4)
	III	@	Allied Physics Practical (OR)	2	-
		@	Allied Biochemistry Practical	(2)	-
	IV	11 UCE 340901	Environmental Studies	4	2
	IV	11 UFC 341003A	Professional Ethics-I: Social Ethics (OR)	2	2
		11 UFC 341003B	Professional Ethics-I: Religious Doctrine	(2)	(2)
		Total for semester III	30	18	

IV	I	11 UGT 410004	General Tamil IV / Hindi IV/French IV	4	3
	II	11 UGE 420104	General English IV	5	3
	III	11 UCH 430206	General Chemistry IV	5	4
	III	11 UCH 430301A	Essentials of p-Block Elements (OR)	5	3
		11 UCH 430301B	Polymers	(5)	(3)
	III	11 UCH 430207	Chemistry Practical III	3	3
	III	11 UCH 430404A	Allied: Physics for Chemistry II (OR)	4	4
		11 UCH 430404B	Allied: Biochemistry – II	(4)	(4)
	III	11 UCH 430405A	Allied Physics Practical (OR)	2	2
	III	11 UCH 430405B	Allied Biochemistry Practical	(2)	(2)
	IV	11 UFC 441004A	Professional Ethics-II: Social Ethics (OR)	2	2
	IV	11 UFC 441004B	Professional Ethics-II: Religious Doctrine	(2)	(2)
			Total for semester IV	30	24
	V	III	11 UCH 530208	Organic Chemistry I	5
III		11 UCH 530209	Inorganic Chemistry I	5	5
III		11 UCH 530210	Physical Chemistry I	5	5
III		11 UCH 530302A	Chemistry of Biomolecules (OR)	5	4
		11 UCH 530302B	Physical Chemistry – II	(5)	(4)
III		@	Chemistry Practical IV	4	-
III		@	Chemistry Practical V	4	-
IV		11 UCH 540601	Skill based Elective I : Food and Nutrition	2	2
			Total for semester V	30	21
VI		III	11 UCH 630211	Organic Chemistry II	5
	III	11 UCH 630212	Inorganic Chemistry II	5	5
	III	11 UCH 630303A	Spectroscopy & Chemical Kinetics (OR)	5	4
	III	11 UCH 630303B	Organic Reagents and Synthesis	(5)	(4)
	III	11 UCH 630304A	Essential of General Chemistry (OR)	5	4
	III	11 UCH 630304B	Advanced Topics in Chemistry	(5)	(4)
	III	11 UCH 630213	Chemistry Practical IV	4	4
	III	11 UCH 630214	Chemistry Practical V	4	4
	IV	11 UCH 640602	Skill based Elective II : Everyday Chemistry	2	2
			Total for semester VI	30	28
I - V	V	11 UCE 551101	SHEPHERD & Gender Studies	100	6
		Total Credit for all semesters		145	

@ Exam at the end of the year

பருவம் -1
11UGT110001

மணி நேரம் - 4
புள்ளிகள் - 3

பொதுத்தமிழ் - I

நோக்கங்கள்

1. சமூக மாற்றச் சிந்தனைகளை உள்ளடக்கிய தற்கால இலக்கியங்களை அறிமுகம் செய்தல்.
2. புதுக்கவிதை, சிறுகதை, உரைநடை ஆகிய இலக்கியங்களின் நயம் பாராட்டுதல்.
3. சந்திப்பிழையின்றி எழுத மாணவர்களைப் பயிற்றுவித்தல்.

பயன்கள்

1. மாணவர்கள் சமூக மாற்றச்சிந்தனைகளை அறிந்துகொள்வர்.
2. சந்திப்பிழைகளை நீக்கி எழுதும் திறன் பெறுவர்.
3. புத்திலக்கியங்களைப் படைக்கும் திறனையும், திறனாய்வு செய்யும் திறனையும் பெறுவர்.

அலகு-1

(10 மணி நேரம்)

மகாகவி பாரதியார் கவிதைகள்
பாரதிதாசன் கவிதைகள்
உரைநடை—முதல் மூன்று கட்டுரைகள்
(கட்டுரைக்களஞ்சியம்)

அலகு-2

(12மணி நேரம்)

கவிமணி தேசிகவிநாயகம் கவிதைகள்
நாமக்கல்கவிஞர் வெ.இராமலிங்கம் கவிதைகள்
இலக்கணம் -வலிமிகும் இடங்கள்

அலகு-3

(10 மணி நேரம்)

கவிஞர் கண்ணதாசன் கவிதைகள்
இலக்கியவரலாறு- மூன்றாம் பாகம்
சிறுகதை- முதல் ஆறு சிறுகதைகள்

அலகு-4

(14 மணி நேரம்)

பாவலரேறு பெருஞ்சித்திரனார் பாடல்கள்
அப்துல் ரகுமான் கவிதைகள்
இலக்கிய வரலாறு – நான்காம் பாகம்
இலக்கணம் - வலி மிகா இடங்கள்

அலகு-5

(14 மணி நேரம்)

கவிஞர் மேத்தா கவிதைகள்
மொழிபெயர்ப்புக்கவிதைகள்
சிறுகதை- 7 முதல் 12 முடிய உள்ள சிறுகதைகள்
உரைநடை- 4முதல் 6 முடிய உள்ள கட்டுரைகள்
(கட்டுரைக்களஞ்சியம்)

பாடநூல்

1. பொதுத்தமிழ் - செய்யுள் திரட்டு- தமிழ்த்துறை வெளியீடு- 2011-2014
2. சமூகவியல் நோக்கில் தமிழ் இலக்கிய வரலாறு, தமிழ்த்துறை வெளியீடு, தூய வளனார் கல்லூரி, திருச்சிராப்பள்ளி-2
3. உரைநடை நூல் - தமிழ்த்துறை வெளியீடு, 2011-2014
4. சிறுகதைத்தொகுப்பு
(கட்டுரைக்களஞ்சியம்)

மதிப்பெண் பகிர்வு

பிரிவு	பாகம் -1	பாகம் -2	பாகம்-3
செய்யுள்	12 (12 வினாக்கள்)	8 (2 வினாக்கள்)	30 (2 வினாக்கள்)
இலக்கியவரலாறு	6 (6 வினாக்கள்)	8 (2 வினாக்கள்)	15 (1 வினா)
உரைநடை	-----	-----	15 (1வினா)
இலக்கணம்	2 (2 வினாக்கள்)	4 (1 வினா)	-----
சிறுகதை	-----	-----	15 (1 வினா)

Semester: I
Code: 11UGE120101

Hours :5
Credits: 3

GENERAL ENGLISH – I

Objectives:

1. To enable the students to develop their effective communicative skills in English.
2. To empower the students with fluency and accuracy in the use of English Language.
3. To transform them into globally employable persons with placement skills.

UNIT-I 12 Hrs

Prose Education.
Employment.
Unemployment.

Poem William Shakespeare— “All the World’s a Stage.”

Letter Writing Formal and Informal.

Short Story O Henry – Robe of Peace. (Extensive Reading).

Essential English Grammar – 1-6 units

UNIT-II 12 Hrs

Prose Application.
Planning.
Curriculum Vitae.

Poem Ben Jonson—“On Shakespeare”
Reading Comprehension

Short Story Rudyard Kipling—The Miracle of Puran Bhagat
(Extensive Reading).

Essential English Grammar – 7-12 units.

UNIT-III 11 Hrs

Prose Interview.
Reporting.
General Knowledge.

Poem Robert Herrick—“Gather Ye Rosebuds.”
Note Making

Short Story H.G.Wells—The Truth About Pyecraft (Extensive Reading).

Essential English Grammar – 13-18 units

UNIT-IV 20 Hrs

Prose Review.(Super Toys)
Stress.
No Time.

Poem Oliver Goldsmith—“ The Village Schoolmaster”
Developing story from hints

Short Story John Galsworthy—“Quality” (Extensive Reading).

Essential English Grammar – 19-24 units

UNIT-V 15 Hrs

Prose Killers.
Gallop Growth.
A Short Story.

Poem William Blake—“ From Auguries of Innocence”
Précis Writing

Short Story William Somerset Maugham— Mabel
(Extensive Reading).

Essential English Grammar – 25-30 units

Text Books

1. Krishnaswamy. N, Sriraman T. Current English for Colleges. Hyderabad: Macmillan Indian Ltd,2006.
2. Dahiya SPS Ed. Vision in Verse, An Anthology of Poems. New Delhi: Oxford University Press,2002.
3. Murphy, Raymond. Essential English Grammar. New Delhi: Cambridge University Press,2009.
4. Seshadri, K G Ed. Stories for Colleges.Chennai: Macmillan India Ltd,2003.

Semester : I
11UCH130201

Hours/week : 7
Credits : 5

GENERAL CHEMISTRY - I

Objectives:

- To understand the bonding and nomenclature of organic molecules
- To learn periodicity of elements
- To understand the principles of quantum chemistry
- To learn the properties of gases
- To understand the theoretical aspects of inorganic qualitative and volumetric analyses

Unit - I: Bonding and Molecular Structure (18hrs)

Covalent bonding – Concept of hybridization – Structure of organic molecules based on sp^3 , sp^2 and sp hybridization – Covalent bond properties of organic molecules: bond length, bond angle, bond energy, bond polarity, dipole moment, inductive, mesomeric, electromeric, resonance and hyper conjugative effects – Naming of organic compounds (up to 10 carbon systems) – Hydrocarbons – monofunctional compounds – Bifunctional compounds – Isomerism – Types of isomerism (structural and stereoisomerisms) with appropriate examples.

Unit - II: Periodic Table and Periodic Properties (18 hrs)

Mendeleev's periodic classification-modern periodic table- grouping of elements into s, p, d, and f blocks-periodic properties- atomic radius: covalent, van der Waals and ionic radii – determination of ionic radii by Pauling's method. Slater's rules- screening constant and effective nuclear charge- ionic radii of isoelectronic ions- ionization energy(IE)- factors affecting IE –periodic variation of IE – comparison of IE of N and O; Mg and Al; Be and B. Electron affinity – periodic variation - electron affinity of halogens. Electronegativity and its applications in predicting bond character.

Unit - III: Basic Quantum Chemistry (18 hrs)

CGS and SI units – Basic units – derived units – subsidiary units – dimensional analysis – Quantum theory and atomic spectra – Bohr's model of atom – Limitations of Bohr model – Sommer field's model – photo electric effect -Compton effect – de Broglie equation – Davisson and Germer experiment – Heisenberg's uncertainty principle – Schrödinger's wave

equation (statement only) Particle in a box– Eigen values - Eigen function - Significance of ψ and ψ^2 - Radial and angular distribution function – Concept and Shapes of orbitals.

Unit - IV: Gaseous state (18 hrs)

Gaseous state – The gas constant R in different units - deviation from ideal behaviour – van der Waals equation for real gases – critical phenomenon – PV isotherm of real gases, critical temperature – critical volume – molecular velocities – root, mean square, average and most probable velocities – Maxwell law for distribution of molecular speed(No need of derivation) – collision number and mean free path – collision diameter.

Unit - V: Analytical Methods-I (18 hrs)

Qualitative Inorganic Analysis: Dry test, flame test, Cobalt nitrate test - Wet confirmatory tests for acid radicals - Interfering acid radicals- Theory of Interference- Elimination of Interfering acid radicals.

Volumetric Analysis: Preparation of standard solutions-normality and molarity - acid-base titrations-types of acid-base titrations-titration curves- selection of suitable indicators.

Error analysis: Accuracy, precision, error-types of errors – determinate & indeterminate- Mean- median- standard deviation- and variance.

Reference:

- Puri B.R., Sharma L.R., Kalia K.K., Principles of Inorganic Chemistry, (23rd edition), New Delhi, Shoban Lal Nagin Chand & Co., (1993) **[Textbook]**
- Lee J.D., Concise Inorganic Chemistry, UK, Black well science (2006)
- Puri B.R., Sharma L.R., Pathania M.S., Principles of Physical Chemistry, (23rd edition) New Delhi, Shoban Lal, Nagin Chand & Co., (1993). **[Textbook]**
- Morrison R.T. and Boyd R.N., Organic Chemistry (6th edition), New York, Allyn & Bacon Ltd., (1976)
- Bahl B.S. and Arun Bahl, Advanced Organic Chemistry, (12th edition), New Delhi, Sultan Chand & Co., (1997). **[Textbook]**
- Frank J. Welcher and Richard B. Hahn, Semimicro Qualitative Analysis, New Delhi, Affiliated East-west Press Pvt. Ltd. (1969).

SEMESTER – I**Hours/Week : 6****Code 11UCH130401****Credits : 5****ALLIED MATHEMATICS I**

[For I B.Sc. Physics, Chemistry, Computer Science, Electronics, I BCA]

UNIT – I

Partial Fractions - Binomial Series - Summation of series - Finding terms - Coefficient of x^n (simple problems only).

Book 1: Chap 1 - sec 1.1 - 1.2, pp: 1-27.

UNIT – II

Exponential Series - Summation - Logarithmic Series - Summation.

Book 1: Chap 1 - sec 1.3, pp: 28-48.

UNIT – III

Matrices – Rank of a matrix - Solving simultaneous linear equation in three unknowns using Elementary operations method - Eigen values and Eigen vectors - Verification of Cayley Hamilton theorem.

Book 1: Chap 3 - sec 3.2 - 3.4, pp: 137 - 160.

UNIT – IV

Higher Derivatives - Formation of equations involving derivatives - Applications of Leibnitz's theorem.

Book 1: Chap 6 - sec 6.1, pp: 266-281.

UNIT – V

Expansions of $\cos nq$ and $\sin nq$ - Powers of sines and cosines off in terms of functions of multiples of q .

Book 1: Chap 5 - sec 5.1 - 5.4, pp: 220-242.

Text Book:

Ancillary Mathematics, Vol-I, 2009 Edition, S. Narayanan, R. Hanumantha Rao T.K. Manicavachagom Pillay, Kandaswamy.

பருவம் -2
11UGT210002

மணி நேரம் - 4
புள்ளிகள் - 3

பொதுத்தமிழ் - II

நோக்கங்கள்

1. சமய நல்லிணக்க உணர்வை வளர்த்தல்.
2. தமிழ்க் காப்பியங்களில் அழகும், அறிவுணர்வும் ஊட்டும் பகுதிகளைப் படித்துப் புரிந்து கொள்ளுதல்.
3. உரைநடைக் கட்டுரை எழுதும் திறன் பெறுதல்.

பயன்கள்

1. தமிழைத் திருத்தமாகப் படிக்கவும், பேசவும், பிழையின்றி எழுதவும் கூடிய திறன் பெறுவர்.
2. இலக்கியங்களில் படித்தவற்றை முறையாக வாழ்க்கையில் கடைப்பிடிப்பர்.

அலகு : 1

(12 மணி நேரம்)

சிலப்பதிகாரம் – அடைக்கலக் காதை - மதுரைக் காண்டம்
இலக்கிய வரலாறு – சைவம் வளர்த்த தமிழ் முதல் புராணங்கள் முடிய.

அலகு : 2

(12 மணி நேரம்)

மணிமேகலை – சிறைக்கோட்டம் அறக்கோட்டம் ஆக்கிய காதை
பெரியபுராணம் – திருநாளைப்போவார் நாயனார் புராணம்
உரைநடை – 7 முதல் 9 முடிய உள்ள கட்டுரைகள்
(கட்டுரைக்களஞ்சியம்)

அலகு : 3

(12 மணி நேரம்)

கம்பராமாயணம் – வாலி வதைப்படலம்
செம்மொழியான தமிழ்மொழியே:1 – 20 பக்கங்கள்
இலக்கணம் – எழுத்திலக்கணம்

அலகு : 4

(12 மணி நேரம்)

தேம்பாவணி – மகன் நேர்ந்த படலம்
சீறாப்புராணம் – அபீறாகு வதைப்படலம்
உரைநடை – 10 முதல் 12 வரையிலான கட்டுரைகள்
செம்மொழியான தமிழ்மொழியே – 21- 37 பக்கங்கள்

அலகு : 5

(12 மணி நேரம்)

இராவண காவியம் – ஆரியப் படலம்
இலக்கிய வரலாறு – தமிழ் இலக்கண நூல்கள் முதல் சிற்றிலக்கியங்கள் முடிய.
இலக்கணம் – சொல்லிலக்கணம்

பாடநூல்கள்

1. செய்யுள் திரட்டு – தமிழாய்வுத்துறை வெளியீடு, 2011 – 2014.
2. இலக்கிய வரலாறு, தமிழாய்வுத்துறை வெளியீடு, 2010.
3. உரைநடைநூல், தமிழாய்வுத்துறை வெளியீடு, 2011-2014
4. செம்மொழியான தமிழ்மொழியே, சங்கம் வெளியீடு, மதுரை.2010

மதிப்பெண் பகிர்வு

பிரிவு	பாகம் -1	பாகம் -2	பாகம்-3
செய்யுள்	12 (12 வினாக்கள்)	8 (2 வினாக்கள்)	30 (2 வினாக்கள்)
இலக்கியவரலாறு	4 (4 வினாக்கள்)	4 (1 வினா)	15 (1 வினா)
உரைநடை	-----	-----	15 (1வினா)
இலக்கணம்	2 (2 வினாக்கள்)	4 (1 வினா)	-----
செம்மொழி	2 (2 வினாக்கள்)	4 (1 வினா)	15 (1 வினா)

Sem: II
Code: 11UGE220102

Hours :5
Credits: 3

GENERAL ENGLISH –II

Objectives:

1. To enable the students to develop their effective communicative skills in English.
2. To empower the students with fluency and accuracy in the use of English Language.
3. To transform them into globally employable persons with placement skills.

UNIT-I		12 Hrs
Prose	Environment. A Dead Planet. Riddles.	
Poem	William Wordsworth—Nutting. Shelley- Ozymandias. Filling Money Order Chalan and Bank Chalan	
Short Story	G.K.Chesterton – The Hammer of God (Extensive Reading)	
Essential English Grammar: -31-36 Units		

UNIT-II		12 Hrs
Prose	Qahwah A Dilemma Computeracy	
Poetry	John Keats—La Belle Dame Sans Merci Robert Browning- The Last Ride Together	
Short Story	Katherine Mansfield—A Cup of Tea (Extensive Reading)	
Dialogue Writing		
Essential English Grammar: 37-42Units		

UNIT-III		11 Hrs
Prose	Review (Use Your English) Entertainment You and Your English	
Poetry	Walt Whitman- I Celebrate Myself. Mathew Arnold—Dover Beach.	

Short Story Thomas Wolfe—The Far and the Near (Extensive Reading)
Conversations
Essential English Grammar:43-48Units

UNIT-IV		20 Hrs
Prose	War Minus Shooting . Usage and Abusage.	
Poetry	Sarojini Naidu—The Gift of India.. Robert Frost—Design .	
Short Story	R.K. Narayan—Half a Rupee Worth (Extensive Reading) Manohar Malgonkar—Bacha Lieutenant	
Story Telling		
Essential English Grammar: 49-54Units		

UNIT-V		15 Hrs
Prose	Who's Who.	
Poetry	Nissim Ezekiel. The Night of The Scorpion	
Short Story	Anita Desai—A Devoted Son (Extensive Reading) Ruskin Bond—The Boy Who Broke the Bank(Extensive Reading) Report Writing	
Letter to the Editor		
Essential English Grammar: 55-60Units		

Text Books

1. Krishnaswamy. N, Sriraman T. Current English for Colleges. Hyderabad: Macmillan Indian Ltd,2006.
2. Dahiya SPS Ed. Vision in Verse, An Anthology of Poems. New Delhi: Oxford University Press,2002.
3. Murphy, Raymond. Essential English Grammar. New Delhi: Cambridge University Press,2009.
4. Seshadri, K G Ed. Stories for Colleges.Chennai: Macmillan India Ltd,2003

Semester : II
11UCH230202

Hours/week : 5
Credits : 5

GENERAL CHEMISTRY - II

Objectives:

1. To understand the conformations and chemistry of alkanes
2. To learn metallurgy
3. To understand the principles of radioactivity and nuclear chemistry
4. To understand the aspects of thermodynamics
5. To understand the theoretical aspects of inorganic qualitative and volumetric analyses

Unit - I: Alkanes (15 hrs)

Nomenclature of alkanes and cycloalkanes, Petroleum source of alkanes – Methods of preparing alkanes – Chemical properties — Mechanism of free radical substitution in alkanes by halogenation-Uses – Conformational study of ethane and n-butane - Relative stability of cycloalkanes from cyclopropane upto cyclooctane - cyclohexane and mono-and disubstituted cyclohexanes.

Unit - II: Metallurgy and s-block elements (15 hrs)

Occurrence of metals- steps involved in the metallurgical processes- concentration of ore by froth floatation, gravity separation and magnetic separation processes. Calcination- roasting- smelting- aluminothermic process- Purification of metals by electrolysis and zone refining. Position of Hydrogen in the periodic table- isotopes of hydrogen- ortho and para hydrogen. s-Block elements – alkali metals-general characteristics - oxides, hydroxides, halides –Alkaline earth metals- general characteristics – preparation of gypsum and its role in setting of cement – preparation and properties of plaster of paris.

Unit - III: Radioactivity and Nuclear chemistry (15 hrs)

Radiations emitted by radioactive substances, the half- life period, radioactive equilibrium, Soddy- Fajan group displacement law. Theory of radioactivity, N/P ratio. Isotopes- isobars and isotones- **Applications of radio activity** - Nuclear forces - packing fraction - mass defect - binding energy - Nuclear fission - atom Bomb and nuclear reactors - Nuclear fission, fusion reaction in the sun, Hydrogen bomb.

Unit - IV: Thermodynamics – I (15 hrs)

Chemical thermodynamics – system – surroundings – isolated, closed and open systems – Homogeneous and heterogeneous systems – state of the system – intensive and extensive properties – thermodynamic process – cyclic process – reversible and irreversible process – isothermal and adiabatic process – state and path functions – exact and inexact differentials – concept of heat and work – work of expansion at constant pressure and free expansion – First law of thermodynamics – statement – definition of internal energy (U), enthalpy (H) and heat capacity – U and H as thermodynamic properties – relationship between C_p and C_v – calculation of W, q, dU and dH for expansion of ideal and real gases under isothermal and adiabatic conditions for reversible and irreversible process – Joule Thomson effect – Relation between μ_{JT} and other thermodynamic quantities – calculation of Joule Thomson coefficient for ideal and real gases – inversion temperature – Zeroth law of thermodynamics – Absolute scale of temperature.

Unit - V: Analytical Methods-II (15 hrs)

Analysis of basic radicals: Group separation and confirmatory tests for basic radicals- Uses of complexing agents in qualitative analysis- common ion effect and solubility product - role of solubility product in the precipitation of various cations in different groups in qualitative analysis.

Volumetric Analysis: Redox titrations, complexometric titrations (EDTA titration), precipitation titrations- iodometry, iodimetry and permanganometry.

Reference:

1. Morrison R.T. and Boyd R.N., Organic Chemistry (6th edition), New York, Allyn & Bacon Ltd., (1976).
2. Bahl B.S. and Arun Bahl, Advanced Organic Chemistry, (12th edition), New Delhi, Sultan Chand & Co., (1997) **[Textbook]**
3. Pine S. H, Organic Chemistry, (4th edition) New Delhi, McGraw- Hill International Book Company. (1986)
4. Puri B.R., Sharma L.R., Kalia K.K., Principles of Inorganic Chemistry, (23rd edition)New Delhi, Shoban Lal, Nagin Chand & Co.,(1993) **[Textbook]**
5. Lee J.D., Concise Inorganic Chemistry, UK, Black well science (2006).
6. Puri B.R., Sharma L.R., Pathania M.S., Principles of Physical Chemistry, (23rd edition)New Delhi, Shoban Lal, Nagin Chand & Co., (1993) **[Textbook]**

Semester : I & II
11UCH230203

Hours/week : 3
Credits : 3

Chemistry Practical I: Inorganic Qualitative Analysis

Objectives:

- To learn the techniques of semi micro qualitative analysis of inorganic salt mixtures.

Unit – I: Working in Chemistry Lab

Introduction – Personal protection – Nature of Chemicals – Toxic, Corrosive, Explosive, Inflammable, Carcinogenic, other hazardous chemicals – Safe storing and handling of chemicals – Disposal of chemical wastes – Glassware – Handling of Glassware – Handling of different types of equipments like Bunsen burner, Centrifuger, Kipp's Apparatus, etc. – Ventilation facilities – Philosophy of Lab Safety – First-Aid techniques – General work culture inside the chemistry lab- importance of wearing lab coat, eye glasses.

Unit – II: General Principles of Qualitative Analysis

Principle of Flame testing – Concept of solubility and solubility product – Theory of Acids and Bases – Concept of pH and Buffer action – Common-ion effect – Redox reactions – Theory of testing acid radicals (simple and interfering) – Principle of grouping of cations – Theory of testing cations.

Unit – III: Semi-micro Qualitative Analysis

- Analysis of simple acid radicals:
carbonate, sulphide, sulphate, chloride, bromide, iodide, nitrate
- Analysis of interfering acid radicals:
Fluoride, oxalate, borate, phosphate, chromate, arsenite
- Elimination of interfering acid radicals and Identifying the groups of basic radicals
- Analysis of basic radicals (group-wise):
Lead, copper, bismuth, cadmium, antimony, iron, aluminum, chromium, zinc, manganese, nickel, calcium, strontium, barium, magnesium, ammonium

- Repeating the tests in no. 04.
- Repeating the tests in no. 04.
- Analysis of a mixture-I containing two cations and two anions (of which one is interfering type)
- Analysis of a mixture-II containing two cations and two anions (of which one is interfering type)
- Analysis of a mixture-III containing two cations and two anions (of which one is interfering type)
- Analysis of a mixture-IV containing two cations and two anions (of which one is interfering type)
- Analysis of a mixture-V containing two cations and two anions (of which one is interfering type)
- Analysis of a mixture-VI containing two cations and two anions (of which one is interfering type)
- Analysis of a mixture-VII containing two cations and two anions (of which one is interfering type)
- Analysis of a mixture-VIII containing two cations and two anions (of which one is interfering type)
- Analysis of a mixture-IX containing two cations and two anions (of which one is interfering type)
- Analysis of a mixture-X containing two cations and two anions (of which one is interfering type)

Unit – IV: Some Applied Experiments (Demonstration only)

- Analysis of water for the presence of ions like calcium, magnesium, iron, sulphate, chloride, fluoride, carbonates.
- Analysis of Cement for the presence of ions like calcium, aluminum, iron, zinc, sulphate, chloride, phosphate
- Analysis of soil for the presence of minerals like potassium, sodium, nitrate, chloride, phosphate.
- Analysis of a binary alloy.

Reference:

- Venkateswaran V, Veeraswamy R., Kulandaivelu A.R., Basic Principles of Practical Chemistry, (2nd edition), New Delhi, Sultan Chand & sons, (1997).

Semester : I & II
11UCH230204

Hours/week : 3
Credits: 3

Chemistry Practical II: Volumetric Analysis

Objectives:

1. To learn the techniques of titrimetric analyses
2. To learn handling procedure of chemical balance

Unit – I: Introduction to Quantitative Analysis

Introduction – Types of Quantitative analysis – Theory of significant figures – Error analysis – Principles of Chemical Balances (double-pan and single-pan) – Apparatus used in titrimetric analysis – Handling of Chemical balances and other apparatus – Concept of Molecular weight, Formula weight, Equivalent weight – Concentrations of solutions – molarity, molality, Normality, Weight percentage.

Unit – II: General Principles of Titrimetry (Volumetric analysis)

Principle of titrimetry – Primary and secondary standards – Preparation of standard solutions – Standardizing the secondary standard solutions – Types of titrimetric analysis – Principle reactions – Concepts of acids, bases, oxidants, reductants – Theory of Indicators – Calculation of strength of solutions and the amount of substance in solutions.

Unit – III: Titrimetric Quantitative Analysis

1. Preparation of a standard solution (Weighing in Chemical balance)
2. Making up a given solution and doing titration
3. Preparing a standard solution and doing titration
4. Making up a given solution and doing a double titration
5. Estimation of strength of a solution
6. Estimation of HCl by NaOH using a standard oxalic acid solution
7. Estimation of Na_2CO_3 by HCl using a standard Na_2CO_3 solution
8. Estimation of Oxalic acid by KMnO_4 using a standard oxalic acid solution
9. Estimation of $\text{K}_2\text{Cr}_2\text{O}_7$ by standard $\text{K}_2\text{Cr}_2\text{O}_7$ solution

10. Estimation of $\text{K}_2\text{Cr}_2\text{O}_7$ by Thio solution
11. Estimation of Iron (II) by KMnO_4 using a standard Mohr's salt solution
12. Estimation of KMnO_4 by thio using a standard potassium dichromate solution
13. Estimation of Iron (II) by $\text{K}_2\text{Cr}_2\text{O}_7$ using a standard Mohr's salt solution
14. Estimation of Copper (II) sulphate by $\text{K}_2\text{Cr}_2\text{O}_7$ solution
15. Estimation of Copper by standard CuSO_4 solution
16. Estimation of Magnesium (II) by EDTA solution
17. Estimation of Calcium by permanganometry

Unit – IV: Some Applied Experiments

18. Estimation of Total Hardness of water
19. Estimation of Antacid
20. Estimation of Bleaching powder

Reference:

1. Venkateswaran V, Veeraswamy R., Kulandaivelu A.R., Basic Principles of Practical Chemistry, New Delhi, Second edition, Sultan Chand & Sons, (1997).
2. Bassett, J., et al., Vogel's Textbook of Quantitative Inorganic Analysis, (4th edition), ELBS Longman, (1985).

SEMESTER – II
11UCH230402

Hours/Week : 6
Credits : 5

ALLIED MATHEMATICS II

[For I B.Sc. Physics, Chemistry, Computer Science, Electronics, I BCA]

UNIT - I

Integration - Integrals of functions containing linear functions of x - Integrals of functions involving $a^2 + x^2$ - integrals of Rational algebraic functions - Integration of irrational functions.

Book 1: Chap. I sec 6.1, 6.2, 7 (Omit 7.4), 8 case (i) to (iv) only
Page no: 7-13, 23-31, 39-47.

UNIT – II

Properties of definite integrals - Simple applications - Integration by parts - Bernoulli's formula.

Book 1: Chap. I Sec. 11, 12, 15
Page no: 61-72, 93, 94.

UNIT – III

Differential equations of first order - Variable separable - Homogeneous equations - Nonhomogeneous equations - Linear equation - Bernoulli's equation.

Book 1: Chap 4: Sec 1-5
Page no: 205-218.

UNIT – IV

Second order Linear equations with constant co-efficients - Particular integrals for $e^{(kx)}$, $\sin kx$, $\cos kx$, x^n and $e^{(kx)} X$.

Book 2: Chap 3: Sec 1-4, Page no: 42-60.

UNIT – V

Laplace transform - Definition - Some general theorems - Inverse Transform.

Book 1: Chap 7: 7.1, 7.2, 7.3, 7.4, 7.5
Page no: 289-308.

Text Book:

1. Ancillary Mathematics, Vol-II (2009), S. Narayanan, R. Hanumantha Rao, T.K. Manicavachagom Pillay, Kandaswamy.
2. Ancillary Mathematics Book II: Narayanan, Manicavachagom Pillay.

பருவம் - 3
11UGT310003

மணி நேரம் - 4
புள்ளிகள் - 3

பொதுத் தமிழ் - III

நோக்கங்கள்

1. செம்மொழித் தமிழ்ச்செய்யுள்களான பதினென்மேல் கணக்கு, பதினென்கீழ்க் கணக்குப் பாடல்களைப் படித்துப் பொருள் புரிந்து கொள்ளும் திறன் பெறுதல்
2. பண்டைய இலக்கியங்களில் அமைந்துள்ள சமூகக் கருத்துக்களை உணர்தல்.
3. மரபுக் கவிதை வடிவங்களை அறிதல்.
4. கவிதைகளில் அணிகள் அமைந்துள்ள பாங்கைப்பிரிதல்.
5. புதினம் வழித் தற்காலச் சமுதாயச் சிக்கல்களையும், அதற்கான தீர்வுகளையும் ஆராய்ந்தறிதல்.

பயன்கள்

1. செம்மொழியாம் தமிழ் மொழியின் சிறப்பை அறிந்துகொள்வர்.
2. பண்டைய இலக்கியங்கள் உணர்த்தும் அறக்கருத்துக்களை அறிந்து, மாணவர் ஒழுக்க நெறியில் வாழ்ந்து சமூகத்தை மேம்படுத்துவர்.
3. மாணவர் புதினத்தைக் கற்பதன் மூலம் சமுதாயச் சிக்கல்களை உணர்ந்து அவற்றிற்குத் தீர்வு காண்பர்.

அலகு : 1

(16 மணி நேரம்)

பத்துப்பாட்டு - குறிஞ்சிப்பாட்டு (முழுமையும்)

அலகு : 2

(10 மணி நேரம்)

நற்றிணை, குறுந்தொகை, யாப்பிலக்கணம் (வெண்பா, ஆசிரியப்பா)

அலகு : 3

(10 மணி நேரம்)

இலக்கிய வரலாறு – ‘தமிழ்மொழியின் தொன்மையும் சிறப்பும்’ முதல் ‘சங்கத் தொகை நூல்கள்’ முடிய.

புதினம் – முழுமையும்.

அலகு : 4

(12 மணி நேரம்)

கலித்தொகை, பதிற்றுப்பத்து, புறநானூறு, அணியிலக்கணம்.

அலகு : 5

(12 மணி நேரம்)

திருக்குறள்

இலக்கிய வரலாறு – சங்க இலக்கியங்களின் தனித்தன்மைகள் முதல் இரட்டைக் காப்பியங்கள் முடிய.

பாடநூல்கள்

1. செய்யுள் திரட்டு, தமிழாய்வுத்துறை வெளியீடு (2011 - 2014)
2. சமூகவியல் நோக்கில் தமிழிலக்கிய வரலாறு, தமிழாய்வுத்துறை வெளியீடு, 2010
3. புதினம் (ஒவ்வொரு கல்வியாண்டும் ஒவ்வொரு புதினம்).

மதிப்பெண் பகிர்வு

பிரிவு	பாகம் -1	பாகம் -2	பாகம்-3
செய்யுள்	12 (12 வினாக்கள்)	8 (2 வினாக்கள்)	30 (2 வினாக்கள்)
இலக்கியவரலாறு	6 (6 வினாக்கள்)	8 (2 வினாக்கள்)	30 (2 வினாக்கள்)
புதினம்	-----	-----	15 (1வினா)
இலக்கணம்	2 (2 வினாக்கள்)	4 (1 வினா)	-----

Sem: III
Code: 11UGE320103

Hours :5
Credits: 3

GENERAL ENGLISH -III

Objectives:

1. To enable the students to complete the pre-reading task to comprehend the local and global issues in the lessons..
2. To enable the students to complete the post-reading task centering on Grammar and Skill Development
3. To empower the students with globally employable skills.

UNIT-I

12 Hrs

Larry Collins & Dominique Lapierre
Freedom at Midnight (Extract)
Alfred Uhry
Driving Miss Daisy
Extensive Reading—Robinson Crusoe (Chapters 1-3)
Essential English Grammar—61-66.

UNIT-II

12 Hrs

Alfred Lord Tennyson
Ulysses
Nathaniel Branden
Our Urgent Need for Self-esteem
Extensive Reading—Robinson Crusoe (Chapters 4-6)
Essential English Grammar—67-72.
Reader's Mail :The Hindu

UNIT-III

11 Hrs

Daniel Goleman
Emotional Intelligence
Marcel Junod
The First Atom Bomb.
Extensive Reading—Robinson Crusoe (Chapters 7-9)
Essential English Grammar—73-78.
Job Application.

UNIT-IV

20 Hrs

E.K.Federov
Climate Change and Human Strategy.
Paolo Mauro
Corruption: Cases, Consequences and Agenda for further Research.
Extensive Reading—Robinson Crusoe (Chapters 10-12)
Essential English Grammar—79-84.
Minutes Writing.

UNIT-V

15 Hrs

Anne Frank
The Diary of Young Girl
A.P.J.Abdul Kalam
Wings of Fire
Extensive Reading—Robinson Crusoe (Chapters 13-15)
Essential English Grammar— 85-90.
Resume Writing.

Text Books

1. Elango K. *Insights*. Hyderabad: Orient Blackswan Pvt Ltd,2009.
2. Murphy, Raymond. *Essential English Grammar*. New Delhi. Cambridge University Press India Ltd,2009.
3. Defoe, Daniel. *Robinson Crusoe*. Chennai: MacMillan India Ltd,2009.
4. Stevenson R L. *Treasure Island*. Chennai: MacMillan India Ltd,2009.
5. Ram N Ed. *The Hindu*. Tiruchirappalli.

Semester : III
11UCH 330205

Hours/week : 6
Credits : 4

GENERAL CHEMISTRY – III

Objectives:

1. To learn the basic principles of stereochemistry.
2. To learn the chemistry of aliphatic unsaturated hydrocarbons.
3. To study the chemistry of boron and carbon group elements.
4. To study the second and third laws of thermodynamics and their applications.

Unit - I: Stereochemistry (18hrs)

Stereoisomerism – Types – Optical isomerism – Chirality based on Symmetry elements (C_n , s , i and S_n) – Idea of asymmetry and dissymmetry – Optical activity – Measurement of optical activity – Concept of enantiomerism, diastereomerism – Axial chirality in substituted allenes – Atropisomerism in substituted biphenyls – R-S, D-L and E-Z notations to express configurations – Erythro, threo conventions – meso and dl-forms of tartaric acid – Stereo selectivity and Stereo specificity in organic reactions with suitable examples – Resolution of Racemic mixture using chiral reagent – Walden Inversion – Asymmetric synthesis – Asymmetric induction.

Unit - II: Alkene, Alkadienes and Alkynes (18hrs)

Alkenes: Nomenclature – Geometrical Isomerism – Petroleum source of alkenes and aromatics – General methods of preparation of alkenes – Chemical properties – Uses – Elimination mechanisms (E_1 , E_2 , E_1CB) – Electrophilic addition- General mechanism - Addition of HX (Markovnikov and Anti- Markovnikov's)- Addition of bromine- Addition of water (Oxymercuration-Demercuration, Hydroboration-oxidation) - Hydroxylation (Syn- and anti-dihydroxylation)- Reduction – Diels- Alder reaction - ozonolysis.

Alkadienes: Types–MO of conjugated diene- General methods of preparation of Dienes - Physical properties – 1,2-1,4 - addition of HX to conjugated dienes-ozonolysis

Alkynes: Nomenclature-General methods of preparation of alkynes – Physical properties – Electrophilic addition of HX, water (Markovnikov and Anti- Markovnikov's), Hydrogen (to form Z-&E-alkenes)-Diels-Alder Reaction - Deprotonation: formation of alkynyl anions - ozonolysis

Unit - III: Boron and Carbon group elements (18hrs)

General Characteristics of Boron group elements with reference to electronic configuration, oxidation states, metallic character and inert pair effect - Diagonal relationship between B and Si. Acid strength of trihalides of boron – structure of diborane and borazole. Preparation, properties and structures of ortho boric acid. Borax bead test. Dimeric structure of $AlCl_3$. General characteristics of carbon group elements with reference to electronic configuration, oxidation states, metallic character, inert pair effect and catenation. Allotropy- structure of graphite and diamond. Differences between CO_2 and SiO_2 . Differences between CCl_4 and $SiCl_4$. Preparation, properties and uses of silicon carbide and silicones. Reducing character of stannous chloride.

Unit - IV: Thermodynamics II (18hrs)

Second law of Thermodynamics – need for the law – Different statements of II law - Heat engine – Carnot's cycle and its efficiency – Thermodynamic scale of temperature – Entropy as a state function – Entropy as a function of P, V and T - Entropy change in phase change – Entropy of mixing – Entropy as a criterion of spontaneous and equilibrium processes in isolated systems – Gibbs function(G) – Hemholtz function(A) as thermodynamic quantities - ΔA and ΔG as criteria for thermodynamic equilibrium and spontaneity – Their advantage over entropy change – Variation of ΔA and ΔG with P, V and T – Gibbs Hemholtz equations and their applications – Thermodynamic equation of state – Maxwell's relations

Unit - V: Applications of II Law and III Law (18hrs)

Equilibrium constant and free energy change - Thermodynamic derivation of law of mass action – K_p , K_c of NH_3 , PCl_5 and $CaCO_3$ system – Thermodynamic interpretation of Le Chatelier principle(concentration,

Temperature, Pressure) - addition on inert gases – Reaction isotherm – Van't Hoff equation – Van't Hoff isochore – Clapeyron equation – Clausius Clapeyron equation and applications- Statement of third law and apparent exceptions to third law.

Reference:

1. Morrison R.T. and Boyd R.N., Organic Chemistry (6th edition), New York, Allyn & Bacon Ltd., (1976)
2. Bahl B.S. and Arun Bahl, Advanced Organic Chemistry, (12th edition), New Delhi, Sultan Chand & Co., (1997) **[Textbook]**
3. Pine S. H, Organic Chemistry, (4th edition) New Delhi, McGraw- Hill International Book Company, (1986).
4. Puri B.R., Sharma L.R., Kalia K.K., Principles of Inorganic Chemistry, (23rd edition) New Delhi, Shoban Lal, Nagin Chand & Co., (1993) **[Textbook]**
5. Lee J.D., Concise Inorganic Chemistry, UK, Black well science (2006)
6. Puri B.R., Sharma L.R., Pathania M.S., Principles of Physical Chemistry, (23rd edition) New Delhi, Shoban Lal, Nagin Chand & Co., (1993) **[Textbook]**
7. Andrew F. Parson, Key Notes in Organic Chemistry, Blackwell Science Pub. (2003).

SEMESTER – III
11UCH330403A

Hours/Week : 4
Credits : 4

ALLIED: PHYSICS I

Objectives:

- To acquire knowledge about mechanics and moving particles
- To study gravitation and elasticity and acquire knowledge about planets, satellites and their movements.
- To understand the principles of musical sound, sound waves and their application in day- to-day life.
- To study the various optical instruments and learn the method of handling them.
- To know the different types of semiconductor devices and their applications in radio and television system

UNIT – I : Mechanics

SHM-velocity, time, period, frequency, phase-equations of wave motion-compound pendulum- center of suspension-interchangeability center of oscillation and suspension- Moment of Inertia –Radius of gyration – Angular Momentum – torque – Theorems of M.I - M.I. of uniform rod, disc, circular ring, Annular ring, solid sphere –Kinetic energy of rotating energy- Acceleration of a body rolling down on an inclined plane.

UNIT – II : Gravitation and Elasticity

Newton's law of gravitation-verification of G –Kepler's laws-relation of G and g - mass and density of earth-variation of the acceleration due to gravity - orbital velocity - escape velocity - types of moduli - Poisson's ratio-relation between ν , n & σ – bending of beams - bending moment - cantilever-cantilever loaded at one end-supported at two ends and loaded in the middle.

UNIT – III : Sound

Velocity of transverse waves along a stretched string-frequency of vibrating string -laws of transverse vibration of strings-verification of laws-Melde's experiment-ultrasonics- piezo-electric effect-production of

ultrasonics- Experiment-detection of ultrasonics-applications-determination of velocity of sound in a liquid-reverberation-absorption

UNIT – IV : Optics

Chromatic aberration-spherical aberration-spectrometer-determination of refractive index-Newton's rings-determination of wavelength and refractive index of liquid-plane transmission grating-resolving power of diffraction grating-determination of wavelength-double refraction Nicol prism-specific rotation-Laurant's polarimeter – Half shade device.

UNIT – V : Basic Electronics

Energy level in solids -intrinsic and extrinsic semi conductors -p-n junction-forward bias, reverse bias-volt-ampere characteristics of p-n junction diode-full wave rectifier- zener diode, tunnel diode, photo diode, LED - transistor-CE and CB characteristics-transistor amplifier.

BOOKS FOR STUDY:

- A.S.Vasudeva, Modern Engineering Physics, S.Chand and CompanyLtd., 1988.
- V.K. Mehta, Principles of Electronics, S.Chand and CompanyLtd., 2009.

UNIT	BOOK	SECTIONS
I	1	Part – IV 1.1-1.6,2.3,1.8-1.10.
		Part – I 4.2,4.3,4.6,4.7,4.9-4.11,4.13-4.16,4.20
II	1	Part – I 2.1-2.5,2.7,2.12,2.13,5.4, 5.9,5.15-5.19.
III	1	Part – IV 4.1-4.4,6.1-6.9
IV	1	Part – III 2.4,2.9,4.25-4.27,5.21,5.27,5.28,6.10,6.16,6.28- 6.30.
V	2	5.1-5.19, 6.1,6.2, 6.11-6.15, 6.17, 6.18, 6.25, 6.27, 7.2-7.10, 7.12, 8.1-8.5, 8.9, 8.12

SEMESTER – III
11UCH330403B

Hours/Week : 4
Credits : 4

ALLIED: BIOCHEMISTRY - I

UNIT – I :

Carbohydrates - Classification; chemical structure and properties of Pentoses and Hexoses - Disaccharides, Trisaccharides and Tetrasaccharides, Biological importance and clinical significance.

UNIT – II :

Polysaccharides - Classification, Chemical structure and properties of Starch, Glycogen, (Clinical Significance) Cellulose, Hemicellulose and Insulin, Mucopolysaccharides, Glycosaminoglycans.

UNIT – III:

Lipids - Classification and General Properties - Fatty acids - types; properties and reactions - detailed study of Glycolipids - phospholipids and Sulpholipids - Clinical Significance.

UNIT – IV:

Fat - soluble vitamins - A, D, E & K - Structure, Chemistry and Functions, Water - soluble vitamins, B Complex (Riboflavin, Niacin, Pyridoxine, Folic acid, Cyanocobalamin, Pantothenic acid) Vitamin C (Ascorbic acid) - Clinical significance - Deficiency and Excess.

UNIT – V :

Minerals - Calcium, Phosphorus, Iodine, Fluorine, Manganese, Iron, Magnesium, Potassium - Requirements - Deficiency - Excess and Physiological role in Man.

Text Books:

1. Jain JL, Fundamentals of Biochemistry, S. Chand & Co, 5th Edition, New Delhi.

Books for Reference:

1. Conn. E & Stumpf, PK, 1979, Outline of Biochemistry, Niley Easdtern Ltd., New Delhi.
2. Das Gupta, SK, 1977, Biochemistry (Vol. II), Macmillan & Co., New Delhi.
3. Renganatha Rao, K. 1986, Text Book of Biochemistry, Printice Hall of India (P) Ltd., New Delhi.
4. Saim, AS, 1994, Text Book of Biochemistry, CBS Publishers, Delhi.

பருவம் - 4
11UGT410004

மணி நேரம் - 4
புள்ளிகள் - 3

பொதுத் தமிழ் - 4

நோக்கங்கள்

1. நாடகத்தின் நோக்கம், அதன் போக்கு, உத்திகள், பாத்திரப் பாங்கு, உரையாடல் முறை, கற்பனைத் திறம் போன்றவற்றை வெளிப்படுத்துதல்.
2. புதிய நாடகங்களைப் படைக்கும் திறனை மாணவர்களிடையே உருவாக்குதல்.

பயன்கள்

1. நாடகவழி அழகியல் உணர்வுகளை வளர்த்துக் கொள்வர்.
2. நாடகங்களைச் சமூகப் பயன்பாட்டிற்கு ஏற்ப உருவாக்கும் திறன் பெறுவர்.

அலகு : 1 (12 மணி நேரம்)
மனோன்மனீயம், பாயிரம், அங்கம் - 1, களம் 1 - 5 வரை.

அலகு : 2 (12 மணி நேரம்)
மனோன்மனீயம், அங்கம் - 2, களம் 1 - 3 வரை.
உரைநடை நாடகம் - ஈரோடு தமிழன்பன் - ஈர நெருப்பு
(முதல் மூன்று நாடகங்கள்)

அலகு : 3 (12 மணி நேரம்)
மனோன்மனீயம், அங்கம் - 3, களம் 1 - 4 வரை.

அலகு : 4 (12 மணி நேரம்)
மனோன்மனீயம், அங்கம் - 4, களம் 1 - 5 வரை.

அலகு : 5 (12 மணி நேரம்)
மனோன்மனீயம், அங்கம் - 5, களம் 1 - 3 வரை.
உரைநடை நாடகம் - ஈரோடு தமிழன்பன் - ஈர நெருப்பு,
(4, 5, 6 ஆம் நாடகங்கள்)

பாடநூல்கள்

1. சுந்தரனார், பெ. மனோன்மனீயம், தமிழாய்வுத்துறை (பதிப்பு), தூய வளனார் கல்லூரி, திருச்சிராப்பள்ளி-2. (அங்கம் - 3 இல் களம் - 4 நீங்கலாக)
2. உரைநடை நாடகம் - ஈரோடு தமிழன்பன் - ஈர நெருப்பு, அய்யா நிலையம், நாஞ்சிக் கோட்டை சாலை, தஞ்சாவூர் - 613 006.

மதிப்பெண் பகிர்வு

பிரிவு	பாகம் -1	பாகம் -2	பாகம்-3
மனோன்மனீயம்	20 (20 வினாக்கள்)	20 (5 வினாக்கள்)	60 (4 வினாக்கள்)
உரைநடை நாடகம்	-----	-----	15 (1 வினா)

Sem: IV
Code: 11UGE420104

Hours :5
Credits: 3

GENERAL ENGLISH -IV

Objectives:

1. To enable the students to complete the pre-reading task to comprehend the local and global issues in the lessons..
2. To enable the students to complete the post-reading task centering on Skill Development and Grammar..
3. To empower the students with globally employable soft skills.

UNIT-I

12 Hrs

Life Stories

F.G.Herod
Mother Teresa
R.K.Narayan
Swami and Friends
Treasure Island (1-4)
91—95.

Extensive Reading
Essential English Grammar
Film Review (The Hindu).

UNIT –II

12 Hrs

Imogen Grosberg
See Off the Shine
George Orwell
The Porting Spirit
Treasure Island (5-8)
96-100.

Extensive Reading
Essential English Grammar
Article Writing on Current Issues.

UNIT-III

11 Hrs

Philip Agre
Building an Internet Culture
Satyajit Ray
Odds Against Us
Treasure Island (9-12)
101-105.

Extensive Reading
Essential English Grammar
Mock Interviews

UNIT-IV

20Hrs

Jerzy Kosinski
TV as Babysitter.
E.F.Scumacher
Technology With Human Face.
Treasure Island (13-17)
106-110.

Extensive Reading
Essential English Grammar
Mock Group Dynamics

UNIT-V

15 Hrs

Aluizio Borem, Fabrico
R.Santos & David E.Bower
Advent of Biology
Mark Ratner & Daniel Ratner
Nanotechnology
Treasure Island (18-22)
111-114.

Extensive Reading
Essential English Grammar
Presentation Skills

Text Books

1. Elango K. *Insights*. Hyderabad: Orient Blackswan Pvt Ltd,2009.
2. Murphy, Raymond. *Essential English Grammar*. New Delhi. Cambridge University Press India Ltd,2009.
3. Defoe, Daniel. *Robinson Crusoe*. Chennai: MacMillan India Ltd,2009.
4. Stevenson R L. *Treasure Island*. Chennai: MacMillan India Ltd,2009.
5. Ram N Ed. *The Hindu*. Tiruchirappalli.

Semester : IV
11UCH430206

Hours/week : 5
Credits : 4

GENERAL CHEMISTRY - IV

Objectives:

1. To understand the chemistry of aromatic hydrocarbons
2. To understand the chemistry of hydroxyl compounds
3. To understand the chemistry of ethers and synthetic polymers
4. To study phase rule and its applications

Unit - I: Benzene (15 hrs)

General methods of preparation of benzene – molecular orbital picture – aromatic character – Huckel's rule of aromaticity (Benzenoid and non-benzenoid compounds) – Aromatic Electrophilic substitution Reactions of benzene: General Mechanism – Mechanism of Nitration, sulphonation, halogenations, Friedel-Craft's Alkylation and Acylations- Orientation and reactivity of mono- and di-substituted benzenes

Unit - II: Alcohols, thiols and Phenols (16 hrs)

Nomenclature – Laboratory preparation of alcohols – Industrial source of alcohols – Physical properties – Chemical properties – Uses – Chemistry of glycols and glycerols – Uses - Pinacol – Pinacolone rearrangement – preparation and properties of thiols- Preparation of phenols – Physical and Chemical properties – Uses – Aromatic electrophilic substitution mechanism – Theory of orientation and reactivity

Unit - III: Ethers, Thioethers and Synthetic Polymers (20 hrs)

Ethers: Preparation- properties and uses of ethers and thioethers – Introduction to Crown ethers – Structure – Applications as PTC.

Synthetic polymers: Rubber as a natural polymer – Types of polymers – homopolymers- copolymers – addition and condensation polymers - polymerization reactions – Mechanisms of cationic, anionic and free radical polymerization reactions – Condensation polymerization – Chemistry of Vulcanization of rubber – Manufacture of Film sheets, Rayon and Polyacrylic fibers -Uses of Polymers

Unit - IV: Phase Rule I (12 hrs)

Phase rule – Meaning of the terms: phase, Component, degrees of freedom – Derivation of Gibbs phase rule – Phase diagrams of one component systems (Water, He, CO₂, and sulphur systems) - Thermal analysis, application of Clapeyron-Clausius equation to water system.

Unit - V: Phase Rule II (12 hrs)

Phase diagrams of two component systems solid-liquid equilibrium – simple eutectic - Bi-Cd system – Pb-Ag systems – Desilverisation of Lead – Phase diagram of system with compound formation with congruent melting point – Mg-Zn System – incongruent melting point – Na-K system – NaCl-Water system – FeCl₃ - Water system – Freezing mixture – gas-solid equilibrium – CuSO₄ – water system – Efflorescence – Deliquescence- three component system (Acetic acid-Chloroform-Water) only.

Reference:

1. Morrison R.T, Boyd R.N., Organic Chemistry, (4th edition) New York, Allyn & Bacon Ltd., (1976)
2. Bahl B.S, Arun Bahl, Advanced Organic Chemistry, (12th edition) New Delhi, Sultan Chand and Co., (1997) **[Textbook]**
3. Pine S. H, Organic Chemistry, (4th edition) New Delhi, McGraw- Hill International Book Company. (1986)
4. Puri B.R., Sharma L.R., Kalia K.K., Principles of Inorganic Chemistry, (23rd edition) New Delhi, Shoban Lal, Nagin Chand & Co., (1993) **[Textbook]**
5. Lee J.D., Concise Inorganic Chemistry, UK, Black well science (2006)
6. Puri B.R., Sharma L.R., Pathania M.S., Principles of Physical Chemistry, (23rd edition) New Delhi, Shoban Lal, Nagin Chand & Co., (1993) **[Textbook]**

Semester : IV

Hours/Week : 5

Paper Code: 11UCH430301A

Credits : 3

Core Elective I: Essentials of p-block elements**Objectives:**

1. To understand the chemistry of nitrogen group elements
2. To understand the chemistry of oxygen group elements
3. To understand the chemistry of halogens and noble gases
4. To learn the acid-base concepts and hydrogen bonding
5. To learn the soil profile and testing

Unit - I: Nitrogen group elements (15 hrs)

Differences between nitrogen and rest of the family members- A comparative study on hydrides, halides and oxides of nitrogen group elements. Structure and basic character of ammonia. Oxyacids of nitrogen (HNO_2 , HNO_3) and phosphorous (H_3PO_3 , H_3PO_4 and $\text{H}_4\text{P}_2\text{O}_7$). Preparation properties and structure of hydrazine. Fertilizers-nitrogenous, phosphatic and potash.

UNIT - II: Oxygen group elements (15 hrs)

Anomalous behaviour of oxygen- paramagnetic nature of oxygen- preparation, properties, structure and uses of sulphuric acid, Caro's acid, Marshall's acid and oleum - **Oxides:** classification of oxides based on their chemical behaviour - acidic oxides, basic oxides, amphoteric oxides and neutral oxides. Classification of oxides based on oxygen content - normal oxides, peroxides, superoxides, dioxides, suboxides and mixed oxides. Preparation, structure, oxidizing and reducing character of hydrogen peroxide.

Unit - III: Halogens and Noble gases (15 hrs)

Peculiarity of fluorine - hydrides, oxides and oxy acids of halogens. Preparation, structure and hydrolysis of inter halogen compounds. Pseudo halogens-chemical reactions. Position of noble gases in the periodic table: Position in the periodic table - Isolation from atmosphere - general

Characteristics- Structure and shape of xenon compounds – XeF_2 , XeF_4 , XeF_6 , XeO_3 and XeOF_4 .

Unit - IV: Acid – Base Concepts & Hydrogen Bonding (15 hrs)

Acid- Base Chemistry- Theories of acids-bases- Arrhenius, Bronsted – Lowry, Lewis, Solvent system (levelling and differentiating effect), Lux - Flood and Usanovich definition – HSAB principle.

Hydrogen bond - Introduction, kinds of H-bond (inter and intra)- consequences and importance.

Unit - V: Soil Profile and testing (15 hrs)

Fundamental concepts – soils as natural phenomena-soils as part of the environment – objectives of soil testing – Soil formation-factors of soil formation, soil profile – Composition, components and properties of soil- Elements required in plant nutrition and their role-N, P, K, Ca, Mg, S, B, Fe, Mn, Cu, Zn, Mo and Cl – Soil fertility and productivity - Preparation and measuring of soil samples, addition of extractants – Soil pH – Soil salinity – Estimation of carbon (volumetric and colorimetric methods), phosphorous (colorimetric method), potassium (flame photometer method) – Lime and gypsum requirements.

References

1. Gilbert R. Muhr, Datta N P, Sankarasubramoney H, Leley V K and Roy L. Donahue. Soil Testing in India, Second Edition. United States Agency for International Development Mission to India, New Delhi, 1965.
2. Fitzpatrick E A. An Introduction to Soil Science, Second Edition. Longman Scientific & Technical, New York, 1986.
3. Bagavathi Sundari K. Applied Chemistry. MJP Publishers, Chennai, 2006.
4. Firman E. Bear (Editor). Chemistry of the Soil, Second Edition, Oxford & IBH Publishing Co., New Delhi, 1965
5. Puri B.R., Sharma L.R., Kalia K.K., Principles of Inorganic Chemistry, (23rd edition) New Delhi, Shoban Lal, Nagin Chand & Co., (1993).

Semester IV
11UCH430301B

Hours / week : 5
Credits : 3

CORE ELECTIVE I: POLYMERS

Objectives

1. To understand structure, types and formation of polymers.
2. To study the preparation and applications of important industrial polymers.

Unit-I (12 Hours)

Nomenclature of polymers – General Characteristics of polymers – types of polymers: thermoplastic, thermosetting. Functionality concept, concept of cross linking. Types of polymerization: Addition, condensation, mechanism-Ionic, free radical and coordination. Methods of polymerization – Bulk emulsion and solution. Copolymers – Block and graft Copolymers

Unit-II (12 Hours)

Polymethanes, polycarbonates, silicones, synthesis, properties and uses. Polythene HDP, LDP, LLDPE, PVC Teflon, Neoprene copolymers of polystyrene, SBR, ABS, SAN-formation, properties and uses.

Unit-III (12 Hours)

Phosphorous based polymers – polyphosphazenes – phosphate glasses- crystalline polymetaphosphates –Madrell's salt and Kuroll's salt, sulphur- phosphorous polymers- ultraphosphate glasses

Unit-IV (12 Hours)

Sulphur based polymers – polymeric sulphur nitride- chalcogenide glasses-coordination polymers – polymerization – copper polymers – synthetic coordination polymers – Volon and quilon polymers – polymers with chelating agents

Unit-V (12 Hours)

Molecular weight, Number, Weight and viscosity, average molecular weight of polymers. Method of determination of molecular weights- Glass

transition temperature (GTT). Factors affecting GTT. Properties – optical, electrical, thermal, mechanical –Degradation of polymers – Thermal, oxidative and chemical methods.

References

1. Puri B.R Sharma L.R., Kalia K.K., *Principles of Inorganic chemistry* (23rd edition) Shoban Lal, Nagin chand & Co .New Delhi, (1993).
2. Gowariker VR., et al., *Polymer science*, Wiley Eastern Ltd., 1986.
3. Billmeyer, *Text book of polymer science*, John –Wiley and sons, 1996.

Semester III & IV
11UCH 430207

Hours/week : 3
Credits : 3

Chemistry Practical III: Physical Chemistry Practical

Objectives:

1. To learn the fundamentals of conductometric and potentiometric titrations
2. To understand the method of determination of critical solution temperature, transition temperature and rate constant
3. To learn the instrumental techniques

Unit - I: Introduction to Physical Chemistry Practical

Introduction – Theory of the practical – Critical solution temperature – transition temperature – Heat of neutralization – Kinetics of ester hydrolysis and Persulphate oxidation – Viscosity – Phase Diagram (simple eutectic) – polarimetry of inversion of sugar – potentiometry – Conductometry – Partition coefficient and Equilibrium constant – Calculation of parameters with units – Drawing Graphs – Handling of various equipments used in physical chemistry practical.

Unit - II: Two Cycles of Experiments

Cycle 1

1. Critical Solution Temperature
2. Heat of Neutralization
3. Transition Temperature
4. Kinetics of Ester Hydrolysis
5. Conductometric Acid-Base Titration
6. Potentiometric Acid-Base Titration
7. Viscosity
8. Measurement of optical density
9. Measurement of O.D and T
10. Determination of $t_{1/2}$ of a radioactive nucleus

Cycle 2

11. Rast Method
12. Effect of impurity on Critical solution Temperature
13. Partition Coefficient, Equilibrium constant of $KI + I_2 \leftrightarrow [KI_3]$
14. Kinetics of Persulphate-Iodide Reaction
15. Conductometric Precipitation Titration
16. Potentiometric Redox Titration
17. Phase Diagram (Simple eutectic system)
18. Kinetics of inversion of sucrose by polarimetry
19. Estimation of iron by colorimetry
20. Determination of Li^+ , K^+ and Ca^{2+} by flame photometry

Unit - III: Demonstration Experiments

01. Determination of Iron by colorimetry
02. Determination of pH of solid samples using pH meter
03. Determination of sodium and potassium by Flamephotometry

Reference:

1. Venkateswaran V, Veeraswamy R., Kulandaivelu A.R., Basic Principles of Practical Chemistry, (2nd edition), New Delhi, Sultan Chand & Sons, (1997).
2. Daniels et al., Experimental Physical Chemistry, (7th edition), New York, McGraw Hill, (1970).
3. Findlay, A., Practical Physical Chemistry, (7th edition), London, Longman (1959).

SEMESTER – IV
11UCH430404A

Hours/Week : 4
Credits : 4

ALLIED: PHYSICS II

Objectives:

- To understand the knowledge of nuclear bomb and X-ray studies.
- For the study of electrostatics, student acquire knowledge about forces in electric field and their applications.
- To understand the knowledge of magnetic field in various conducting media
- To know the information regarding lasers and fiber optics in communication system.
- To know the different types of digital instruments in various electronic devices and digital computer.

UNIT – I : Modern Physics

Liquid drop model – nuclear fission - nuclear fusion – atom bomb- photo electric effect – Einstein's photo electric equation – experimental verification – Compton effect – theory – X-ray diffraction – Bragg's law – Bragg's X-ray spectrometer – structure of KCl and NaCl crystal – Sommerfeld relativistic atom model.

UNIT – III : Electrostatics

Gauss law - proof – force between two point charges in vacuum – applications of Gauss law - electric field due to a line charge, an infinite plane sheet of charge, infinite charged conducting plate, charged spherical shell and charged sphere – Coulomb's law from Gauss law – capacitors – parallel plate capacitor with dielectric and dielectric with varying thickness.

UNIT – III : Magnetism and Current Electricity

Magnetizing field - intensity of magnetization - flux density – deflection magnetometer – Tan A and Tan B simultaneous method – vibration magnetometer – absolute determination of M and H – hysteresis – energy

loss in hysteresis - Ampere's law – Biot – Savarts law – magnetic field due to straight conductor carrying current – magnetic field on the axis of a circular coil carrying current – magnetic field due to a solenoid – force between two parallel conductors – Post Office Box – Potentiometer – principle and measurement of resistance and current..

UNIT – IV : Lasers and Fiber Optics

Atomic excitation - excitation by absorption-induced absorption - spontaneous absorption-spontaneous and induced emission - optical pumping-Ruby laser - He-Ne laser-applications of lasers-fiber optics-propagation of light in various media and in optical fiber- optical fiber and total internal reflection-numerical aperture - fiber optic communication-advantages –telephone system and optical fibre.

UNIT – V : Digital Electronics

Binary number system – conversion of binary into decimal, decimal into binary - logic gates and Universal gates – NAND and NOR as a Universal building block – Boolean algebra – De Morgan's theorem – flip flops: SR, Clocked SR, JK, D-type, T-type.

BOOKS FOR STUDY:

- A. S. Vasudeva - Modern Engineering Physics, S.Chand and Company Ltd., 1988.
- Course Material.

UNIT	BOOK	SECTIONS
I	1	2.2,2.3,5.4,6.10-6.13,9.10-9.13,9.17,15.7,15.8
II	1	2.2-2.5,3.1,3.2,3.7,3.8
III	1	3.2-3.4,3.15,3.16,1.2-1.4,1.7-1.10.
IV	1	8.2,8.3,8.8-8.15, 8.17, 8.20, 8.22, 8.24, 8.28, 8.34, 8.35
V	2	Course Material

BOOK FOR REFERENCE:

- Digital Principles and Applications, leach and Malvino, 5th Edition, Tata McGraw hill Ltd., 2002.

SEMESTER – IV
11UCH430404B

Hours/Week : 4
Credits : 4

ALLIED: BIOCHEMISTRY - II

UNIT – I :

Atomic Acids - Structure - Classification - General Physical and Chemical Properties - Acid Base properties - Isoelectric point - Standard and Non-standard amino acids - structure and biological role, peptide bonds - antibiotics - penicillin.

UNIT – II :

Proteins - Classification (based on solubility, complexity and function); General Properties and role of proteins, primary (Insulin), secondary (alpha helix and beta structure), tertiary (Collagen) and quaternary (Hemoglobin) structure - backbone stabilizing forces.

UNIT – III:

Enzymes - Definition and Nomenclature - Principles of Catalysis - ES complex - Transition state - Apoenzymes - Coenzymes and cofactors - Mechanism of enzyme action - V_{max} and K_m ; Enzyme inhibition - Factors affecting enzyme action.

UNIT – IV:

Nucleic acids - bases - nucleotides - structure and properties of DNA and RNA, Types of RNA - Denaturation Renaturation - Biological Role of Nucleic acids.

UNIT – V :

Secondary plant metabolites - structure, properties and reactions of porphyrin (Chlorophyll, Cytochromes, Heme); Terpenoids, (Carotenoids, Rubber); Phenols; Classification, Properties and Reactions of Alkaloids.

Text Books:

1. Jain JL, Fundamentals of Biochemistry, S. Chand & Co, 5th Edition, New Delhi.

Books for Reference:

1. Conn. E & Stumpf, PK, 1979, Outline of Biochemistry, Niley Easdtern Ltd., New Delhi.
2. Das Gupta, SK, 1977, Biochemistry (Vol. II), Macmillan & Co., New Delhi.
3. Renganatha Rao, K. 1986, Text Book of Biochemistry, Printice Hall of India (P) Ltd., New Delhi.
4. Saim, AS, 1994, Text Book of Biochemistry, CBS Publishers, Delhi.

SEMESTER – III & IV
11UCH430405A

Hours/Week : 2
Credits : 2

ALLIED: PHYSICS PRACTICAL

Any 16 Experiments

1. Young's modulus – Non uniform bending – cantilever
2. Young's modulus – Cantilever
3. S.T. – Method of drops
4. S.T. – Capillary rise.
5. Viscosity – variable pressure head
6. Concave lens - f, R, μ .
7. Air wedge – Thickness of wire.
8. Newton' Rings R
9. Spectrometer – Solid prism
10. Spectrometer – Grating (Normal Incidence)
11. M1/M2 – Tan A and Tan B simultaneous method
12. Absolute determination of M and H.
13. P.O. Box – Temp. Coefficient
14. Potentiometer – Ammeter calibration
15. Potentiometer - R and ρ .
16. Field along the axis of the coil
17. Sonometer – Frequency of turning fork
18. Junction diode characteristics
19. Zener diode characteristics.
20. Logic gates – IC's
21. Jolly's bulb

SEMESTER – III & IV
11UCH430405B

Hours/Week : 2
Credits : 2

ALLIED: BIOCHEMISTRY PRACTICAL

PRACTICALS - I

1. Qualitative Test for Carbohydrates
2. Colorimetric Estimation of Glucose
3. Quantitative Estimation of Lipids
4. TLC of Lipids
5. Estimation of Total acidity in curd
6. Colorimetric estimation of Starch
7. Determination of Acid Value of fats

PRACTICALS - II

1. Determination of strength of amino acids (Formol - titration)
2. Separation of Amino acids by paper chromatography
3. Separation and Elution of plant pigments by column chromatography
4. Colorimetric estimation of proteins
5. Colorimetric estimation of total free amino acids
6. Determination of V max and Km values for peroxidase
7. Amylase activity

Semester : V
11UCH530208

Hours/week : 5
Credits : 5

ORGANIC CHEMISTRY - I

Objectives:

1. to learn the chemistry of organohalogen compounds
2. to learn the chemistry of carbonyl compounds
3. to study the chemistry of carboxylic acids and their derivatives
4. to study the chemistry and synthetic applications of organometallic compounds.

Unit - I: Alkyl and Aryl Halides (15 hrs)

Nomenclature – General methods of preparation of haloalkanes – Physical properties – Chemical properties – Uses – Nucleophilic substitution mechanisms (S_N^1 , S_N^2 and S_N^i) – Evidences – Stereochemical aspects of Nucleophilic substitution mechanisms – General methods of preparation of halobenzenes - Physical properties – Chemical properties – Uses – Mechanisms of electrophilic and nucleophilic substitution reactions – Theory of orientation and reactivity.

Unit - II: Aldehydes and Ketones (15 hrs)

Nomenclature – Laboratory preparation of aliphatic carbonyl compounds – Physical properties – Chemical properties – Uses – Molecular Orbital picture of Carbonyl group – Nucleophilic addition mechanism at carbonyl group – Condensation reactions – Bechmann rearrangement - Acidity of alpha-hydrogen – General methods of preparation of aromatic carbonyl compounds – Physical and Chemical properties – Uses – Effect of aryl group on the reactivity of carbonyl group- Perkin, Knoevenagel condensations, Cannizzarro reaction.

Unit - III: Active-Methylene Compounds (15 hrs)

Introduction – Preparation of malonic ester – Physical and Chemical properties – Synthetic applications – Preparation of ethyl acetoacetate – Physical and Chemical properties – Synthetic applications – Introduction to

α , β - unsaturated carbonyl compounds – Electrophilic and Nucleophilic addition mechanisms across the $-C=C-$, Nucleophilic addition mechanism across the $-C=O$ – Michael addition- synthetic uses.

Unit - IV: Carboxylic Acids and Their Derivatives (15 hrs)

Nomenclature – General methods of preparation of carboxylic acids (including Arndt-Eistert synthesis) – Physical properties – Structure and acidity – Chemical properties – preparation of dicarboxylic acid – Physical and Chemical properties – Uses – Introduction to Derivatives of Carboxylic acids – nucleophilic substitution mechanism at acyl carbon – Acyl chlorides, Anhydrides, Esters, Amides- Hofmann, Curtius, Lossen and Schmidt rearrangements - Introduction to oils and fats – Fatty acids – soaps and detergents and mechanism of their cleansing action.

Unit - V: Organometallic Compounds (15 hrs)

Introduction to organometallic compounds -Preparation of organometallic compounds with metals like – Mg, Cu, Li, Zn, Se, Si, Pd and Gilman reagent their synthetic applications.

Reference:

1. Finar I. L, Organic Chemistry, Vol 1&2, (6th edition) England, Addison Wesley Longman Ltd. (1996)
2. Morrison R.T, Boyd R.N., Organic Chemistry, (7th edition) New York, Allyn & Bacon Ltd., (2011)
3. Bahl B.S, Arun Bahl, Advanced Organic Chemistry, (12th edition) New Delhi, Sultan Chand and Co., (1997) [Textbook]
4. Pine S. H, Organic Chemistry, (4th edition) New Delhi, McGraw- Hill International Book Company. (1986)

Semester : V

Hours/week : 5

Paper Code: 11UCH 530209

Credits : 5

INORGANIC CHEMISTRY I**Objectives**

1. To learn the general characteristics of d and f block elements and important compounds of them.
2. To understand the basics and theories of coordination compounds
3. To know the properties of metals, alloys and polymers

Unit - I: Transition metals (d – block elements) (15 hrs)

First, second and third transition series - General characteristics – Metallic character, atomic and ionic radii – oxidation states, colour, complex formation, catalytic and magnetic properties-Non-stoichiometric compounds-Important compounds of transition metals: Ziegler – Natta catalyst. Prussian blue, Sodium nitro prusside, Turnbull's blue, Nickel DMG complex, Wilkinson's Catalyst- KMnO_4 and $\text{K}_2\text{Cr}_2\text{O}_7$.

Unit - II: Inner transition metals (f – block elements) (15 hrs)

Lanthanides: Properties of lanthanides. Electronic configuration – oxidation states – ionic radii, lanthanide contraction. Colour and magnetic properties. Extraction of mixture of lanthanides from monazite sand and separation of lanthanides. Uses of lanthanides.

Actinides: Sources of actinides – preparation of transuranic elements - Electronic configuration – oxidation states – ionic radii – Colour of ions – comparison with lanthanides. Extraction of thorium from monazite sand. Production and uses of plutonium.

Unit - III: Coordination compounds I (15 hrs)

Coordination compounds – central metal ion – ligands-types of ligands– coordination number, oxidation numbers, and coordination sphere – Nomenclature isomerism (structural and stereo) - Werner's theory of complexes. EAN rule – Magnetic properties. VB theory- applications and limitations, Factors affecting stability of complexes.

Unit - IV: Coordination compounds II (15 hrs)

Crystal Field theory. Crystal field splitting in octahedral, tetrahedral and square planar fields – factors influencing the magnitude of crystal field splitting – CFSE calculations- magnetic properties and colour.

Labile and inert complexes- stepwise and overall stability constants- Reaction mechanism – substitution reactions in octahedral complexes - Acid hydrolysis: SN_1 and SN_2 mechanisms – mechanism of electron transfer reactions – inner sphere and outer sphere mechanisms – Two electron transfer reactions – Complementary and non- complementary reactions.

Unit - V: Metals, Alloys and Polymers (15 hrs)

Mechanical properties of materials and change with respect to temperature – Materials of constructions used in industry. Important alloys of iron, copper, Aluminium & Nickel. Manufacture; settings of cement. Manufacture & Types of glass. Inorganic Polymers – General properties- Glass transition temperature – Maddrell's salt – Kuroll's salt – polymeric sulphur nitride – silicon rubber – silicon resins.

Reference:

01. Puri B.R., Sharma L.R., Kalia K.K., Principles of Inorganic Chemistry, (23rd edition) New Delhi, Shoban Lal, Nagin Chand & Co., (1993)
[Text Book]
02. Lee J.D., Concise Inorganic Chemistry, UK, Black well science (2006).

Semester : V**Hours/week : 5****Paper Code: 11UCH 530210****Credits : 5****PHYSICAL CHEMISTRY I****Objectives**

1. To learn the properties of solutions and fundamentals of solid state
2. To understand the applications of electrolytic conductance and electromotive force
3. To study the structure of molecules based on physical properties.

Unit - I: Properties of Solutions (15 hrs)

Ideal binary liquid mixtures – liquid –liquid mixture (Benzene and Toluene) – Raoult's law and Henry's law – activity and activity coefficients –Fractional distillation of binary miscible liquid – Non-ideal systems – Azeotropes – HCl and water system – Ethanol and water system.

Partially miscible binary liquid systems: Phenol and water –Triethylamine and water – Nicotine and water – lower and upper CST's – Immiscible liquid – Nernst distribution – Principle and applications of steam distillation.

Dilute solutions and colligative properties: Determination of molecular weight – relative lowering of vapour pressure – Elevation of boiling point – Depression of freezing point – Thermodynamic derivation – Abnormal molecular mass – Van't Hoff factor – Degree of dissociation and degree of association of solutes.

Unit - II: Solid state (15 hrs)

Isotropic and anisotropic solids – Interfacial angle – symmetry elements in crystal systems – Bravais lattices - Unit cell – law of rational indices (Weiss indices), Miller indices – unit cell dimension – density – number of atoms per unit cell – X-ray diffraction by crystals – derivation of Bragg's equation – Experimental methods of X-ray study- rotating crystal method – X-ray pattern by powder method - crystal structure of KCl, NaCl, ZnS, CsCl – Radius ratio and packing in crystal – Determination of Avogadro number – Vitreous state.

Unit - III: Electrical conductance (15 hrs)

Ohm's law – conductance in metals and electrolytic solution – Specific conductance – equivalent conductance - Measurement of equivalent conductance using Kohlrausch law and its applications – Arrhenius theory of electrolytic dissociation and its limitations – Weak and strong electrolytes according to Arrhenius theory - Ostwald's dilution law, its uses and its limitations - the elementary treatment of Debye Huckel theory of strong electrolytes - Transport number – Determination of transport number Hittorf's method and moving boundary method – Applications

of conductance measurements: Determination of degree of dissociation – determination of K_a of acid – Determination of solubility of sparingly soluble salt – common ion effect – conductometric titrations(acid –base and precipitation)

Unit - IV: Electromotive force (15 hrs)

Electro chemical cells – electrolytic cell – Reversible and irreversible cells – Conventional representation of electrochemical cells – EMF and its measurements – Weston- Cd standard cell – computation of cell EMF - Relation between free energy and EMF – Gibbs Hemholtz equation and EMF – Calculations of thermodynamic quantities of cell reaction (ΔG , ΔH , ΔS and K) - Nernst equation – Types of reversible electrodes – Gas/Metal ion – metal /metal ion – metal/insoluble/ anion - redox electrodes – Electrode reaction – Nernst equation of electrode reaction – Derivation of cell EMF – single electrode potential – standard hydrogen electrode – reference electrodes – Standard electrode potential - sign conventions - Electrochemical series and its significance – concentration cell with and without transport number – Liquid Junction Potential – Application of EMF measurements – valency of ions, solubility product, activity coefficient, Potentiometric titration – Determination of pH using hydrogen, Quinhydrone and glass electrodes – Determination of pK_a of acids by potentiometry.

Unit - V: Physical Properties and Chemical Structure (15 hrs)

Polarization of molecules in an electric field – Polarizability and dipole moment – Induced and orientation polarization – Clausius Mosotti equation – measurement of molar polarization – Dipole moment – Measurement of dipole moment in solution (using Debye equation and dilute solution methods) – dipole moment of diatomic and poly atomic molecules – Bond moments – Lorenz-Lorentz equation – Applications of dipole moment measurements – determining the percentage of ionic character of bonds- shapes of simple molecules like BCl_3 , H_2O , CO_2 , NH_3 , CCl_4 – Dipole moments of substituted benzenes – o,m & p-dichlorobenzenes.

Reference:

1. Puri B.R., Sharma L.R., Pathania M.S., Principles of Physical Chemistry, (23rd edition) New Delhi, Shoban Lal, Nagin Chand & Co., (1993) **[Textbook]**
2. Atkins P.W., Physical Chemistry, (5th edition) Oxford University Press. (1994).

Semester : V
11UCH530302A

Hours/week : 5
Credits : 4

Core ELECTIVE II: CHEMISTRY OF BIOMOLECULES

Objectives

- To learn the chemistry of amino acids, proteins, nucleic acids, vitamins and antibiotics
- To understand the chemistry of alkaloids and terpenoids

Unit - I: Sugars (12 hrs)

Introduction – Classification – Nomenclature – Physical properties – Glucose – Cyclic structures – Chemical properties – Mutarotation – Anomerism – Epimerization – Kiliani-Fischer Synthesis – Ruff Degradation – Fructose – cyclic structures – Interconversion of ketose to aldose – Conversion of glucose into ascorbic acid – structures of disaccharides: lactose, maltose, cellobiose, sucrose – Structure – Uses – Cellulose – properties – Structure – synthetic uses.

Unit - II: Amino acids and Proteins (12 hrs)

List of amino acids – Structures – Preparation of amino acids – Reactions of amino acids – synthesis of peptides: Protection, Activation and deprotection of N- and C- terminals – protecting and deprotecting agents – role of DCC – and Merrifield solid phase synthesis – Definition – Classification of proteins – Terminal Residue analysis: N-terminal (Fredrick Sanger and Edman Pehr methods) – C-terminal analysis – Overlap method for protein sequence – Structure of proteins – primary, secondary and tertiary structures of proteins – tests for proteins

Unit - III: Heterocycles (12 hrs)

Introduction – Nomenclature – Synthesis of Pyrrole, Furan and Thiophene – Molecular orbital pictures – Preparation of Pyrrole – Physical and Chemical properties – Uses – Electrophilic substitution mechanism – Preparation of Furan and Thiophene – Physical and Chemical properties – Uses – Laboratory preparation, structure, Physical and Chemical properties

and uses of Indole, Pyridine, Quinoline – Electrophilic and Nucleophilic substitution reactions mechanisms.

Unit - IV: Nucleic acids (12 hrs)

Types of bases – Types of sugars – Nucleosides and Nucleotides – Types of nucleic acids – Structure and functions of DNA and RNA

Vitamins and Antibiotics

Vitamins – Types – Sources and deficiency disorders – Antibiotics – structure and functions of chloramphenicol, penicillins, streptomycin, tetracyclins – Definition of disinfectants, antiseptics, antipyretics, analgesics and antimalarials.

Unit - V: Alkaloids, Steroids and Terpenoids (12 hrs)

Introduction to Alkaloids – Classification – Occurrence and Isolation – Structural elucidation of piperine only – Structures of alkaloids: Quinine, Morphine, Atropine, Nicotine, Coniine, Piperine and Papaverine – Structure and functions of steroids – Androgen, Estrogen and cholesterol – Classification of terpenoids – definition, classification, isoprene rule – Structure and uses of some essential oils – Structural elucidation of geraniol.

Reference:

- Finar I.L., Organic Chemistry Vol 2, (6th edition) England, Addison Wesley Longman Ltd. (1996)
- Morrison R.T., Boyd R.N., Organic Chemistry, (4th edition) New York, Allyn & Bacon Ltd., (1976)
- Bahl B.S., Arun Bahl, Advanced Organic Chemistry, (12th edition) New Delhi, Sultan S Chand and Co., (1997).
- J L Jall, Elements of Biochemistry S Chand Pub.
- Stryer, Fundamentals of Biochemistry
- Jayashree Ghosh, A Text book of Pharmaceutical Chemistry (1999).

Semester V **Hours/week : 5**
11UCH530302B **Credits : 4**

Core Elective II : PHYSICAL CHEMISTRY II

Objectives

1. To learn the concept of liquid state, acids and bases.
2. To understand the thermo chemistry and colloids.

Unit – 1 The Liquid State (12 Hours)

The gaseous, liquid and solid states, vacancy theory liquids, free volume in liquid, physical properties of liquids.

Vapour pressure, surface tension – effect of temperature. Viscosity – effect of temperature.

Refraction, optical activity and structure of liquids.

Unit 2 Acids and Bases – I (12 Hours)

Arrhenius concept, Bronsted – Lowry concept, Conjugate acids – bases pair, influence of solvent on acid strength, dissociation in acetic acid, water, liq. NH₃, HF.

Lewis concept of acids and bases. Relative strength of acids and bases.

Unit 3 Acids and Bases – II (12 Hours)

Dissociation of weak acids and bases, pH scale, common ion effect, buffer solutions.

Hydrolysis of salts, determination, Acid – Base Indicators – theory, solubility product, Applications.

Unit 4 Thermochemistry (12 Hours)

Change of internal energy, change of enthalpy in a chemical reaction, exothermic and endothermic reactions, relation between heats of reaction at constant volume and at constant pressure, standard enthalpy changes of reactions – determination, The Kirchhoff equation, Hess's law – applications, Bond energies – applications.

Unit 5 Colloids (12 Hours)

Colloidal systems, classification, preparation, purification and properties, determination of size of colloidal particles, surfactants – micelle formation, solubilization, micellar catalysis, emulsification, microemulsions, gels and their preparation.

References

1. Puri B.R Sharma L.R ., Kalia K. K., *Principles of Physical Chemistry* (23rd edition) Shoban Lal, Nagin chand & Co .New Delhi, (1993).
2. B.S. Bahl, Arun Bahl, G. D. Tuli., *Essentials of Physical Chemistry*, S. Chand, New Delhi, 2005.

Semester : V
11UCH 540601

Hours/Week : 2
Credits : 2

Skill Based Elective-I: FOOD AND NUTRITION

Objectives:

1. To learn the importance of food and nutrition
2. To know the chemical composition and importance of balanced diet
3. To learn the food adulterants and identification of them

Unit - I: Food, nutrition and health (6 hrs)

The meaning of food, nutrition, nutritional care and health-nutritional problems in India.

Unit - II: Biological importance of food (6 hrs)

Nutritional classification of food-nutrients as body constituents-digestion and absorption of food. Types of food, caloric content and dieting.

Unit - III: Basic chemical constituents of food (6 hrs)

Biological functions of carbohydrates, proteins, fats, vitamins, minerals and water.

Unit - IV: Food adulteration testing (6 hrs)

Common adulterants in food-testing methods of all food adulterants.

Unit - V: Health problems of food adulteration (6 hrs)

Principal adulterants and their health effects.

References

1. Alex Ramani V, Food Chemistry, MJP Publishers, Triplicane, Chennai, 2009.
2. Thangamma Jacob, Food adulteration, Macmillan company of India limited, New Delhi, 1976.
3. Jeyaraman J, Laboratory manual in biochemistry, Wiley Eastern limited, New Delhi, 1981.

Semester : VI

Hours/week : 5

Paper Code: 11UCH 630211

Credits : 5

ORGANIC CHEMISTRY II**Objectives**

- To learn the chemistry of organo nitrogen compounds and polynuclear aromatic compounds.
- To apply spectral data to assign the structure of organic compounds

Unit - I: Nitrogen Compounds (18 hrs)

Nomenclature – Preparation of Nitro compounds – Physical and Chemical Properties – Uses – Preparation of Amino compounds – Physical and Chemical Properties – Uses – Electrophilic substitution mechanism – orientation and reactivity - Preparation of Diazonium salts — Chemistry of Phenyl hydrazine – Uses.

Unit - II: Polynuclear Aromatic Compounds (18 hrs)

Types of Polynuclear Aromatic compounds (condensed and isolated) – Nomenclature – Naphthalene from coal tar and petroleum – Laboratory preparation – Structure elucidation of Naphthalene – Aromatic character – Physical properties – Chemical properties – Uses – Mechanism of Aromatic electrophilic substitution – Theory of orientation and reactivity – Anthracene, Phenanthrene from coal tar and petroleum – Laboratory preparation of anthracene and phenanthrene – Molecular orbital Structures– Aromatic characters – Physical properties – Chemical properties – Uses – Preparation of biphenyls and triphenyl methane – Physical and Chemical properties – Uses.

Unit - III: UV-Visible and IR Spectroscopy (18 hrs)

UV-VISIBLE: Electromagnetic spectrum – Energy-Wavelength relationship – Introduction to UV-VIS spectroscopy – Beer-Lamberts Law – simple instrumentation – Bands in UV-VIS spectrum – Possible electronic transitions – Types of electronic transitions based on selection rules – Characteristic absorption (I_{\max} and e_{\max}) of $>C=O$, $>C=C<$, $>C=C-C=C<$, $>C=C-C=O$, Aryl groups – Factors influencing the absorption – Some terms: Chromophore, Auxochrome, Bathochromic shift, Hypsochromic shift, Hypochromic shift, Hyperchromic shift- Solvent Correction-Woodward-Fisher method to calculate I_{\max} of dienes and $>C=C-C=O$ compounds.

IR: Introduction to IR spectroscopy – Hooke's Law – simple instrumentation – bands in IR spectrum – possible vibrations in organic molecules – Selection rule – Characteristic absorptions (ν_{\max}) of various bond vibrations – Factors influencing the absorption - Interpreting typical UV-VIS and IR spectra of some organic compounds: hydrocarbons (saturated & unsaturated)- Organohalogen- organochalcogens and organonitrogens- differentiating H- bonding in IR spectrum.

Unit - IV: NMR Spectroscopy (18 hrs)

Magnetically active nuclei – simple instrumentation – signals in NMR spectrum – Chemical shift – characteristic chemical shift values of various protons and carbons – number splitting and area of the peaks – coupling constants – interpreting the NMR spectra of some organic molecules – introduction to NMR spectroscopy- types of carbons and their signals and splitting only- ESR spectroscopy: Principle and applications to methyl and naphthyl radicals.

Unit - V: Mass Spectrometry (18 hrs)

Principle of mass spectrometry – simple instrumentation – Fragmentation pattern – m/z values of various fragments – Nitrogen rule – McLafferty rearrangement - Interpreting the mass spectra of some organic molecules Combined approach to identify the structure of organic molecules of simple molecules.

Reference:

- Finar I.L., Organic Chemistry Vol 1&2, (6th edition) England, Addison Wesley Longman Ltd. (1996).
- Morrison R.T., Boyd R.N., Organic Chemistry, (6th edition) New York, Allyn & Bacon Ltd., (1996).
- Bahl B.S, Arun Bahl, Advanced Organic Chemistry, (12th edition) New Delhi, Sultan Chand and Co., (1997) **[Textbook]**
- Pine S. H, Organic Chemistry, (4th edition) New Delhi, McGraw- Hill International Book Company. (1986).
- Kalsi. L., Organic Spectroscopy, New Delhi, New Age International Company. (1998).
- Seyhan N. Ege, Organic Chemistry, New York, Houghton Mifflin Co., (2004).
- YR Sharma, Elements of Organic Spectroscopy, S Chand Pub. (2010).

Semester : VI
11UCH 630212

Hours/Week : 5
Credits : 5

Inorganic chemistry II

Objectives

1. To learn the concepts of metallic, ionic and covalent bonding
2. To understand the significance and role of metal ions in biological systems
3. To understand different analytical techniques
4. To learn the basics of nanotechnology

Unit - I: Covalent Bond (18 hrs)

Lewis theory – octet rule and its exceptions, electron dot structural formula. Sidgwick – Powell theory- prediction of the molecular shapes. Valence Bond theory – Hybridization and geometry of molecules. VSEPR theory and model – Illustration of CH_4 , H_2O , NH_3 , SF_4 , XeF_2 , XeF_6 . MO theory: LCAO method, criteria of orbital overlap, types of molecular orbitals (sigma and pi). Qualitative MO energy level diagram of homo and hetero diatomic molecules H_2 , He_2 , N_2 , O_2 , and CO, bond order and stability of molecules.

Unit - II: Ionic and Metallic Bond (18 hrs)

Properties of ionic compounds – Factors favouring the formation of ionic compounds (Ionization energy, Electron affinity, Electro negativity and Lattice energy) - Lattice energy – definition, Born – Lande equation (Derivation not required), factors affecting lattice energy- Born – Haber cycle – Illustration and calculation only for MX (general and NaCl) and MX_2 . Fajan's rules with illustrations - Properties of metals, electron sea model, band theory explaining the properties of metals, semiconductors and insulators- Stoichiometric and non-stoichiometric defects and their applications. Superconductors – introduction, BCS theory and applications.

Unit - III: Bio-inorganic Chemistry (18 hrs)

Metal ion in biology and their vital role in the active site, Structure and functions of Metallo proteins and enzymes. Ion transport mechanism in

cell membrane – Na and K pumps- Ionophores – Structures and characteristic features of Haemoglobin and myoglobin – Vitamin B_{12}

Unit - IV: Analytical Chemistry (18 hrs)

Gravimetric analysis: mechanism of precipitation – solubility products – common ion effect – Types of precipitation – co-precipitation and post precipitation - Colorimetric analysis: Beer-Lambert law applications and limitations- principles of spectrophotometry - Thermal Analysis: Principle, Instrumentation and applications of TGA - Chromatographic Techniques: Principle, instrumentation, sampling and applications of thin layer and column chromatographic techniques.

Unit - V: Nanotechnology (18 hrs)

Basics of nanoscience and nanotechnology – chemistry of nanoparticles – nanotechnology –Methods of synthesis of nano materials – plasma arching, sol gels –applications of nano chemistry –catenanes –carbon nanotubes –types- synthetic methods-fullerene-its properties.

Reference:

1. Puri B.R., Sharma L.R., Kalia K.K., Principles of Inorganic Chemistry, (23rd edition) New Delhi, Shoban Lal, Nagin Chand & Co., New Delhi (2010) [Text Book]
2. Vogel A.I., A Text book of Quantitative Inorganic Analysis, London, Longman Group Ltd.
3. Lee J.D., Concise Inorganic Chemistry, UK, Black well science (2006)
Pradeep T, Nanomaterials.

Semester : VI
11UCH630303A

Hours/Week : 5
Credits : 4

Core Elective III: Spectroscopy and Chemical Kinetics

Objectives

1. To learn the fundamentals of spectroscopic techniques
2. To study the rate and mechanisms of chemical reactions
3. To understand homogeneous and heterogeneous catalysis

Unit - I: Spectroscopy I (12 hrs)

Electromagnetic radiation, quantisation of energies in molecules (Translational, rotational, vibrational and electronic) – Microwave spectroscopy – condition – molecular rotation – theory of microwave spectroscopy – selection rule – effect of isotopic substitution – Calculation of μ and bond length of diatomic molecules.

Infrared spectroscopy – condition – molecular vibration – modes of vibration of linear and Non-linear molecules – Diatomic CO_2 , H_2O – stretching and bending vibrations – selection rules – calculation of force constant – isotope effect – Applications of IR spectra – (Group frequencies, finger printing and Hydrogen bonding only).

Unit - II: Spectroscopy II (12 hrs)

Raman spectroscopy – condition – Raleigh and Raman scattering – Stokes and Anti-stokes lines – Difference between Raman and IR spectroscopy – Rotational Raman spectra – Application to covalent compounds – Mutual exclusion principle.

UV visible spectroscopy – conditions – theory of electronic spectroscopy- types of electronic transitions – Frank-Condon principle – Predissociation – Dissociation energy – Applications.

Unit - III: Chemical Kinetics I (12 hrs)

Rate of reaction – rate laws – rate constant – order and molecularity of reactions – Factors influencing the rate of a reaction – Derivations of rate constants for Zero, first and second order reaction – Fractional order reactions

– Half-life period – Pseudo first order reactions and examples – Methods of determination of order of reactions (Integration, graphical, half-life, Oswald's dilution method, experimental)

Unit - IV: Chemical Kinetics II (12 hrs)

Steady state approximation - Chain reactions and explosion reaction - Temperature dependence of reaction rates – Arrhenius parameters. Theories of reaction rates – simple collision theory – limitations — Lindmann's hypothesis of unimolecular reactions – Theory of absolute reaction rates – influence of ionic strength on reaction rate.

Unit - V: Chemical Kinetics III (12 hrs)

Homogeneous and Heterogeneous catalysis – Acid-base catalysis, enzyme catalysis – Michaelis Menten equation – Adsorption of Gas by solids – unimolecular surface reaction – Bimolecular surface reaction – Heat of Adsorption – Factors influencing adsorption – Physisorption and chemisorption – Langmuir's theory of adsorption – Freundlich's isotherm , Gibbs adsorption isotherm for adsorption from solutions.

Note: Numerical problems wherever possible.

Reference:

1. Puri B.R., Sharma L.R., Pathania M.S., Principles of Physical Chemistry, (23rd edition) New Delhi, Shoban Lal, Nagin Chand & Co., (1993) [Textbook]
2. Atkins P.W., Physical Chemistry, (7th edition) Oxford University Press. (2009).
3. Castellan G.W., Physical Chemistry, New Delhi, Orient Longmann.

Semester VI Hours / week : 5
 11UCH630303B Credits : 4

CORE ELECTIVE III: ORGANIC REAGENTS AND SYNTHESIS

Objectives:

1. To understand the principles of different methods of synthesis
2. To understand the structure and reactivity of organometallic reagents
3. To study the applications of organometallics in organic synthesis

UNIT I Organic Synthesis by Disconnection Approach(12 Hours)

Introduction – Basic Principles of Synthesis of Aromatic Compounds
 – Disconnection Approach – Functional Group Interconversions – Synthons
 – Aromatic Electrophilic and Nucleophilic Substitutions – Strategy I (The order of Events – Some Guidelines) – One-Group C-X Disconnections – Strategy II (Chemoselectivity, some Guidelines) – Two-Group Disconnections – Strategy III (Polarity Reversal, Cyclization) – Amine Synthesis (Salbutamol, Fenfluramine) – Protecting the Functional Groups – synthesis of a sweetening agent (Asp-Phe-OMe) – General Strategy of Choosing a Disconnection – Stereoselectivity – Regioselectivity – Alkene synthesis – Use of Acetylenes - Group C-C Disconnections (Alcohols, Carboxylic acids, Carbonyl compounds)

UNIT II Common Organic Reagents (12 Hours)

Structure and applications (mechanism not expected) of AIBN, BuLi, B₂H₆, CHCl₃, DCC, Grignard reagent, NBS, Ph₃P, PCl₅, LDA, NaN₃, NaNO₂, SOCl₂, Me₂S and Me₂CuLi

UNIT III Redox Reagents (12 Hours)

Structure and applications (mechanism not expected) of the following oxidants and reductants.

Oxidants: PCC, H₂O₂, mCPBA, MnO₂, OsO₄, KMnO₄, HIO₄, LTA, SeO₂, DDQ.

Reductants: LiAlH₄, NaBH₄, Li/Liq.NH₃, Raney Ni, Wilkinson Catalyst, Lindlar's catalyst, MPV, Clemmenson and Wolf-Kishner reductions, Birch reduction.

UNIT IV Name Reactions (Mechanism expected) (12 Hours)

Aldol, Perkin, Knoevenagel, benzoin, Claisen condensation, Cannizzaro reaction, Reformatsky reaction, HVZ reaction, Hoffmann elimination, Morkovnikov's addition, Michael addition, Diels-Alder reaction, Friedel-Crafts alkylation and acylation

UNIT V Organo metallic compounds – Introduction (12 Hours)

Definition – Synthetic uses of Grignard reagents – Limitations of Grignard synthesis – Organo-lithium compounds – Organometallics in medicine and agriculture

References

1. Stuart Warren, *Organic Synthesis: The Disconnection Approach*, Wiley-India, New Delhi (2007).
2. Sanyal S N, *Reactions, Rearrangements and Reagents*, Bharati Bhawan Publishers and Distributors, Ranchi (2010).
3. Meharotra Anirudh Singh R.C., *Organometallic Chemistry*, Wiley-Eastern Ltd., New Delhi (1991).

Semester : VI

Hours/week : 5

Paper Code: 11UCH630304A

Credits : 4

Core Elective IV: ESSENTIALS OF GENERAL CHEMISTRY**Objectives**

1. To learn the various mechanisms of functional group interconversions in organic chemistry
2. To study organic photochemical reactions
3. To learn the characteristics of composite materials
4. To study the fundamentals of group theory
5. To study the principles of radiation chemistry

Unit - I: Review of general organic reactions and mechanisms(12 hrs)

Electronic movements and their effects. Reaction Intermediates. Types of Organic Reactions General reactions of alkenes, alkynes, alkyl halides, alcohols, phenols, aliphatic and aromatic carbonyl compounds, carboxylic acids and amines. Testing of Functionality using specific reagents. Reagents – reactions – Mechanisms- Synthon- synthetic equivalent and umpolung reaction-definition with example-Oxidants- Reductants- functional interconversions.

Unit - II: Photochemical Reactions**(12 hrs)**

Photochemical versus thermal reactions- Jabalonskii diagram-Types of photochemical reactions - Norrish Type I and II processes-Barton reaction- Paterno-Buchi reaction- dimerization reactions- sigmatropic rearrangements: Claisen rearrangements.

Unit - III: Composite materials**(12 hrs)**

Composite materials-introduction- classification of composite materials- The matrix phase-structural composites and its types. Ceramics-types- raw materials- white wares manufacture- properties and classification- specialized ceramic products.

Unit - IV: Group theory**(12 hrs)**

Symmetry elements and operations-properties of a group-Abelian group-cyclic group- point groups of molecules (C_n , C_{n_v} , C_{n_h} , D_{n_h} , D_{n_d} and linear molecules)- optical activity and dipole moment on the basis of symmetry.

Unit - V: Photochemistry and Radiation Chemistry**(12 hrs)**

Photochemical reaction – Laws of photochemistry – quantum yield – primary and secondary process – HI decomposition – HBr decomposition – kinetics of hydrogen- bromine reaction - kinetics of hydrogen- chlorine reaction – Photochemical equilibrium - photodimerisation of Anthracene – Photosensitisations – Chemiluminescence – Phosphorescence.

Introduction to radiation chemistry – Primary and secondary process – radiolysis of water – hydrated electrons – Radiolysis of Fricke dosimeter solution – radiation dosimetry.

Reference:

1. Finar I.L, Organic Chemistry Vol 1&2, (6th edition) England, Addison Wesley Longman Ltd. (1996)
2. Puri B.R., Sharma L.R., Pathania M.S., Principles of Physical Chemistry, (23rd edition) New Delhi, Shoban Lal, Nagin Chand & Co., (1993)
3. Puri B.R., Sharma L.R., Kalia K.K., Principles of Inorganic Chemistry, (23rd edition) New Delhi, Shoban Lal, Nagin Chand & Co.,(1993)
4. K.V.Raman., Group Theory and its applications to Chemistry, Tata McGraw-Hill Education Private Ltd (1990).

Semester VI
11UCH630303B

Hours/Week : 5
Credit : 4

Core Elective-IV: Advanced Topics in Chemistry

UNIT I (12 Hours)

Fundamental concepts of photochemistry - Jablonski diagram - photosensitization - photochemical reactions - comparative study of Norrish type I and Norrish type II reactions.

UNIT II (12 Hours)

Fundamental concepts of pericyclic reactions – characteristics – types – application of FMO and MO correlation diagram methods to electrocyclic and cycloaddition reactions – Woodward-Hoffmann rules.

UNIT III (12 Hours)

Use of p-orbitals in p bonding - use of d orbitals by non-metals - experimental evidence of $p\pi-p\pi$, $p\pi-d\pi$ bonding - experimental evidence for d-orbital contraction and participation.

UNIT IV (12 Hours)

Acidity of boron trihalides – carbon and silicon tetrahalides.
Concept of 3-centred 2 electron bonds in electron-deficient molecules – complex boron hydrides – Wades rules.
Colour of transition metal compounds and complexes.

UNIT V (12 Hours)

Introduction and basic principles of green chemistry – tools of green chemistry – green solvents – green reactions – microwave induced green synthesis – Nanotechnology – synthesis of carbon nanotubes (CNTs) – types, properties and uses.

Reference

1. Depuy C.H & Chapman, *Molecular reactions and photochemistry*, Prentice Hall of India, New Delhi.
2. James. E. Huheey, *Inorganic Chemistry* (Second Printing) New York, Harper & Row publishers (1972).
3. Lee J D, *Concise Inorganic Chemistry*, 6th edition, ELBS, London, 1998.
4. Anastas P.T, Warner JC, *Green Chemistry, Theory and Practice*, Oxford University Press, New York, 1998.

Semester – VI
 Paper Code: 11UCH640602
 Hours/Week : 2
 Credits : 2

Skill Based Elective – II: EVERYDAY CHEMISTRY

Objectives

1. To know the chemistry of water
2. To study the applications of industrially important compounds
3. To study the different types of fuels
4. To study the importance of drugs
5. To understand the need of biological chemistry

UNIT – I: Chemistry of water (6 hrs)

Impurities in water – Hardness and its disadvantages – Prevention of scale formation (softening of water) – Portable water (water for domestic supply).

UNIT – II: Industrial Chemistry (6 hrs)

Cement – Manufacture of Portland cement – Special cements – Mortars and Concretes. Rubber – Vulcanization – Uses of rubber. Explosives – Classification of Propellants and Rocket fuels – Properties of a good propellant.

UNIT – III: Fuels (6 hrs)

Coal – Classification of coal. Petroleum – Origin – Classification – Refining – Cracking – Knocking – Leaded Petrol. Diesel oil – Non petroleum fuels – Natural gas – Liquid Petroleum Gas (LPG).

UNIT – IV: Pharmaceutical Chemistry (6 hrs)

Drugs – Nature, Source and study of drugs – Classification of drugs. Anesthetics – Antiseptics – Disinfections – Antibiotics – Preservatives – Antioxidants.

UNIT – V: Biological Chemistry (6 hrs)

Vitamins – Fat and Water soluble – Physiological functions. Chemistry of Oils, Soaps and Detergents. Clinical chemistry – presence of glucose in blood and urine – Cholesterol in urine diabetes – anemia – blood pressure.

Reference

1. Krishnamurthy. N., Jayasubramanian. K and Vallinayagam(1990), Applied Chemistry.
2. Jayashree Ghosh (1999), A Text Book of Pharmaceutical Chemistry.

Semester : V & VI
 11UCH630213
 Hours/week : 4
 Credits : 4

CHEMISTRY PRACTICAL IV Gravimetry & Organic Preparation

Objectives

1. To learn the techniques of gravimetric analysis
2. To learn the methods of organic preparations

Unit - I: Theory of Gravimetry

Principles of quantitative precipitation – Conditions for precipitation – Methods of Digestion – Quantitative filtrations – Techniques of drying - Theory of weighing – Handling of chemical balance – Scientific Reporting

Unit - II: Theory of Organic preparations

Principles of chemical conversions – Handling of organic chemicals and glassware – Filtration techniques – Drying techniques –Distillation techniques - Recrystallization techniques – Scientific Reporting

Unit - III: Gravimetric Analysis

1. Estimation of Lead as Lead chromate
2. Estimation of Barium as Barium chromate
3. Estimation of Nickel as Nickel-DMG complex
4. Estimation of Copper as Copper(I) thiocyanate
5. Estimate of Magnesium as Magnesium oxinate
6. Estimation of Calcium as Calcium oxalate
7. Estimation of Barium as Barium sulfate
8. Estimation of Iron as Iron(III) oxide

Unit - IV: Organic Preparation

Preparation of Organic compounds involving the following chemical conversions

- | | | |
|------------------|----------------------|-------------------|
| 1. Oxidation | 2. Reduction | 3. Esterification |
| 4. Hydrolysis | 5. Nitration | 6. Bromination |
| 7. Diazotization | 8. Osazone formation | 9. Sulphonation |

Reference:

1. Venkateswaran V, Veeraswamy R., Kulandaivelu A.R., Basic Principles of Practical Chemistry, (2nd edition), New Delhi, Sultan Chand & sons, (1997).
2. Furniss, B.S., et al., Vogel's Textbook of Practical Organic Chemistry, (7th edition), London, ELBS – Longman, (1984).

Semester : V & VI
11UCH630214

Hours/Week : 4
Credits : 4

CHEMISTRY PRACTICAL V
Physical constants & Organic Analysis

Objectives

- To learn the techniques of organic qualitative analysis
- To learn the determination of physical constants of organic compounds

Unit - I: Theory of Organic Analysis

Principles of qualitative analysis – Handling of apparatus and hazardous chemicals like bromine, sodium, NaNO_2 , concentrated acids and bases, etc. – Theory of the various chemical reactions / tests – Techniques of derivatization – Scientific Reporting.

Unit - II: Theory of measurement of physical parameters

Principles of physical measurements – Handling of chemicals and the apparatus – Scientific Reporting.

Unit - III: Organic Analysis

Analysis of simple organic compounds

- characterization of functional groups
- confirmation by preparation of solid derivatives / characteristic colour reactions

Note:

- Mono - functional compounds are given for analysis. In case of bi-functional compounds, students are required to report any one of the functional groups
- Each student is expected to do the analysis of at least 15 different organic substances

Unit - IV: Determination of Physical constants

Determination of boiling and melting points by semi micro method.

Reference:

- Venkateswaran V, Veeraswamy R., Kulandaivelu A.R., Basic Principles of Practical Chemistry, (2nd edition), New Delhi, Sultan Chand & Sons, (1997).
- Furniss, B.S., et al., Vogel's Textbook of Practical Organic Chemistry, (7th edition), London, ELBS – Longman, (1984).

SKILL BASED ELECTIVES

BOTANY

11UBO540601 Mushroom Culture
11UBO640602 Herbal Technology

BUSINESS ADMINISTRATION

11UBU540601 Personality Development
11UBU640602 Managerial Skills

CHEMISTRY

11UCH540601 Food and Nutrition
11UCH640602 Everyday Chemistry

COMMERCE

11UCO540601A Accounting for Executives
11UCO540601B Soft Skills for Managers
11UCO640602A Total Quality Management
11UCO640602B Fundamentals of Accounting Packages

COMMERCE (CA)

11UCC540601 Soft Skills
11UCC640602 Basics of Accounting

COMPUTER APPLICATIONS (Dept of IT)

11UBC540601A Fundamentals of IT
11UBC540601B Internet Concepts
11UBC640602A Visual Programming
11UBC640602B Flash

COMPUTER SCIENCE

11UCS540601A Office Automation
11UCS540601B Internet Concepts
11UCS640602A Fundamentals of Computer Networks
11UCS640602B E-Commerce

ECONOMICS

11UEC540601	Security Analysis
11UEC640602	Economics of Insurance

ELECTRONICS

11UEL540601	DVD Troubleshooting and Assembling
11UEL640602	PC Assembling

ENGLISH LITERATURE

11UEN540601	Business English Writing
11UEN640602	Media Skills

HISTORY

11UHS540601	Indian History for Competitive Exams
11UHS640602	Tourism and Travel Management

MATHEMATICS

11UMA540601	Mathematics for Competitive Exams
11UMA640602	MATLAB

PHYSICS

11UPH540601	Cell Phone Servicing
11UPH640602A	Electrical Wiring
11UPH640602B	Videography

STATISTICS

11UST540601	Data Analysis for Competitive Exams
11UST640602	Statistics for Management

TAMIL

11UTA540601	தமிழ் இலக்கியத்தில் மனித உரிமைகள்
11UTA640602	மைய அரசுப் பணித் தேர்வுத்தமிழ்