B Sc
CHEMISTRY

SYLLABUS (2007-2010)

under
CHOICE BASED CREDIT SYSTEM
(CBCS)

ST. JOSEPH'S COLLEGE (AUTONOMOUS)

(Nationally Reaccredited with A+ Grade / College with Potential for Excellence)

TIRUCHIRAPPALLI - 620 002

Features of Choice Based Credit System (CBCS)

The Autonomous St. Joseph's College (1978) with A+ Grade from NAAC (2007) has introduced the choice based credit system (CBCS) for UG and PG courses from the academic year 2001-2002.

OBJECTIVES of Credit System:
* To provide mobility and flexibility for students within and outside the parent department
* To provide broad based education
* To help students learn at their own pace
* To provide students scope for acquiring extra credits
* To impart more job oriented skills to students
* To make any course multi-disciplinary in approach

What is a credit system?
Weightage to a course is given in relation to the hours assigned for the course. Generally one hour per week has one credit. However, there could be some flexibility because of practicals, field visits and tutorials. The following Table shows the relation between credits and hours.

Hours in a week	Hours (2-3)	Hours (4)	Hours (5-6)
Theory Credits	1	3	4
Practicals Credits	1	2	3

For UG courses a student must earn a minimum of 140 credits to get a pass. The 140 credits are split as follows:

		BA	BSc	BCom
English	:	16	16	8
Languages	:	12	12	12
Allied: Compulsory - 2 courses	:	10	10	10
Allied: Optional - 2 courses	:	10	8	10
Computer Literacy	:	2	2	2
Foundation Courses	:	3	3	3
Environmental Studies	:	3	3	3
Electives	:	9	9	9
SHEPHERD	:	3	3	3
Core Courses	:	72	74	80
Total	:	140	140	140

A student can acquire credits more than 140 by taking electives offered by departments in the free hours available to him in 5th and 6th semesters.

Allied Courses:
The allied courses are of two categories.
Allied Compulsory and Allied Optional: The student has choice in allied optional as two courses are offered simultaneously. The department must offer two courses. The student has to choose one.

Electives
A student should take at least three electives.
A least one elective should be from Arts Department for a student of Science Department and vice versa for Arts students.
A student cannot take more than one elective from his parent department.

Credit System Codes - Subject Code Fixation

The various papers in the different courses are coded. The following code system is adopted.

- The code number of the subject should be as **07UPH1XX** where
  - a) 07 refers to year of revision
  - b) U refers to Undergraduate
  - c) PH refers to Physics*
  - d) 1 refers to Semester 1
  - e) 0X refers to Languages (Part 1)
  - f) 1X refers to General English (Part 2)
  - g) 2X refers to Core Major (Part 3)
  - h) 5X refers to Core Allied Compulsory (Part 3) ⎫
  - i) 7X refers to Core Allied Optional (Part 3) ⎬ X - Paper number
  - j) 8X refers to Elective (Part 3) ⎪
  - k) 9X refers to Foundation Course (Part 4) ⎭

- The code number of the subject should be as **07PEC1XX** where
  - a) 07 refers to year of revision
  - b) P refers to Postgraduate
  - c) EC refers to Economics*
  - d) 1 refers to Semester 1
  - e) 2X refers to Core ⎫
  - f) 4X refers to Optional ⎬ X-Paper number
  - g) 6X refers to EDC ⎭

Codes for Departments:

Sl. No.	Course	Subject Code
1.	Biochemistry	BI
2.	Biotechnology	BT
3.	Business Administration	BU
4.	Chemistry	CH
5.	Commerce	CO
6.	Computer Applications	CA
7.	Computer Science	CS
8.	Information Technology	IT
9.	Economics	EC
10.	English	EN
11.	English - General	GE
12.	Electronics	EL
13.	Foundation Course	FC
14.	French	FR
15.	Hindi	HI
16.	History	HS
17.	Human Resource Management	HR
18.	Mathematics	MA
19.	Physics	PH
20.	Plant Biology & Plant Biotechnology	PB
21.	Personnel Management & Industrial Relations	PM
22.	Sanskrit	SA
23.	Statistics	ST
24.	Tamil	TA
25.	Tamil - General	GT
26.	Transport Management	TM

Evaluation

For each course there is formative Continuous Internal Assessment (CIA) and Semester Examinations (SE) in the weightage ratio 50:50. The following table illustrates how one evaluates the **Overall Percentage Marks** (OPM) for a student in Part I (English) in the four papers put together.

$$OPM = a_1b_1 + a_2b_2 + a_3b_3 + a_4b_4 / (b_1+b_2+b_3+b_4)$$

Where a_1, a_2, a_3 and a_4 indicate the marks obtained in the 4 semesters for English and b_1, b_2, b_3 and b_4 indicate the corresponding credits for the 4 courses. For example let us consider the following marks scored by a student in the 4 semesters in English.

Part II-General English

S. No.	Sem.	Subject	CIA	SE	Total	Avg	Credit	Cr.pts
1.	I	GE-I	50	48	98	49.0	4	196.0
2.	II	GE-II	50	48	98	49.0	4	196.0
3.	III	GE-III	50	50	100	50.0	4	200.0
4.	IV	GE-IV	50	48	98	49.0	4	196.0
		TOTAL						*788.0*

OPM = 788 / total number of credits = 788.0 / 16 = 49.25

This percentage corresponds to III class.

If OPM is between 50 and 60 the student gets II class. If OPM is 60 and more then the student is placed in I class.

If scores OPM=75 and more he gets first class with distinction.

Similarly we can compute OPM for part II and Part III using the marks in various subjects and the corresponding credits.

Part IV consists of foundation courses, computer literacy, SHEPHERD programme, Service Organisation and only a pass is indicated for these and Part IV is not taken into account for computing OPM.

Declaration of result:

_____ has successfully completed B.Sc. degree course with FIRST CLASS. His overall average percentage of marks in part III is _____. He has acquired 11 more credits in the course by taking Foundation Courses, Environmental Studies, Computer Literacy, and SHEPHERD programme.

B. Sc. CHEMISTRY - COURSE PATTERN

Sem.	Part	Code	Subject Title	Hr	Cr
I	I	*	Tamil – I / Hindi – I / French – I / Sanskrit - I	4	3
	II	07UGE111	General English - I	5	4
	III	07UCH121	General Chemistry -I	6	6
	III	@	Chemistry Practical -I	3	
	III	@	Chemistry Practical -II	3	
	III	07UMA159	Allied : Mathematics for Chemistry -I	6	5
	IV	07UFC191	Foundations of Humanity	2	1
			Library	1	
			Total for semester - I	30	19
II	I	*	Tamil – II / Hindi – II / French –II / Sanskrit - II	4	3
	II	07UGE212	General English - II	5	4
	III	07UCH222	General Chemistry -II	5	5
	III	07UCH223	Chemistry Practical -I	3	4
	III	07UCH224	Chemistry Practical -II	3	4
	III	07UMA260	Allied : Mathematics for Chemistry -II	6	5
	IV	07UFC292	Computer Literacy	2	2
	IV	07UFC293	Social Analysis	2	1
			Total for semester - II	30	28
III	I	*	Tamil – III / Hindi – III / French –III / Sanskrit - III	4	3
	II	07UGE313	General English - III	5	4
	III	07UCH325	General Chemistry -III	6	6
	III	@	Chemistry Practical -III	3	
	III	07UPH371	Allied: Physics -I	(4)	(3)
	III	@	Allied: Physics Practical / or	(2)	
	III	07UPB371	Allied: Biochemistry – I	4	3
	III	@	Allied: Biochemistry Practical	2	
	IV	07UFC394	Social Ethics / or		
	IV	07UFC395	Religious Doctrine-I	2	1
	IV	07UFC396	Environmental Studies	4	2
			Total for semester - III	30	19
IV	I	*	Tamil – IV / Hindi – IV / French –IV / Sanskrit - IV	4	3
	II	07UGE414	General English – IV	5	4
	III	07UCH426	General Chemistry –IV	6	6
	III	07UCH427	Chemistry Practical –III	3	4
	III	07UPH472	Allied: Physics -II	(4)	(3)
	III	07UPH473	Allied: Physics Practical / or	(2)	(2)
	III	07UPB472	Allied: Biochemistry – II	4	3
	III	07UPB473	Allied: Biochemistry Practical	2	2
	IV	*	Elective - I	4	3
	IV	07UFC497	Building Men for Others / or		
	IV	07UFC498	Religious Doctrine-II	2	1
			Total for semester - IV	30	26
V	III	07UCH528	Organic Chemistry-I	5	5
	III	07UCH529	Inorganic Chemistry-I	5	5
	III	07UCH530	Physical Chemistry-I	5	5
	III	*	Elective –II	4	3
	III	@	Chemistry Practical – IV	4	
	III	@	Chemistry Practical - V	4	
			Library	3	
			Total for Semester -V	30	18

	III	07UCH631	Organic Chemistry-II	5	5
	III	07UCH632	Inorganic Chemistry-II	5	5
	III	07UCH633	Physical Chemistry-II	5	5
VI	III	*	Elective –III	4	3
	III	07UCH634	Chemistry Practical – IV	4	5
	III	07UCH635	Chemistry Practical - V	4	4
			Library	3	
			Total for Semester -VI	**30**	**27**
I-V	IV		Extension Service : SHEPHERD		3
			Total Credits for All Semesters		**140**

* Code numbers according to the subjects chosen
@ Practical Examination in the following semester

Sem:I   Hours : 5
07UGT101   Credits: 4

பொதுத்தமிழ் - 1

நோக்கங்கள்:

1. சமூக மாற்ற உணர்வை ஊட்டும் தலைசிறந்த தற்காலக் கவிஞர்கள், உரைநடை ஆசிரியர்களது படைப்புகளின் இலக்கியநயம் பாராட்டல்.

2. சந்திப்பிழையின்றி எழுதப் பயிற்றுவித்தல்

பயன்கள்

1. சமூக உணர்வூட்டும் படைப்புகளை அழகியல் நுகர்ச்சி வாயிலாக மாணாக்கர் கற்றுக்கொள்வர்.

2. சந்திப்பிழை நீக்கி எழுதும் திறன் பெறுவர்.

செய்யுள் திரட்டு

1. மகாகவி பாரதியார் கவிதைகள்

2. பாரதிதாசன் கவிதைகள்

3. சுத்தானந்த பாரதியார், தமிழ்க்கனல் ஷஎன்னருமைத் தமிழர்களே'

4. கவிமணி கவிதைகள்

5. கவிஞர் கண்ணதாசன் - இயேசு காவியம்

6. பெருஞ்சித்திரனார் பாடல்கள்

7. அப்துல் ரகுமான் - ஆலாபனை

8. கவிஞர் அறிவுமதி கவிதைகள்

9. மொழிபெயர்ப்புக் கவிதைகள்

10. இலக்கணம்: வல்லினம் மிகும் - மிகா இடங்கள்

இலக்கிய வரலாறு - மூன்றாம் பாகம்

சிறுகதை

உரைநடை : முதல் ஆறு கட்டுரைகள்

பாடநூல்

1. செய்யுள் திரட்டு - தமிழ்த்துறை வெளியீடு, 2004-2007

2. இலக்கணம் - மேற்குறித்த நூலில் உள்ளது.

3. *சமூகவியல் நோக்கில் தமிழ் இலக்கிய வரலாறு*, தமிழ்த்துறை வெளியீடு

4. உரைநடை நூல் - *திறன் வளர்க்கும் கட்டுரைகள்*, தமிழ்த்துறை வெளியீடு, 2004-05 (அறக்கட்டளைச் சொற்பொழிவு நீங்கலாக 12 கட்டுரைகள்)

5. சிறுகதை: உறவு, நியுசெஞ்சுரி புத்தகநிலையம், சென்னை, 2007 முதற்பதிப்பு

Sem.: I   Hours   : 5
Code: 07UGE111   **GENERAL ENGLISH - I**   Credits : 4

Objectives
1. To enable students develop their communication skills.
2. To inculcate in students the four basic skills: Reading, Writing, Listening and Speaking.

Unit I
1. Prose   : At the College
2. Shakespeare   : The Merchant of Venice
3. Essential English Grammar   : Units 1 to 5
4. Reading Comprehension

Unit II
5. Poetry   : The Passionate Shepherd to his Love
6. Shakespeare   : The Taming of the Shrew
7. Essential English Grammar   : Units 6 to 10
8. Letter Writing   : Informal

Unit III
9. Prose   : Outside the Class
10. Shakespeare   : The Tempest
11. Essential English Grammar   : Units 11 to 15
12. Letter Writing   : Formal

Unit IV
13. Prose   : For Business and Pleasure
14. Poetry   : Daybreak
15. Shakespeare   : Julius Caesar
16. Essential English Grammar   : Units 16 to 22

Unit V
17. Poetry   : I love to see it lap the miles
18. Shakespeare   : King Lear
19. Shakespeare   : Macbeth
20. Essential English Grammar   : Units 23 to 29

Required Reading
1. Krishnaswamy, N. & T. Sriraman: Creative English for Communication (Macmillan)
2. Raju, A.K. (ed.)   : Pegasus (Macmillan)
3. Murphy, R.   : Essential English Grammar (CUP)
4. Dodd, E.F.   : Six Tales from Shakespeare (Macmillan)

Semester I   Hrs/Week: 6
07UCH 121   Credit 6
GENERAL CHEMISTRY I

Unit 1: Electronic structure and periodic properties
Quantum numbers and their significance, Pauli's exclusion principle, Hund's rule, Aufbau principle, Extra stability of half-filled and completely filled orbital, Electronic configuration of atoms. Modern periodic law, Long form of periodic table, cause of periodicity, division of elements into s, p, d, and f blocks. Variation of atomic radius, ionic radius, ionisation energy, electron affinity and electro negativity along the periods and down the groups- Factors determining ionisation energy and electro negativity.

Unit 2: Basic Quantum Chemistry and Gaseous State
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 – Sommerfeld's model – photoelectric effect -Compton effect – de Broglie equation – Danission 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. 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 3: Bonding and Molecular Structure
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 hyperconjugative effects – Naming of organic compounds (up to 10 carbon systems) – Hydrocarbons – mono functional compounds – bi functional compounds – Isomerism – Types of Isomerism (structural and stereoisomerisms) with appropriate examples – Calculation of empirical and molecular formulae

Unit 4: Qualitative Inorganic Analysis
Dry test, flame test, borax bead test, Cobalt nitrate test - Wet confirmatory tests for acid radicals - Interfering acid radicals, Theory of Interference, Elimination of Interfering acid 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 of different groups in qualitative analysis.

Unit 5: Volumetric Analysis
Error analysis: accuracy, precision, error-types of errors – determinate & indeterminate - error propagation - proportional, constant- instrumental, methodical, personal error- relative and absolute error – representation of error: mean, median, deviation, standard deviation, and variance - analysis of error curve.

Standard solution, titration, equivalence point, end point, indicator - primary standards - normality, molarity - Acid base titrations, Redox, complexometric titrations (EDTA titration), precipitation and conductometric titrations- iodometry, iodimetry and permanganometry - selection of suitable indicator for acid-base titrations - theory of acid base indicators and Adsorption indicators. Introduction to sampling methods.

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) [Textbook]

02. Lee J.D.,
Concise Inorganic Chemistry, UK, Black well science (2006)

03. Puri B.R., Sharma L.R., Pathania M.S.,
Principles of Physical Chemistry, (23rd edition)New Delhi, Shoban Lal, Nagin Chand & Co., (1993). [Textbook]

04. Glasstone S., Lewis D.,
Elements of Physical Chemistry, London, Mac Millan & Co. Ltd.

05. Morrison R.T. and Boyd R.N.,
Organic Chemistry (6th edition), New York, Allyn & Bacon Ltd., (1976)

06. Bahl B.S. and Arun Bahl,
Advanced Organic Chemistry, (12th edition), New Delhi, Sultan Chand & Co., (1997). [Textbook]

07. Frank J. Welcher and Richard B. Hahn,
*Semimicro Qualitative Analysis, N*ew Delhi, Affiliated East-west Press pvt. Ltd. (1969).

Sem I   Hours/Week: 6
07UMA159   Credit   : 5

Allied: MATHEMATICS FOR CHEMISTRY - I

Objectives
1. To train the students in master in the techniques of various branches of Mathematics
2. To motivate the students to apply the techniques in their respective major subjects.

Unit   - I
      Binomial theorem for rational index-exponential and logarithmic series - summation and simple approximations related to binomial, exponential and logarithmic series.
(Book1, Chapter 5, 6 and 7 Pages: 87-141)

Unit - II
      Cayley Hamilton theorem - verification - finding inverse of a matrix using cayley Hamilton theorem - eigen values and eigen vectors. (Simple problems only for matrices of order upto 3 X 3).
(Book 2, Chapter 5, Sections 14, 15, 16 Pages: 157-172)

Unit - III
      Successive differentiation - Leibenitz theorem and its applications - radius of curvature - derivative as a rate measure.
(Book 3, Chapter 3&10 Sections 2.1-2.4)

Unit - IV
      Complex Numbers - Applications of De-Movire's theorem - Expansions of $\sin n\theta$, $\cos n\theta$, $\tan n\theta$, - Expansions of $\sin^n\theta$, $\cos n\theta$ - Expansions of $\sin\theta, \cos\theta, \tan\theta$ in powers of θ .
(Book 1, Chapter 9 Sections: 9.0-9.3)

Unit - V
      Hyperbolic Functions - Inverse Hyperbolic Functions - Basic concepts of Graphs - Subgraphs - connected graphs - complete graphs - trees - Spanning Trees.
(Book 1, Chapter 10 Sections 10.1-10.2, Book4, Chapter 1, 2, 3 -relevant definitions and examples only)

BOOKS FOR STUDY
1. Arumugam and Issac, "Ancillary Mathematics", Paper I ,1992
2. Narayanan and manichavaschagam pillay, "Ancillary Mathematics", Book I S. Viswanathan (Publishers & Printers) Pvt. Ltd., 2000.
3. Narayanan and Manichavachagam pillay, "Differential calculus", Volume I S. Viswanathan (Publishers & Printers) Pvt. Ltd., 2003.
4. Narsingh Deo, "Graph Theory with Applications to Engineering and Computer Science" Prentice-Hall of India Pvt. Ltd., 1986.

Sem:II   Hours : 5
07UGT202   Credits: 4

பொதுத்தமிழ்-2

நோக்கங்கள்

1. சமயநல்லிணக்க உணர்வை வளர்த்தல்

2. தமிழ்க்காப்பியங்களில் அழகும் அறிவுணர்வும் ஊட்டும் பகுதிகளைப் படித்துப் புரிந்து கொள்வர். உரைநடைக்கட்டுரை எழுதும் திறன் பெறுவர்.

பயன்கள்

தமிழைத் திருத்தமாகப் படிக்கவும் பேசவும் பிழையின்றி எழுதவும் தேர்ச்சி பெறுதல்.

தம் படைப்புக்களில் படித்தவற்றை முறையாகப் பயன்படுத்தல்

1. செய்யுள் திரட்டு

1. சிலப்பதிகாரம்

2. மணிமேகலை

3. சீவகசிந்தாமணி

4. கம்பராமாயணம்

5. தேம்பாவணி

6. சீறாப்புராணம்

7. இரட்சணிய சரிதம்

8. இலக்கணம்: எழுத்து, சொல்

2. இலக்கணம் - எழுத்து, சொல் (தமிழ்த் துறை வெளியீடு)

இலக்கிய வரலாறு - இரண்டாம் பாகம் (தமிழ்த்துறை வெளியீடு,2001)

உரைநடை நூல்-7 முதல் இறுதிக்கட்டுரைகள் வரை, திறன்வளர்க்கும் கட்டுரைகள் (7-12) (தமிழ் ஆய்வுத்துறை வெளியீடு, 2001)

பாடநூல்:

செய்யுள் திரட்டு - தமிழ்த்துறை வெளியீடு, 2004-07

Sem. : II   Hours : 5
Code : 07UGE212   Credits : 4

GENERAL ENGLISH - II

Objectives
1. To enable students develop their communication skills.
2. To inculcate in students the four basic skills: Reading, Writing, Listening and Speaking.

Unit I
1. Prose   : Are you Smart?
2. Jules Verne   : Around the World in 80 Days (Chap. 1 to 5)
3. Essential English Grammar   : Units 30 to 35
4. Reading Comprehension

Unit II
5. Poetry   : Gitanjali (Song 36)
6. Jules Verne   : Around the World in 80 Days (Chap. 6 to 10)
7. Essential English Grammar   : Units 36 to 40
8. Note-making

Unit III
9. Prose   : Are you Creative?
10. Jules Verne   : Around the World in 80 Days (Chap. 11 to 15)
11. Essential English Grammar : Units 41 to 45
12. Note-taking

Unit IV
13. Prose   : How to Win?
14. Poetry   : The Pond
15. Jules Verne   : Around the World in 80 Days (Chap. 16 to 20)
16. Essential English Grammar : Units 46 to 50

Unit V
17. Poetry   : The Tree
18. Jules Verne   : Around the World in 80 Days (Chap. 21 to 26)
19. Essential English Grammar : Units 51to 57
20. Dialogue Writing

Required Reading
1. Krishnaswamy, N. & T. Sriraman : Creative English for Communication (Macmillan)
2. Raju, A.K. (ed.)   : Pegasus (Macmillan)
3. Murphy, R.   : Essential English Grammar (CUP)
4. Verne, J. (Retold by M. Green) : Around the World in Eighty Days (Macmillan)

Semester II   Hrs/Week: 5
07UCH 222   Credit: 5

GENERAL CHEMISTRY II

Unit 1: Alkanes
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 up to
cyclooctane - cyclohexane and mono-and disubstituted cyclohexanes.

Unit 2: Stereochemistry
Stereoisomerism – Types – Optical Isomerism – Chirality based on Symmetry elements (C_n,
σ, i and S_n) – Idea of asymmetry and dissymmetry – Optical activity – Measurement of
optical activity – Concept of enantiomerism, diasteromerism – Axial chirality in substituted
allenes – Atropisomerism in substituted biphenyls – R, S and D, L 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 3: Metallurgy and s – block elements.
Occurrence of metals, various 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. Extraction of Al, Be and Ni.

Position of Hydrogen in the Periodic Table, atomic hydrogen, nascent hydrogen, occluded
hydrogen, uses of hydrogen.

Compounds of s- block elements: General Characteristics, oxides, hydroxides, halides and
hydrides. Anomalous behaviour of Li and Be.

Unit 4:   Radioactivity and Nuclear chemistry
Radiations emitted by radioactive substances, the half- life period, Radio active equilibrium,
Soddy- Fajan displacement law, Theory of radioactivity, N/P ratio. Isotopes, isobars and
isotones. Applications of radioactivity. Nuclear forces, Packing fraction, mass defect,
Binding energy - Nuclear fission- Utilisation of fission energy, Plutonium and Atom Bomb -
Nuclear fusion, Fusion reaction in the sun, Hydrogen bomb - Artificial radio activity. Q
values of nuclear reactions.

Unit 5: Thermodynamics I
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 – I law
of thermodynamics – statement – definition of internal energy (u), enthalpy (H) and heat
capacity – U and H as thermodynamic properties – relationship between Cp and Cv –
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 – Zeroeth law of thermodynamics – Absolute

scale of temperature – Thermo chemistry - Hess's law – standard enthalpy of formation, combustion, neutralisation – integral and differential heats of solution – Kirchoff's equation.

Reference:
1. Morrison R.T. and Boyd R.N.,
   Organic Chemistry (6th edition), New York, Allyn & Bacon Ltd., (1976)
2. Bahi 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. Glasstone S., Lewis D., Elements of Physical Chemistry, London, Mac Millan &
   Co. Ltd.

Semester I & II   Hrs/Week: 3
07UCH 223   Credit: 4

CHEMISTRY PRACTICAL I
Qualitative Analysis

Unit 1: 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, Certifuger, 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.

Unit 2: 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 3 : Semi-micro Qualitative Analysis
01. Analysis of simple acid radicals:
     carbonate, sulphide, sulphate, chloride, bromide, iodide, nitrate

02. Analysis of interfering acid radicals:
     Fluoride, oxalate, borate, phosphate, chromate, arsenite

03. Elimination of interfering acid radicals and Identifying the groups of basic radicals
04. Analysis of basic radicals (group-wise):
     Lead, copper, bismuth, cadmium, antimony, iron, aluminium, chromium, zinc, manganese, nickel, calcium, strontium, barium, magnesium, ammonium

05. Repeating the tests in no. 04.
06. Repeating the tests in no. 04.
07. Analysis of a mixture-I containing two cations and two anions (of which one is interfering type)
08. Analysis of a mixture-II containing two cations and two anions (of which one is interfering type)
09. Analysis of a mixture-III containing two cations and two anions (of which one is interfering type)
10. Analysis of a mixture-IV containing two cations and two anions (of which one is interfering type)
11. Analysis of a mixture-V containing two cations and two anions (of which one is interfering type)
12. Analysis of a mixture-VI containing two cations and two anions (of which one is interfering type)
13. Analysis of a mixture-VII containing two cations and two anions (of which one is interfering type)
14. Analysis of a mixture-VIII containing two cations and two anions (of which one is interfering type)
15. Analysis of a mixture-IX containing two cations and two anions (of which one is interfering type)
16. Analysis of a mixture-X containing two cations and two anions (of which one is interfering type)

Unit 4 Some Applied Experiments (Demonstration only)

17. Analysis of water for the presence of ions like calcium, magnesium, iron, sulphate, chloride, fluoride, carbonates.
18. Analysis of Cement for the presence of ions like calcium, aluminium, iron, sulphate, chloride & SiO_2.
19. Analysis of soil for the presence of minerals like potassium, sodium, nitrate, chloride, phosphate.
20. Analysis of a binary alloy.

Reference:

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

Semester I & II   Hrs/Week : 3
07UCH 224   Credit : 4

CHEMISTRY PRACTICAL II
Volumetric Analysis

Unit 1 Introduction to Quantitative Analysis
Introduction – Types of Quantitative analyses – 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, Formality, Normality, Weight percentage.

Unit 2 General Principles of Titrimetry (Volumetric analysis)
Principle of titrimetry – Primary and secondary standards – Preparing standard solutions – Standardizing the secondary standard solutions – Types of titrimetric analyses – Principal reactions – Concepts of acids, bases, oxidants, reductants – Theory of Indicators – Calculations for strengths of solutions and the amounts of substances in solutions.

Unit 3 Titrimetric Quantitative Analysis
1. Preparation of a standard solution (Weighing in Chemical balance)
2. Making up a given solution and doing a titration
3. Preparing a standard solution and doing a 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 Iron (II) sulphate by $KMnO_4$ using a standard Mohr's salt.
10. Estimation of Iron (II) by $KMnO_4$ using a standard Mohr's salt solution
11. Estimation of $KMnO_4$ by thio using a standard potassium dichromate solution
12. Estimation of Iron (II) by $K_2Cr_2O_7$ using a standard Mohr's salt solution
13. Estimation of Copper (II) sulphate by $K_2Cr_2O_7$ solution
14. Estimation of Magnesium (II) by EDTA solution

Unit 4 Some Applied Experiments
15. Estimation of Total Hardness of water
16. Estimation of Antacid
17. 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).

Sem II   Hours/Week: 6
07UMA260   Credit   : 5

Allied: MATHEMATICS FOR CHEMISTRY - II

Objectives
1. To train the students in master in the techniques of various branches of Mathematics
2. To motivate the students to apply the techniques in their respective major subjects.

Unit - I
Standard Integrals - Properties of definite integrals.
(Book 1: Chapter 1)

Unit - II
Integration by parts - Double integrals - Applications of double integrals to find areas.
(Book 1: Chapter 1, 5)

Unit - III
Fourier series: Full - range and Half - range series - Sine series and Cosine series.
(Book 1: Chapter 4)

Unit - IV
Laplace transform of function - Inverse Laplace transforms - Application of Laplace transforms in solving differential equations.
(Book 2: Chapter 4)

Unit - V
Non Homogeneous differential equations of first order-Linear Equation - Bernoulli's Equations - Second order differential equations with constant co-efficients-Homogeneous linear differential equations of the second order with variable co-efficients.
(Book 2: Chapter 1 and 3)

Books for Study

1. Manickavachagam Pillai, T.K: Ancillary Mathematics, Integral calculus, S. Viswanathan Publishers & Printers.
2. Manickavachagam Pillai, T.K: Ancillary Mathematics, Differential Equations, S. Viswanathan Publishers & Printers.

Sem:III   Hours : 5
07UGT303   Credits: 4

பொதுத்தமிழ்-3

நோக்கங்கள்

1. தமிழ்ச்செய்யுள்களைப் படித்துப் பொருள் புரிந்து கொள்ளுதல்

2. செய்யுள்களில் அமைந்துள்ள சமூகக்கருத்துக்களை உணர்தல்

3. படைப்புத்திறனை வளர்த்தெடுத்தல்

பயன்கள்

1. புரிந்து கொண்ட கருத்துக்களில் பயனுள்ளவற்றைத் தெளிவாக, இனிமையாக எடுத்துச்சொல்லும் திறனைப் பெறுதல்.

2. தமிழ் மொழியின் சிறப்பை அறிதல்.

செய்யுள் திரட்டு

1. குறுந்தொகை

2. பதிற்றுப்பத்து

3. கலித்தொகை

4. புறநானூறு

5. சிறுபாணாற்றப்படை

6. பதினெண் கீழ்க்கணக்கு - திருக்குறள்

7. இலக்கணப் பகுதி: யாப்பு, அணி

இலக்கணம் : யாப்பு, அணி

புதினம் - சூரியகாந்தன், *அம்மன் பூவோடு*, பாவைபதிப்பகம், சென்னை, 2003

இலக்கிய வரலாறு - முதல் பாகம்.

பாடநூல்

செய்யுள் திரட்டு - தமிழ்த்துறை வெளியீடு 2004-07

சமூகவியல் நோக்கில் இலக்கிய வரலாறு - தமிழ்த்துறை வெளியீடு

Sem. : III   Hours : 5
Code : 07UGE 313   Credits : 4

GENERAL ENGLISH - III

Objectives
1. To enable students to acquire reading habit and thus develop their reading skills.
2. To make them activate their passive vocabulary and sentence structures through prescribed texts.
3. To enhance their taste for reading that will naturally develop their vocabulary power and sentence structures.
4. To develop the listening, speaking and writing skills of students through the prescribed texts.

Unit – I
1. Guy de Maupassant   : The Diamond Necklace
2. Emile Gaboriou   : The Accursed House
3. Sheila Kaye-Smith   : Mrs. Adis
4. Anton Tchekov   : The Bet
5. Reading Comprehension

Unit – II
6. O. Henry   : After Twenty years
7. Leonard Merrick   : The Judgement of Paris
8. Stephen Leacock   : The Conjuror's Revenge
9. A.E. Coppard   : The Halfyard Ham
10. Expansion of a Maxim

Unit – III
11. Far From the Madding Crowd : Chapters 1 to 4
12. Far From the Madding Crowd : Chapters 5 to 8
13. Far From the Madding Crowd : Chapters 9 to 11
14. Far From the Madding Crowd : Chapters 12 and 13
15. Essential English Grammar   : Units 58 to 72

Unit – IV
16. P.G. Wodehouse   : The Prize Poem
17. Mulk Raj Anand   : The Barber's Trade Union
18. R.K. Narayan   : Wife's Holiday
19. Kushwant Singh   : The Mark of Vishnu
20. Essential English Grammar   : Units 73 to 91

Unit - V
21. Far From the Madding Crowd : Chapters 14 to 15
22. Far From the Madding Crowd : Chapters 16 to 18
23. Far From the Madding Crowd : Chapters 19 to 21
24. Far From the Madding Crowd : Chapters 22 to 24
25. Précis Writing

Required Reading
1. Ramesh, K.P. (Ed.)   : The Diamond Necklace and Other Stories (Macmillan)
2. Hardy,T. (Retold by EF Dodd) : Far From the Madding Crowd (Macmillan)
3. Murphy, Raymond   : Essential English Grammar (CUP)

Semester III   Hrs/Week : 6
07UCH 325   Credit : 6
GENERAL CHEMISTRY III

Unit 1: Alkenes and Benzene
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}) – Competition between Elimination and Substitution reactions – Addition mechanism – Electrophilic, Free radical and Ziegler-Natta Catalytic polymerization of ethylene – Polymers of alkene derivatives – General methods of preparation of benzene – molecular orbital picture – aromatic character – Huckel's rule of aromaticity – Chemical properties – Uses – Electrophilic substitution mechanism – Orientation and reactivity in substituted benzenes.

Unit 2: *p*- Block elements. Boron and Carbon group elements
General Characteristics of Boron group elements: Diagonal relationship between B and Si. Extraction of Al – Structure of diborane, Structure of borazole, preparation, properties and structures of ortho-boric acid and borax. Preparation and properties of $LiAlH_4$ and $AlCl_3$.

General Characteristics of carbon group elements: General characteristics of carbon group elements with reference to ionisation energy, catenation, inert pair effect and allotropy. Structure of graphite and diamond. A comparative study on hydrides, halides and oxides of carbon group elements. Structure of different types of silicates, silicones, carborundum and lead pigments.

Unit 3: Nitrogen and Oxygen group elements
Differences between nitrogen and rest of the family members. A comparative study on hydrides, halides and oxides of nitrogen group elements. Oxy acids of nitrogen and phosphorous. Preparation properties and structure of hydrazine and hexachlorocyclo triphosphazene.

Anomalous behaviour of oxygen- Paramagnetic nature of oxygen. Preparation, properties, structure and uses of sulphuric acid, oleum and persulphuric acid.

Oxides: classification of oxides based on their chemical behaviour - Acidic oxide, Basic oxide, Amphoteric oxide and neutral oxides. Classification of oxides based on oxygen content - Normal oxides, peroxides, super oxides, dioxides, sub oxides and mixed oxides.

Unit 4: Thermodynamics II
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) – Helmholtz 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 Helmholtz equations and their applications – Thermodynamic equation of state – Maxwell's relations

Unit 5: Applications of II law and III law
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 of inert gases – Reaction

isotherm –van't Hoff equation – van't Hoff isochore – Clapeyron equation – Clausius Clapeyron equation and applications.

Need of III law – Nernst heat theorem – Statement of III law – Concept of residual entropy – Evaluation of absolute entropy from heat capacity data – Exception to III law (O & P – hydrogen, CO, N_2O and ice)

Reference:
1. Morrison R.T. and Boyd R.N.,
   Organic Chemistry (6th edition), New York, Allyn & Bacon Ltd., (1976)
2. Bahi 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. Glasstone S., Lewis D.,
   Elements of Physical Chemistry, London, Mac Millan & Co. Ltd.

Sem III   Hours / Week : 4
07UPH371   Credits : 3

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

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 – Acceleration of a body rolling down an inclined plane-SHM-velocity, time, period, frequency, phase-equations of wave motion-compound pendulum- center of suspension-interchangeability center of oscillation and suspension

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 g - orbital velocity-escape velocity-types of modulii-relation between y,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-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 abberation-spherical abberation-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

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, LCD-transistor-CE and CB characteristics-transistor amplifier-FET-characteristics and amplifier

Book For Study:

1. A.S.Vasudeva, Modern Engineering Physics, S.Chand and CompanyLtd., 1988.
2. Cyclostyled text

Unit	Book		Sections
I	1	Part –I	4.2,4.3,4.6,4.7,4.9-4.11,4.13-4.16,4.20
		Part – IV	1.1-1.6,2.3,1.8-1.10.
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	Cyclostyled text.	

Sem-III   Hours/week: 4
07UPB371   Credits: 3

Allied: BIOCHEMISTRY - I

Unit-I

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

Unit-II

Polysaccharides- Classification, Chemical structure and properties of Starch, Glycogen, (Clinical significance) Cellulose, Hemicellulose and Inulin. 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, Cyanocobalamine, 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
2. Conn, E. & Stumpf, PK. 1979. Outline of Biochemistry, Niley Easdtern Ltd., New Delhi.
3. Das Gupta, SK. 1977. Biochemistry (Vol. II), Macmillan & Co., New Delhi.
4. Renganatha Rao, K. 1986. Text Book of Biochemistry, Prentice-Hall of India (P) Ltd., New Delhi.
5. Saim, AS. 1994. Text Book of Biochemistry, CBS Publishers, Delhi.

Sem: IV   Hours : 5
07UGT404   Credits: 4

<div align="center">பொதுத்தமிழ்-4</div>

நோக்கம்

1. நாடகத்தின் நோக்கம், அதன் போக்கு, உத்திகள், பாத்திரப்பாங்கு, உரையாடல் முறை, கற்பனைத்திறம் போன்றவற்றை வெளிப்படுத்தல்

2. புதிய நாடகங்களைப் படைக்கும் திறனை மாணவர்களிடையே உருவாக்குதல்.

பயன்கள்

1. நாடகவழி அழகியல் உணர்வுகளை வளர்த்தல்.

2. நாடகங்களைச் சமூகப் பயன்பாட்டிற்கு ஏற்ப உருவாக்குதல்

செய்யுள் நாடகம் :

மனோன்மணீயம், பேராசிரியர் சுந்தரனார்

        அலகு 1: மனோன்மணீயம், பாயிரம், அங்கம் 1, களம் 1-5 வரை

        அலகு 2: மனோன்மணீயம், பாயிரம், அங்கம் 2, களம் 1-3 வரை

        அலகு 3: மனோன்மணீயம், பாயிரம், அங்கம் 3, களம் 1-4 வரை

        அலகு 4: மனோன்மணீயம், பாயிரம், அங்கம் 4, களம் 1-5 வரை

        அலகு 5: மனோன்மணீயம், பாயிரம், அங்கம் 5, களம் 1-3 வரை

உரைநடை நாடகம் :

முனைவர் ஆ. சிவக்கண்ணன், *பேராசிரியர் பிரம்மச்சாரி*, நியூசெஞ்சுரி புத்தகநிலையம், 2005. (உரைநடை நாடகம் முழுமையும்)

பாடநூல்

1. பேராசிரியர் சுந்தரனார் , மனோன்மணீயம் - (பதி) தமிழ்த்துறை,

    தூய வளனார் கல்லூரி, திருச்சிராப்பள்ளி

2. முனைவர் சிவக்கண்ணன், *பேராசிரியர் பிரம்மச்சாரி,* பாவைப்பதிப்பகம்.

மதிப்பெண் பகிர்வு

        மனோன்மணீயம்   - 80

        உரைநடை நாடகம்   - 20

உரைநடை பாகம் 3-இல் நாடகம் கட்டுரை வினாவில் மட்டும் இடம் பெற வேண்டும்.

Sem. : IV   Hours : 5
Code : 07UGE414   Credits : 4

GENERAL ENGLISH - IV

Objectives
1. To enhance reading skills towards developing vocabulary power and composition skills.
2. To create in students a taste for enjoying English One-Act Plays thus making them imbibe dramatic skills.
3. To develop the listening, speaking and writing skills of students through the prescribed texts.

Unit – I
1. A. Ball   : The Seven Slaves
2. R.H. Wood   : Post Early for Christmas
3. Reading Comprehension
4. Essential English Grammar   : Units 92 to 98

Unit – II
5. Monica Thorne   : The King Who Limped
6. A.E.M. Bayliss   : One Good Turn
7. A Tale of Two Cities   : Part I
8. Essential English Grammar   : Units 99 to 106

Unit – III
9. A Tale of Two Cities   : PART II: Chapters 1 to 3
10. A Tale of Two Cities   : PART II: Chapters 4 to 7
11. A Tale of Two Cities   : PART II: Chapters 8 to 10
12. General Essay

Unit – IV
13. Allan Monkhouse   : Night Watches
14. Ella Adkins   : The Unexpected
15. A Tale of Two Cities   : PART II: Chapters 11 to 13
16. Essential English Grammar   : Units 107 to 114

Unit – V
17. Josephina Niggli   : Sunday Costs Five Pesos
18. A Tale of Two Cities   : PART III: Chapters 1 to 5
19. A Tale of Two Cities   : PART III: Chapters 6 to 9
20. Report Writing

Required Reading
1. K.S. Ramamurthy (Ed.)   : Seven One-Act Plays (OUP)
2. Dickens, C. (Retold by P. Atkinson): A Tale of Two Cities (Macmillam)
3. Murphy, Raymond   : Essential English Grammar (CUP)

Semester IV   Hrs/Week : 6
07UCH 426   Credit : 6

GENERAL CHEMISTRY IV

Unit 1: Alkynes and Dienes
Nomenclature – General methods of preparation of alkynes – Physical properties – Chemical properties – Uses – Types of alkadienes – General methods of preparation of Dienes - Physical properties – Chemical properties – Uses – Mechanisms of electrophilic and Free radical addition reactions – Polymers – Rubber as a natural polymer – Types of polymerization reactions – Mechanisms of Ionic and Free radical polymerization reactions – Condensation polymerization – Chemistry of Vulcanization of rubber – Chemistry of manufacture of Film sheets, Rayon and Polyacrylic fibres -Uses of Polymers – Classification of terpenoids – Structure and uses of some essential oils.

Unit 2: Polynuclear Aromatic Compounds
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 substituion – Theory of orientation and reactivity – Anthracene, Phenanthrene from coal tar and petroleum – Laboratory preparation of anthracene and phenanthrene – Aromatic characters – Physical properties – Chemical properties – Uses – Preparation of biphenyls and triphenyl methane – Physical and Chemical properties – Uses.

Unit 3: Chemistry of Alcohols and Ethers
Nomenclature – Laboratory preparation of alcohols – Industrial source of alcohols – Physical properties – Chemical properties – Uses – Chemistry of glycols and glycerols – Uses – Preparation of phenols including dihydric phenols – Acidity of phenols - Physical and Chemical properties – Uses – Aromatic electrophilic substituion mechanism – Theory of orientation and reactivity – Laboratory preparation of ethers – Physical properties – Chemical properties – Uses – Introduction to Crown ethers – Structure – Applications.

Unit 4: Halogens and Noble gases
General characteristics of halogen with reference to electronegativity, electron affinity, oxidation states and oxidising power. Peculiarities of fluorine. Hydrides, oxides and oxo acids of halogens. Inter halogen compounds and pseudo halogens.

Noble gases : 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 5: Phase Rule
Phase rule – Meaning of the terms phase, component, degrees of freedom – Derivation of Gibbs phase rule – Phase diagrams of one component systems (Water, CO_2, and sulphur systems) – 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 – $FeCl_3$-Water system – Freezing mixture – gas-solid equilibrium – $CuSO_4$ –water system – Efflorescence - Deliquescence

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]
7. Glasstone S., Lewis D.,
   Elements of Physical Chemistry, London, Mac Millan & Co. Ltd.

Semester III & IV   Hrs/Week : 36
07UCH 427   Credit : 6

CHEMISTRY PRACTICAL III
(Physical Chemistry Practical)

Unit 1: Introduction to Physical Chemistry Practicals
Introduction – Theory of the practicals – Critical solution temperature – Transition temperature – Heat of neutralization – Kinetics of ester hydrolysis and persulphate oxidation – Viscosity – Phase Diagram (simple eutectic) – Polarimetry of inversion of cane sugar – Potentiometry – Conductometry – Partition coefficient and Equilibrium constant – Calculation of parameters with units – Drawing Graphs – Handling of various equipments used in physical chemistry practicals

Unit 2: Two Cycles of Experiments
Cycle 1:
01. Critical Solution Temperature
02. Heat of Neutralization
03. Transition Temperature
04. Kinetics of Ester Hydrolysis
05. Conductometric Acid-Base Titration
06. Potentiometric Acid-Base Titration
07. Viscosity

Cycle 2:
08. Rast Method
09. Effect of impurity on Critical solution Temperature
10. Partition Coefficient, Equilibrium constant of $KI + I_2 \leftrightarrow [KI_3]$
11. Kinetics of Persulphate-Iodide Reaction
12. Conductometric Precipitation Titration
13. Potentiometic Redox Titration
14. Phase Diagram (Simple eutectic system)

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).

07 UPH 472   Hours / Week : 4
                                                             Credits : 3

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 II : 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 fiber .

Unit V : DIGITAL ELECTRONICS

Binary number system – conversion of binary in to decimal, decimal in to 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, and T-type – applications – introduction to digital computer.

Books For Study:

(1) A. S. Vasudeva - Modern Engineering Physics,S. Chand and Company   Ltd,.1988.
(2) Cyclostyled text

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	Cyclostyled Text

07 UPH 473

Hours / Week : 2
Credits : 4

Allied: PHYSICS PRACTICALS
(any 16 Experiments)

1. Young's modulus – Non uniform bending – cantilever

2. Young's modulus – Cantilever

3. S .T. – Method of drops

4. Viscosity – variable pressure hand

5. Concave lens – f, R, μ.

6. Air wedge – Thickness of wire.

7. Newton' Rings R

8. Spectrometer – Solid prism

9. Spectrometer – Grating (Normal Incidence)

10. M_1/M_2 – Tan A and Tan B simultaneous method

11. Absolute determination of M and H.

12. P.O. Box – Temp. Coeffet

13. Potentiometer – Ammeter calibration

14. Potentiometer – R and ρ.

15. Field along the axis of the coil

16. Vibration of strings – Melde's

17. Sonometer – Frequency.

18. Junction diode and zener diode characteristics.

19. Logic gates – IC's

20. DeMorgans Theorems – Verification.

21. S.T. – Capillary rise.

22. Jolly's bulb

Sem-IV   Hours/week: 4
07UPB472   Credits: 3

Allied: BIOCHEMISTRY   II

Unit-I
Amino 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 quarternary (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 Km; 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 J.L. Fundamentals of Biochemistry, S. Chand & Co. 5th Edition, New Delhi.

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

Sem-III   Hours/week: 2
                                                                         Credits: 1

Allied: BIOCHEMISTRY

PRACTICALS - I

1. Qualitative tests 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

Sem-IV   Hours/week: 2
                                                                         Credits: 1

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   Hrs/Week : 5
07UCH 528   Credit : 5

ORGANIC CHEMISTRY I

Unit 1: Organohalogen Compounds

Nomenclature – General methods of preparation of haloalkanes – Physical properties – Chemical properties – Uses – Nucleophilic substitution mechanisms (S_N1, S_N2 and S_Ni) – 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 2: Carbonyl Compounds

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 - 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

Unit 3: Sugars

Introduction – Classification – Nomenclature – Principle of Manufacture of Glucose – Physical properties – Cyclic structure – Chemical properties – Mutarotation – Anomerism – Epimerization – structural elucidation of glucose - Uses – Manufacture of fructose - Physical properties – Cyclic structure – Chemical properties – Uses – Kiliani-Fischer Synthesis – Ruff Degradation – Inter conversion of ketose to aldose – Conversion of glucose into ascorbic acid – Manufacture of sucrose – Physical and chemical properties – Uses – Cyclic structures of disaccharides: lactose, maltose, cellobiose, sucrose – Manufacture of Starch – Physical and Chemical properties –Structure - Uses – Manufacture of Cellulose – properties – Structure – Uses

Unit 4: Carboxylic acids

Nomenclature – General methods of preparation of carboxylic acids – Physical properties – Structure and acidity – Chemical properties – Uses – preparation of Dicarboxylic acid – Physical and Chemical properties – Uses – Introduction to derivatives of Carboxylic acids – Nucleophilic substitution mechanism at acyl carbon – Preparation, physical and chemical properties of the compounds: Acyl chlorides, Anhydrides, Esters, Amides – Introduction to oils and fats – Fatty acids – Manufacture of soap – Mechanism of cleansing action of soap – Preparation of detergents – Cleansing action of detergents

Unit 5: Organo-Sulfur Compounds

Introduction – Nomenclature of thiols, thioethers, sulfonic acids – General methods of preparation of thiols, thioethers – physical and chemical properties – Uses –Introduction to aromatic sulfonic acids – preparation – physical and chemical properties – Uses – preparation and uses of sulphonyl chlorides, sulphonamides, saccharin, detergents. Introduction – preparation of OrganoMagnesium compounds – physical and chemical properties – Uses – preparation of OrganoZinc compounds – physical and chemical properties – Uses – reparation of OrganoLithium compounds – physical and phemical properties – Uses – chemistry of OgranoCopper, OrganoLead, OrganoPhosphorus and OrganoBorane compounds

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, (6th edition) Printicw Hall of India , New Delhi (2000)
3. Bahl B.S, Arun Bahl,   [Textbook]
   Advanced Organic Chemistry, (12th edition) New Delhi, Sultan Chand and Co., (1997)
4. Pine S. H,
   Organic Chemistry, (4th edition) New Delhi, McGraw- Hill International
   Book Company. (1986)
5. Seyhan N. Ege,
   Organic Chemistry, New York, Houghton Mifflin Co., (2004)

Semester V   Hrs/week : 5
07UCH 529   Credit : 5

INORGANIC CHEMISTRY I

Unit1: Transition metals (*d* – block elements)
First, second and third transition series   - General characteristics – Metallic character, atomic and ionic radii – oxidation states, colour, complex formation, catalytic and magnetic properties. Important compounds of transition metals: Ziegler – Natta catalyst, Prussian blue, Sodium nitro prusside, Turnbull's   blue, Nickel DMG complex.

Unit 2: Coordination compounds I
Coordination compounds – central metal ion – ligands – coordination number, oxidation numbers, and coordination sphere – Types of ligands. Werner's theory of complexes. EAN rule – Nomenclature, isomerism – Factors affecting stability of complexes – stereo chemistry – Magnetic properties.

Unit 3: Coordination compounds II
Modern theories of metal – ligand bond. VB theory, CF theory. Crystal field splitting in octahedral and tetrahedral fields – factors influencing the magnitude of crystal field splitting – magnetic properties and colour. 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 4: Inner transition metals (*f* – block elements)
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 5: Metals Alloys and Polymers
Mechanical properties of materials and change with respect to temperature –. Important alloys of iron, copper, aluminium and nickel. Manufacture of cement – the chemistry of setting of cement - Manufacture and Types of glass. Industrial polymers – Introduction to Nano technology.

Reference:
1. Puri B.R., Sharma L.R., Kalia K.K., *Principles of Inorganic Chemistry*, (23rd edition)New Delhi, Shoban Lal, Nagin Chand & Co.,(1993).   [Textbook]
2. Lee J.D., *Concise Inorganic Chemistry*, UK, Black well science (2006).

Semester V   Hrs/Week: 5
07UCH 530   Credit: 5

PHYSICAL CHEMISTRY I

Unit 1: Properties of Solutions
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 –triehtylamine 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 2: Solid state
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 3: Electrical conductance
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 diluton law, its uses and its limitations - the elementary treatment of Debye Huckel theory of strong electrolytes – evidence for the existence of ionic atmosphere – the conductance at high field (Wien effect) – Conductance at high frequency (Debye – Falkenhagen effect) – 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) – activity coefficient of electrolytes - calculation of ionic strength– Debye Huckel limiting law

Unit 4: Electromotive force
Electro chemical cells – electrolytic cell – reversible and irreversible cells – conventional representation of electrochemical cells – EMF and its measurements – Weston - Cadmium 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 - red ox 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 - Corrosion – general theory – electrochemical theory – passivity – prevention of corrosion

Unit 5: Physical Properties and Chemical Structure

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* dichlorobenzene – magnetic properties of matter – magnetic flux – magnetic permeability – *ferro-* and *antiferro-magnetism* – curve constant – Determination of magnetic susceptibility – Guoy's method – number of unpaired electrons – spin only magnetic moment value – application to structural problems of $K_3[Fe(CN)_6]$, $K_4[Fe(CN)_6]$, $Ni(CO)_4$.

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. Maron and Prutton,
    Physical Chemistry, London, Mac Millan.
3. Atkins P.W.,
    Physical Chemistry, (5th edition) Oxford University Press, (1994).
4. Castellan G.V.,
    Physical Chemistry, New Delhi, Orient Longmans.

Semester VI   Hrs/week:5
07UCH 631   Credit : 5

ORGANIC CHEMISTRY II

Unit 1: Organo-Nitrogen Compounds

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 – List of amino acids – structures - preparation of amino acids – synthesis of peptides – classification of proteins – primary and secondary structures of proteins.

Unit 2: Active-methylene Compounds, Vitamins and Antibiotics

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 – nucleophilic addition mechanisms across the -C=C- Nucleophilic addition mechanism across the –C=O – synthetic uses – Vitamins – types – sources and deficiency disorders – Antibiotics – structure and functions of chmoromycetin, penicilline, streptomycein – definition of disinfectants and antiseptics - some examples – uses of vitamins and antibiotics.

Unit 3: Heterocycles

Introduction – Nomenclature – Molecular orbital pictures of Pyrrole, Furan and Thiophene – laboratory preparation, physical and chemical properties and uses of Pyrrole, Furan and Thiophene — electrophilic substitution mechanism – laboratory preparation, structure, Physical and Chemical properties and uses of Indole, Pyridine, Quinoline – electrophilic and nucleophilic substitution mechanisms – Introduction to Alkaloids – classification – occurrence and isolation – general properties – structures and uses of alkaloids: Quinine, Morphine, Atropine, Nicotine, Coniine, Piperine. structural elucidation of piperine and nicotine by chemical method.

Unit 4: Organic Spectroscopy I

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 (λ_{max} and ε_{max}) of carbonyl , isolated double bond, conjugated double bond systems and aryl groups – factors influencing the absorption – spectroscopic terms: Chromophore, Auxochrome, Bathochromic shift, Hypsochromic shift, Hypochromic shift, Hyperchromic shift – introduction to IR spectroscopy – Hooke's Law – simple instrumentation – bands in IR spectrum - physical and qualitative idea of Fourier transformation technique – possible vibrations in organic molecules – Selection rule – characteristic absorptions (λ_{max})of various bond vibrations – factors influencing the absorption - Interpreting typical UV-VIS and IR spectra of some organic compounds: hydrocarbons (saturated & unsaturated), organohalogens, organochalcogens and organonitrogens.

Unit 5: Organic Spectroscopy II

Magnetically active nuclei – simple instrumentation – signals in NMR spectrum – chemical shift – factors influencing the chemical shift values - 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 – principle of EPR spectroscopy –

significance of splitting in EPR signals – some illustrative systems (methyl, benzene, quinone, etc.) - principle of MASS spectrometry – simple instrumentation – fragmentation pattern – m/z values of various fragments – nitrogen rule – interpreting the MASS spectra of some organic molecules – combined approach to identify the structure of simple organic molecules.

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*, (6th edition), Prentice – Hall of India Ltd., New Delhi, (2000)
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)
5.   Kalsi. L., *Organic Spectroscopy*, New Delhi, New Age International Company. (1998).
6.   Seyhan N. Ege, *Organic Chemistry*, New York, Houghton Mifflin Co., (2004).

Semester VI   Hrs/Week : 5
07UCH 632   Credit: 5

INORGANIC CHEMISTRY II

Unit 1: Covalent Bond
Lewis theory – octet rule and its exceptions, electron dot structural formula. Sidwig – 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 2: Ionic and Metallic Bond
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 3: Hydrogen bonding, Acid – Base and Bioinorganic Chemistry
Hydrogen bond - Introduction, kinds of H-bond (inter and intra)- consequences and importance -   Acid- Base Chemistry- Theories of acids-bases- Arrhenius, Bronsted – Lowry, Lewis, Solvent system(levelling and differentiating effect), Lux - Flood and Usanovich definition – HSAB principle -   Bio-inorganic Chemistry - 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 – Ionophore – Structure and characteristic features of Haemoglobin and myoglobin – vitamin B_{12}.

Unit 4: Analytical Chemistry
Gravimetric analysis: mechanism of precipitation – solubility products – common ion effect – types of precipitation – co-precipitation and post precipitation - colourimetric analysis: Beer-Lambert law applications and limitations- principles of spectro photometry - Thermal Analysis: Principle, Instrumentation and applications of DTA, DGA and DSC - Chromatographic Techniques: Principle, instrumentation, sampling and applications of Paper-thin layer- column-gas and High performance liquid – chromatographic techniques.

Unit 5: Pollution and Waste Management
Air, oxygen and Nitrogen cycle – water, biosphere, energy and soil pollutants and their saturatory limits. – flora and fauna – pollution evaluation methods. Air pollution – various pollutants, water pollution – organic and inorganic pollutants. Noise pollution, sewage analysis, pesticide pollution, Fertilizers. Green house effect. Solid waste management and industrial safety.

Reference:
1. Lee J.D., *Concise Inorganic Chemistry*, UK, Black well science (2006)
2. Vogel A.I., *A Text book of Quantitative Inorganic Analysis*, London, Longman Group Ltd.
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. Anilkumar De., *Environmental Chemistry*, New Delhi, Wiley Eastern Ltd.

Semester VI   Hrs/Week : 5
07UCH 633   Credit: 5

PHYSICAL CHEMISTRY II

Unit 1: Spectroscopy I

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).

UV visible spectroscopy – conditions – theory of electronic spectroscopy- types of electronic transitions – Franck-Condon principle – Pre-dissociation – Applications.

Unit 2: Spectroscopy II

Raman spectroscopy: condition – Raleigh and Raman scattering – Stokes and Anti-stokes lines – Difference between Raman and IR spectroscopy – Rotational Raman spectra of non-Centro symmetric molecules(HCl only)– Application to covalent compounds – Mutual exclusion principle.

NMR spectroscopy: Magnetic and Non-magnetic nuclei – condition – principle of nuclear magnetic resonance – ring current effect – shielding mechanism – chemical shift – Number of signals – spin-spin coupling – coupling constant (J) – Splitting of signals – NMR spectra of simple organic molecules – NMR spectra of ethyl alcohol molecule in detail.

ESR spectroscopy: condition – theory of ESR spectroscopy – Hyperfine splitting - ESR spectra of simple radicals CH_3, CD_3 and naphthalene.

Unit 3: Photochemistry and Radiation Chemistry

Photo chemical reaction – Laws of photo chemistry – quantum yield – primary and secondary process – HI decomposition – HBr decomposition – kinetics of hydrogen- bromine reaction - kinetics of hydrogen- chlorine reaction – Decomposition of ammonia – photochemical equlibirium - photodimerisation of anthracene – photochemical reactions in solutions – Photo sensitisations – Chemiluminescence – Phosphorescence.

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

Unit 4: Chemical Kinetics I

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 a reactions (Integration, graphical, half-life, Oswald's dilution method, experimental) Temperature dependence of reaction rates – Arrhenius parameters.

Unit 5: Chemical Kinetics II

Theories of reaction rates – simple collision theory – limitations – steady state approximation – Lindmann's hypothesis of unimolecular reactions – Theory of absolute reaction rates – Catalysis and Adsorption.

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 – Freunlich'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. Maron and Prutton,
   Physical Chemistry, London, Mac Millan.
3. Atkins P.W.,
   Physical Chemistry, (5th edition) Oxford University Press. (1994)
4. Castellan G.V.,
   Physical Chemistry, New Delhi, Orient Longmann.

Semester V & VI   Hrs/Week: 5
07UCH 634   Credit : 6

CHEMISTRY PRACTICAL - IV
Gravimetry & Organic Preparation

Unit 1:   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 2: Theory of Organic Preparations

Principles of chemical conversions – Handling of organic chemicals and the glass ware – Filtration techniques – Drying techniques – Recrystallization techniques – Scientific Reporting.

Unit 3: 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 Sulphate as Barium sulphate
8. Estimation of Iron as Iron (III) oxide

Unit 4: 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   Hrs/Week: 3
07UCH 634   Credit: 3

CHEMISTRY PRACTICAL V
Physical Constants & Organic Analysis

Unit 1:   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 2: Theory of Measurement of Physical Parameters
Principles of physical measurements – Handling of chemicals and the apparatus –Scientific Reporting.

Unit 3: Organic Analysis
       Analysis of simple organic compounds
        a.   characterization functional groups
        b.   confirmation by preparation of solid derivatives / characteristic colour reactions
Note:
1. Mono-fuctional compounds are given for analysis. In case of bi-functional compounds, students are required to report any one of the functional groups.
2. Each student is expected to do the analysis of at least 15 different organic substances

Unit 4: Determination of Physical constants
Determination of boiling / melting points by semimicro method.

Unit 5: Demonstration Experiments
        1. Determination of Iron by colorimetry
        2. Determination of pH of soil samples using pH meter
        3. 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. Furniss, B.S., et al., *Vogel's Textbook of Practical Organic Chemistry*,
        (7th edition), London, ELBS – Longman, (1984).

ELECTIVES OFFERED BY VARIOUS DEPARTMENTS FOR UG COURSES

Sem	Code No.	Title of the Paper	Hours	Credits
Department of Business Administration				
IV	07UBU481	Soft Skills Development	4	3
V	07UBU582	Advertisement and Sales Promotion	4	3
VI	07UBU683	Personal Growth Programme	4	3
Department of Chemistry				
IV	07UCH481	Food and Nutrition	4	3
V	07UCH582	Everyday Chemistry	4	3
VI	07UCH683	Soil Testing	4	3
Department of Commerce				
IV	07UCO481	Elements of Business Process Outsourcing (BPO)	4	3
	07UCO482	Accounts for Executives	4	3
V	07UCO583	Soft Skills Development	4	3
	07UCO584	Fundamentals of Investment Management	4	3
VI	07UCO685	Small Scale Business Development	4	3
	07UCO686	Hotel Management	4	3
Department of Computer Science				
IV	07UCS481	Office Automation	4	3
	07UCS482	Internet Concepts	4	3
V	07UCS583	Fundamentals of Computer Networks	4	3
	07UCS584	Information Technology	4	3
VI	07UCS685	E-Commerce	4	3
	07UCS686	Foundations of Computer Science	4	3
Department of Computer Application (BCA) (SFS)				
IV	07UCA481	Personal Soft Skills	4	3
Department of Economics				
IV	07UEC481	Indian Economy	4	3
V	07UEC582	Tamil Nadu Economy	4	3
VI	07UEC683	Economics of Social Issues	4	3
Department of Electronics				
IV	07UEL481	Computer Electronics	4	3
V	07UEL582	Radio and Television	4	3
VI	07UEL683	DVD Player Assembling and Troubleshooting	4	3

Department of English

IV	07UEN481	English for Competitive Exams	4	3
	07UEN482	Film Studies	4	3
V	07UEN583	English for Communication	4	3
	07UEN584	Public Speaking in English	4	3
VI	07UEN685	English of Literature	4	3
	07UEN686	English for Empowerment	4	3

Department of History

IV	07UHS481	Tourism and Travel Agency	4	3
V	07UHS582	Tourism and Automation	4	3
VI	07UHS683	Indian History for Competitive Examinations	4	3

Department of Mathematics

IV	07UMA481	Mathematics for Competitive Examinations	4	3
V	07UMA582	Graph Theory	4	3
VI	07UMA683	Operations Research	4	3

Department of Physics

IV	07UPH481	Everyday Physics	4	3
V	07UPH582	Photography	4	3
VI	07UPH683	Cell Phone Servicing	4	3
VI	07UPH684	Electrical Wiring	4	3

Department of Plant Biology & Plant Biotechnology

IV	07UBO481	Mushroom Culture	4	3
V	07UBO582	Everyday Biology	4	3
VI	07UBO683	Remote Sensing	4	3

Department of Statistics

IV	07UST481	Statistics for Management	4	3
V	07UST582	Data Analysis for Competitive Examination	4	3
VI	07UST683	Actuarial Statistics	4	3

Department of Tamil

IV	07UTA481	மைய அரசுப்பணித்தேர்வுத் தமிழ்	4	3
V	07UTA582	தமிழ் இலக்கியத்தில் மனித உரிமைகள்	4	3
VI	07UTA683	சித்த மருத்துவம்	4	3
VI	07UTA684	மக்கள் தகவல் தொடர்பியல்	4	3