SRM UNIVERSITY
(Under section 3 of UGC Act 1956)

B.Sc CHEMISTRY
(For students admitted during the academic year 2013-2014)
CURRICULUM AND SYLLABUS

FACULTY OF SCIENCE AND HUMANITIES
SRM UNIVERSITY
SRM NAGAR, KATTANKULATHUR – 603 203

DETAILS OF THE CREDITS

Component	Course	Total Number Of Credits
Part I	Language	10
Part II	English & foreign language	10
Part III	Major & Allied subjects	99
Part IV	Skill based courses	10
Part IV	Value Added Course	9
Part V	Extension activity	2
	Total	**140**

MC- MAJOR CORE COURSE
It is offered by parent department, totally related to the major subject, components like theory, practical, project.

ME-MAJOR ELECTIVE
It is also offered by the parent department. The objective is to provide choice and flexibility within the department. The student can choose his/her elective paper. Elective is related to the major subject. The difference between core course and elective course is that there is choice for the student. The department is at liberty of offer four elective courses in any semester.

SK-SKILL BASED COURSES AND VALUE ADDED SUBJECTS
It an inter departmental course offered by a department for the students belonging to other departments. The objective is to provide mobility and flexibility outside the parent department. This is introduced to make every course multidisciplinary in nature.

SUPPORTIVE COURSE

The supportive course is the inter departmental course, computer literacy,professional ethics to develop computer skills and Social ethics.

GENERAL
As per the Supreme Court order Environmental Studies is offered to all with two credits**.**

TOTAL NUMBER OF CREDITS - 140

B. Sc (Chemistry).

(For students admitted from the academic year 2013-on wards)

Curriculum 2013

(Credit System)

Eligibility

The candidates seeking admission to the B.Sc.Degree program shall be required to have passed (10+2) (Higher Secondary) examination or any other equivalent examination of any authority, recognized by this University, with Physics, Chemistry and Computer Science/Mathematics/ Biology.

Duration and Structure of the B. Sc Programme

3 Years in 6 Semesters

Legend:

L - Number of lecture hours per week
T - Number of tutorial hours per week
P - Number of practical hours per week
C - Number of credits for the course

Category of courses:

G - General
MC – Major Core
ME – Major Elective
SC- Supportive Course
SK – Skill based course
AS-Allied Subjects
VC-Value Added Course

B.Sc-DEGREE-CHEMISTRY
Curriculum – 2013
(Applicable for students admitted during the Academic Year 2013-14)

SEMESTER I							
Course Code	**Category**	**Course Name**	**L**	**T**	**P**	**Total of L+T+P**	**C**
LAF1111/LAH1111/ LAT1211	G	Language I (Tamil/Hindi/French)	5	0	0	5	5
LAE1111	G	English I	5	0	0	5	5
CHE1311	MC	General Chemistry-I	5	0	0	5	5
CHE1322	MC	Semi micro analysis	0	0	3	3	0
AMA1211	AS	Allied Mathematics-I	5	0	0	5	4
PDT1211	VC	Communication Skills	2	0	0	2	1
Total No. of Credit			**22**	**0**	**3**	**25**	**20**

SEMESTER II							
Course Code	**Category**	**Course name**	**L**	**T**	**P**	**Total of L+T+P**	**C**
LAT1221/LAH1121/LAF1121	G	Language 2 (Tamil/Hindi/French)	5	0	0	5	5
LAE1121	G	English 2	5	0	0	5	5
CHE1321	MC	General Chemistry II	5	0	0	5	5
CHE1322		Semi micro analysis	0	0	3	3	2
AMA1221	AS	Allied Mathematics-II	5	0	0	5	4
CHE1323	G	Environmental Studies	2	0	0	2	2
Total No. of Credit			**22**	**0**	**3**	**25**	**23**

SEMESTER III							
Course Code	**Category**	**Course name**	**L**	**T**	**P**	**Total of L+T+P**	**C**
CHE1331	MC	General chemistry-III	3	2	0	5	4
CHE1332		Principles of Analytical chemistry	3	1	0	4	4
CHE13E1	ME	Elective-I Green chemistry	3	1	0	4	4
CHE13E2		Elective-I Polymer Chemistry					
CHE1333	SK	C Programming and its application to Chemistry	3	0	0	3	3
CHE1334		C Programming and its application to Chemistry	0	0	2	2	2
CHE1335	MC	Inorganic volumetric Estimation-I	0	0	3	3	2
APH1211	AS	Allied Physics-I	4	1	0	5	4
APH1212		Allied Physics (Practical –I)	0	0	3	3	2
VAE1231	VC	Value Education	1	0	0	1	1
		Total No. of Credit	**17**	**5**	**8**	**30**	**26**

SEMESTER IV							
Course Code	**Category**	**Course Name**	**L**	**T**	**P**	**Total of L+T+p**	**C**
CHE1341	MC	General Chemistry-IV	3	2	0	5	4
CHE1342		Concepts in Physical Chemistry	3	1	0	4	4
CHE13E3	ME	Elective-II Chemistry of Natural Products	3	1	0	4	4
CHE13E4		Elective-II Pharmaceutical Chemistry					
CHE1343	MC	Inorganic Volumetric estimation-II	0	0	3	3	2
APH1213	AS	Allied Physics – II	4	1	0	5	4
APH1214		Allied Physics (Practical –II)	0	0	3	3	2
BI1341	SC	Basic of Bioinformatics	3	0	0	3	3
CDC 1241	VC	Quantitative aptitude and logical reasoning - I	1	1	0	2	2
NYS1211 NYS1212 NYS1213 NYS1214	NSO/YOGA/ NSS/NCC	Extension Activity	0	0	1	1	1
		Total No. of Credit	**17**	**6**	**7**	**30**	**26**

SEMESTER V							
Course Code	Category	Course Name	L	T	P	Total of L+T+P	C
CHE1351	MC	Inorganic Chemistry	5	0	0	5	4
CHE1352		Organic Chemistry	5	0	0	5	4
CHE1353		Physical Chemistry	5	0	0	5	4
CHE1354	SE	Material & Nano Chemistry	3	0	0		3
CHE1355	MC	Gravimetric Estimation	0	0	5	3	3
CHE1356		Preparation of Organic Compounds	0	0	5	5	3
CDC 1251	VC	Quantitative aptitude and logical reasoning - II	1	1	0	2	2
		Total No. of Credit	**19**	**1**	**10**	**30**	**23**

SEMESTER VI						
Course Code	**Category**	**Course Name**	**L**	**T**	**P**	**C**
CHE1361	MS	Organic Reagents and Reaction Mechanisms	5	0	0	4
CHE1362		Coordination and Solid state Chemistry	5	0	0	4
CHE1363		Fundamentals of Spectroscopy	5	0	0	4
CHE1364	MC	Qualitative analysis of Organic compounds	0	0	5	3
CHE1365		Physical Chemistry Practical	0	0	5	3
CDC1261	G	Behavioral Skills	2	0	0	2
CHE1366		Project	0	0	3	2
		Total No. of Credit				**22**

.

SEMESTER III

Subject Code	Title of Subject	Credits			
		L	T	P	C
CHE1331	General Chemistry – III	3	2	0	4

INSTRUCTIONAL OBJECTIVES	
(i)	To study the chemistry of alcohols and phenols.
(ii)	To study about benzene and benzenoid compounds
(iii)	To learn the chemistry of p-block elements.
(iv)	To study the laws of thermodynamics and their applications

UNIT I Chemistry of Benzene and other Benzenoid Compounds

Structure of benzene, general methods of preparation of benzene, electrophilic substitution reaction mechanisms - nitration, sulphonation, halogenation, Friedel Crafts alkylation and acylation. Orientation and reactivity of substituted benzenes. Polynuclear aromatic hydrocarbons – preparation, properties and uses of naphthalene, anthracene and phenanthrene.

UNIT II Chemistry of Alcohols, Phenols and Ethers

Nomenclature, classification and preparation of alcohols – properties and uses – chemistry of glycols and glycerols - preparation, properties and uses.

Mono, di and tri hydric phenols: preparation, properties and uses. Aromatic electrophilic substitution reaction mechanism – theory of orientation and reactivity.

Laboratory preparation of ethers. Epoxides – properties and uses – introduction to crown ethers.

UNIT III Chemistry of Group–13, 14 & 15 Elements

General characteristics of boron group elements with reference to electronic configuration and oxidation states. Metalloids and inert pair effect. Diagonal relationship between B and Si. Diborane – structure. Componds of boron - boric acid and borazole. Aluminum - amphoteric behavior and aluminates.

UNIT IV Chemistry of Carbon and Nitrogen Elements

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.

General characteristics of nitrogen group elements– the unique features of nitrogen from the rest of the family –industrial preparation of ammonia, hydrazine, hydroxylamine - oxyacids of phosphorus.

UNIT V Thermodynamics – I

Chemical thermodynamics – system – surrounding – isolated, closed and open systems – Homogeneous and heterogeneous systems. State of the system – intensive and extensive properties. Thermodynamic processes – cyclic process – reversible and irreversible process – isothermal and adiabatic process. State and path functions. 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 RJT and other thermodynamic quantities – calculation of Joule Thomson coefficient for ideal and real gases – inversion temperature.

Text Books

1. Puri B.R, Sharma L.R., Kalia K.K., (1993): Principles of Inorganic Chemistry, 23rd edition, Shoban Lal Nagin Chand & Co, New Delhi.
2. Lee J.D., (2006): Concise Inorganic Chemistry, Black well science, UK.
3. Glasstone S., Lewis D., (1960): Elements of Physical Chemistry, Mac Millan & Co. Ltd, London.

References

1. Puri B.R, Sharma L.R., Pathania M.S., (1993) : Principles of Physical Chemistry, 23rd edition, Shoban Lal Nagin Chand & Co, New Delhi.
2. Morrison R.T. and Boyd R.N., (1976): Organic Chemistry, 6th edition, New York
3. Bahl B.S. and Arun Bahl, (1997): Advanced Organic Chemistry, 12th edition, Sultan Chand & Co, New Delhi

SEMESTER III

Subject Code	Title of the Subject	Credits			
		L	T	P	C
CHE1332	Principles of Analytical Chemistry	3	1	0	4
INSTRUCTIONAL OBJECTIVES					
(i)	To learn the principles of chemical analysis and analytical chemistry.				
(ii)	To use modern instruments and classic techniques to design experiments and to record the results scientifically.				
(iii)	To apply statistical analysis to experimental measurements.				
(iv)	To understand the various purification techniques available and the need for purity of components.				
(v)	To have a knowledge about Chromatographic techniques and their applications in daily life.				
(vi)	To be able to skillfully decide the choice of precipitants and list the factors that affect the solubility of a precipitate.				

UNIT I Introduction to Analytical Chemistry and Safety Methods

Analytical Chemistry - its role, classification of analytical methods, advantages of instrumental methods - good lab habits - common lab operations, safety in the analytical lab - first aid in the case of burns and cuts.

UNIT II Data Analysis

The Mean- The Median- Precision-Accuracy-Confidence limits-Standard Deviation- Errors-Rules for improving Accuracy-Rejection of Data- Significant figures- Reporting of Data-Presentation of Tabulated Data-Scatter Diagrams- Method of Least Squares- S.I. Units.

UNIT III Purification Techniques

Dessicant: Types of dessicant- Relative efficiencies of dessicant- Drying powder and temperature- Regeneration of dessicant- choice of dessicant-technique of drying: drying of solids- Distillation: Theory of distillation- Technique: Fractional-Steam, Azeotropic- Vacuum – Recrystallization- Sublimation Criteria and Tests for purity: Melting point, boiling point-Refractive index and density.

UNIT IV Separation Techniques

Precipitation- Solvent Extraction- Chromatography: Types- Column, thin layer, paper, Ion exchange , Gas-Liquid Chromatography- HPLC and Electrophoresis (Introduction)

UNIT V Principles of Gravimetric Analysis

Methods of obtaining the precipitate- Conditions for precipitation- Choice of precipitants-Advantages of using Organic Precipitants- Specific and Selective Precipitants- Sequestering Agents- Solubility Products and Precipitation- Factors which affect Solubility of Precipitates-Theories of Precipitation- Co-precipitation – post precipitation- procedures to minimize occlusion- procedures to minimize surface adsorption- Effect of digestion- General rules for precipitation- precipitation from homogeneous medium- washing of precipitates- Drying of precipitates- Types, care and use of crucibles.

Text Books

1. R. Gopalan (2004): Elements of Analytical Chemistry, 3rd Edition, Sultan Chand and Co, New Delhi
2. Skoog D.A and.West D.M, (1988): Fundamentals of Analytical Chemistry, Saunders College Publishing, New York
3. Vogel A.I. (1957): A Textbook of Practical Organic Chemistry, Longman, London.

References

1. Sharma B.K (2004): Principles of Instrumental Analytical Chemistry, Krishna Prakashan Media, Meerut.
2. Willard, Merrit, Dean, Settle, (1986): Instrumental Methods of Analysis: CBS Publishers, Delhi.
3 . B. Sivasankar, (2012): Instrumental methods of analysis, Oxford University Press.

SEMESTER III

Subject Code	Title of the Subject	Credits			
		L	T	P	C
CHE13E1	Green Chemistry	3	1	0	4

INSTRUCTIONAL OBJECTIVES	
(i)	To learn the green concepts.
(ii)	To understand the green processes viz. Microwave mediated process
(iii)	To learn the concept of green solvent viz. Ionic liquids
(iv)	To study the concepts like green reagents

UNIT I Introduction to Green Chemistry

Green chemistry - Anastas' twelve principles of green chemistry -Principle of atom economy. Examples of reactions following the principles of green chemistry and atom economy. Green Preparation of propene and Green synthesis of Ibuprofen

UNIT II Microwave Mediated Organic Synthesis

Microwave activation – advantage of microwave exposure – specific effects of microwave – Neat reactions– solid supported reactions (with two specific examples) - functional group transformation – oxidation - reduction reactions. Solvent free one pot synthesis of phthalocyanine complex of copper (II).

UNIT III Ionic Liquids

Introduction –classification of ionic liquids- synthesis of ionic liquids – physical properties – recyclability- applications of ionic liquids for the following reactions – alkylation, hydroformylation, Friedel-Craft reaction and Diels-Alder reaction.

UNIT IV Supported Catalysts and Phase Transfer Catalyst (PTC)

Supported metal catalysts – mesoporous silica. Phase transfer catalyst - Synthesis – applications

UNIT V Alternative Synthesis, Reagents and Reaction Conditions

Photoreduction of benzophenone to benzopinacol using sunlight. Photochemical alternative to Friedel-Crafts reaction and use of dimethyl carbonate as a methylating agent. Reaction in water - furan and maleic acid. Supercritical liquids – water and CO_2. Extraction of D-limonene from orange peel.

Text Books.

1. V. K. Ahluwalia (2006): Green Chemistry – Environmentally benign reactions –. Ane Books, New Delhi India,.
2. Paul T. Anastas & Tracy C. Williamson (1998): Green Chemistry – Frontiers in benign chemical synthesis and processes- edited by, Oxford University Press.

References

1. Paul T. Anastas & Tracy C. Williamson (1998): Green Chemistry – Frontiers in benign chemical synthesis and processes, Oxford University Press, New York
2. Rashmi Sanghi & M. M. Srivastava (2003): Green Chemistry – Environment friendly alternatives, Narora Publishing House.
3. Cann, M.C. & Connelly, M. E (2008): Real- world cases in Green Chemistry, American Chemical Society, Oxford University Press.
4. Cann, M. C. & Thomas, P. (2008): Real world cases in Green Chemistry, American Chemical Society, Oxford University Press.

SEMESTER III

Subject Code	Title of the Subject	Credits			
		L	T	P	C
CHE13E2	Polymer Chemistry	3	0	0	4

INSTRUCTIONAL OBJECTIVES	
(i)	To learn the basic concepts of polymers
(ii)	To understand the properties of polymers
(iii)	To learn the techniques involved in polymerisation
(iv)	To understand the chemistry of some important polymers.
(v)	To get the knowledge about the advance techniques in polymers

UNIT I Introduction to Polymers

Monomers and polymers-definition-classification of polymers on the basis of microstructures, macrostructures and applications (thermosetting and thermoplastics) Distinction among plastics, elastomers and fibers. Homo and heteropolymers. Copolymers. Chemistry of polymerization- chain polymerization- free radical, ionic, coordination. Step polymerization – miscellaneous- ring opening & group transfer polymerization.

UNIT II Physical Properties and Reactions of Polymers

Properties : Glass transition temperature (Tg) – Definition – Factors affecting Tg - relationship between Tg and molecular weight and melting point. Importance of Tg. Molecular weight of polymers: number average, weight average, sedimentation and viscosity average molecular weights-degree of polymerization-molecular weight distribution.

Reactions :

Hydrolysis - hydrogenation – addition – substitution-cross-linking vulcanization and cyclisation reactions. Polymer degradation. Basic idea of thermal, photo and oxidative degradation of polymers

UNIT III Polymerization Techniques and Processing

Polymerisation techniques - Bulk, solution, suspension, emulsion, melt condensation and interfacial polycondensation polymerizations. Polymer processing: Calendering –die casting, rotational casting –compression. Injection moulding.

UNIT IV Chemistry of Commercial Polymers

Preparation, properties and uses of Teflon, polymethylmethacrylate. Polyethylene, polystyrene, PAN, polyesters, polycarbonates, polyamides (Nylon and Kevlar), polyurethanes, PVC, epoxy resins, rubber –styrene and neoprene rubbers, Phenol – formaldehydes and urea-formaldehyde resins.

UNIT-V Advances in Polymers

Biopolymers and Biodegradable Polymers in medical field- High temperature and fire resistant polymers. Silicones. Conducting polymers-Composites. (basic idea only).

Text Book

1. Billmeyer F.W. Jr. (1984): Text book of Polymer Science, John Wiley and Sons, 1984.
2. Gowariker V.R., Viswanathan N.V. and Jayader Sreedhar, (1978): Polymer Science, Wiley Eastern Ltd., New Delhi

References

1. Sharma, B.K., (1989): Polymer Chemistry, Goel Publishing House, Meerut..
2. Arora M.G., Singh M. and Yadav M.S., (1989):Polymer Chemistry, 2nd Revised edition, Anmol Publications Private Ltd., New Delhi.

SEMESTER III

Subject Code	Title of the Subject	Credits			
		L	T	P	C
CHE1333	C Programming and its Application to Chemistry	3	0	0	3
INSTRUCTIONAL OBJECTIVE					
(i)	To understand the basic fundamentals of C programming by learning various operators, arrays and functions.				

UNIT I Introduction, Variables, Constants and Operators

Importance of C, Basic structure of C program, character set, key words and identifiers, variables and data types, declaration of variables, assigning values to variables, defining symbolic constants, Operators, Expressions, Type conversion in expressions, Hierarchy of operations, input and output operations.

UNIT II Decision Making – Branching and Looping

a) **Decision Making and Branching**

Use of simple *if* statement, *if…else* statement, nesting of *if…else* statement, *switch* statement, conditional operator (? : operator), *GO TO* statement.

b) **Decision Making and Looping**

Use of *while* statement, *do…while* statement, *for loops,* nesting of *for loops*, jumps in loops (break), skipping a part of a loop (continue).

UNIT III Arrays and Character Strings

Arrays - Introduction, One dimensional arrays, two dimensional arrays, initializing two dimensional arrays, multi dimensional arrays.

Declaring and initializing string variables, reading strings from terminal, writing strings to screen, putting strings together, comparison of two strings, string handling functions.

UNIT IV Functions, Structures and Unions

Function definition, Function call, Function declaration (brief overview only).

Definition of a Structure, processing a Structure, types of statements in Structures, Union, Pointers (Elementary ideas only)

UNIT V Practical 'C' Programming

Application of C programming in chemical problems

1) Calculation of pH of a solution
2) Calculation of number of vibrational modes of linear and non-linear molecules
3) Calculation of RMS, Average and Most Probable velocity
4) Conversion of Fahrenheit to Centigrade and vice versa

Text Books

1. Balagurusamy, E. (2004): Programming in ANCI C, Tata Mc Graw- Hill, New Delhi.
2. Raman, K.V. (1993): Computers in Chemistry, 1st Edition, Tata Mc Graw- Hill, New Delhi

SEMESTER III

Subject Code	Title of the Subject	Credits			
		L	T	P	C
CHE1334	C Programming and its Application to Chemistry (Practical)	0	0	2	2

Practical 'C' Programming

1) Finding largest of three numbers
2) Calculation of pH of the solution
3) Conversion of Fahrenheit to Centigrade and vice versa
4) Sum of the squares of 1 to 10 numbers
5) Calculation of RMS, Average and Most Probable velocity
6) Calculation of energy of Electromagnetic radiation
7) Calculation of number of vibrational modes of linear and non-linear molecules
8) Calculation of Half-life period
9) Sorting of first ten elements in the periodic table
10) Printing name of the elements and their atomic numbers in 'C' format.

Text Books

1. Balagurusamy, E. (2004): Programming in ANCI C, Tata Mc Graw- Hill, New Delhi.
2. Raman, K.V. (1993): Computers in Chemistry, 1st Edition, Tata Mc Graw- Hill, New Delhi

SEMESTER III

Subject Code	Title of Course	Credits			
		L	T	P	C
CHE1335	Inorganic Volumetric Estimation – I (Practical)	0	0	3	2
INSTRUCTIONAL OBJECTIVES					
(i)	To enable the students to acquire the quantitative skills in volumetric analysis.				
(ii)	At the end of the course, the students should be able to plan experimental projects and execute them				

Volumetric Practical

Calibration of volumetric kits: burette, pipettes and standard flasks.

Estimation of the following

1. Oxalic acid using analar Oxalic acid (Link $KMnO_4$)
2. Mohr salt using analar Mohr salt (Link $KMnO_4$)
3. Ferrous sulphate using analar Mohr salt (Link $KMnO_4$)
4. Calcium by direct method
5. Lead by indirect method
6. MnO_2 and available O_2 in pyrolusite
7. Mohr salt using analar Mohr salt (link $K_2Cr_2O_7$)
8. Ferrous sulphate using analar Mohr salt (Link $K_2Cr_2O_7$)
9. Potassium dichromate using analar potassium dichromate (Link Fe^{2+})
10. Ferric iron using analar potassium dichromate
11. Potassium permanganate using analar potassium dichromate (Link Fe^{2+})

General scheme for distribution of marks in practical examination

Time: 3 h Marks: 50 (External) + 50 (Internal)

- Principle & table :10 Marks
- Calculation : 10 Marks
- Procedure : 10 Marks
- Accuracy : 10 Marks
- Record : 10 Marks
- Internal : 50 Marks

Total : 100

Text Books

1. Venkateswaran V., Veerasamy R. and Kulandaivelu A.R., (1997.): Basic principles of Practical Chemistry, 2nd edition, Sultan Chand & sons, New Delhi.
2. Sundaram, Krishnan, Raghavan, (1996): Practical Chemistry (Part II), S. Viswanathan Co. Pvt.

References

1. Furniss B.S., Hannaford A.J., Smith P.W. G., Tatchell A.R, (2005): Vogel's Text Book of Practical Organic Chemistry, 5th Edn., Harlow, Longman.
2. Ganapragasam N.S. and Ramamurthy G., (1998): Organic Chemistry – Lab manual, S. Viswanathan Co. Pvt.

SEMESTER III

Subject Code	Title of the Subject	Credits			
		L	T	P	C
APH1211	Allied Physics - I	4	1	0	4
INSTRUCTIONAL OBJECTIVES					
(i)	To understand the fundamentals of physics.				
(ii)	To give the basic understanding of material properties.				
(iii)	To educate and motivate the students in the field of science.				

UNIT I Simple Harmonic Motion and Circular Motion

Time period, Amplitude, Phase, Spring mass system, Simple pendulum, Composition of two simple harmonic motions along a line and at right angles –Lissajous figures. Uniform circular motion – Acceleration of a particle in a circle, centripetal and centrifugal forces. Banking on curved roads – motion of a car around a circle.

UNIT II Properties of Matter

Elasticity and plasticity, Elastic constants. Bending of beams – Young's modulus by non-uniform bending, Torsion in a wire – determination of rigidity modulus by torsion pendulum. Viscosity: Coefficient of viscosity – Poissuelle's formula. Stoke's law – terminal velocity. Surface tension: Molecular theory of surface tension – Excess pressure inside a drop and bubble.

UNIT III Heat and Thermodynamics

Kinetic theory of gases – basic postulates, ideal gas laws, Van Der Waal's equation of states, pressure of an ideal gas, RMS speed. Laws of thermodynamics – entropy – change of entropy in reversible and irreversible processes. Low temperature: Joule – Kelvin effect, theory and applications – Liquefaction of gases – Linde's process – adiabatic demagnetization.

UNIT IV Electricity and Magnetism

Electric charge, conservation of charge, permittivity, Coulomb's law, Electric field, electric potential, Gauss's law and its applications, conductors, dielectrics, electric current, Ohm's law. Magnetic induction, permeability, susceptibility, Magnetic field due to a current carrying conductor – Biot – Savart's law – field along the axis of a coil – force on a conductor carrying current in a magnetic field. Ampere's circuital law,
Faraday's law. Gradient, Curl and Divergence. E-M waves, Maxwell's equations in free space.

UNIT V Optics - I

Light and Optics, Fermat's principle, laws of reflection and refraction, total internal reflection and its illustrations. Mirrors and lenses, lens formula, combinations of thin lenses. Refraction through a prism – combination of two prisms to produce dispersion without deviation and deviation without dispersion. Defects of images –Coma, distortion – spherical and chromatic aberration in lenses.

Text Books

1. R. Resnick and D. Halliday, Fundamentals of Physics, Wiley Publication, 8th Edition, 2011.
2. Dr. R. K. Agarwal, Rekha Jain, Dr. Garima Jain,Optics, Krishna Prakashan Media Ltd., 2006.
3. D.C. Dayal, Fundamentals of Electricity & Magnetism, Himalaya Publishing House, 2013.
4. Brijilal & Subramanyam, Heat & Thermodynamics,S. Chand Limited, 2001.

References

1. P.V. Naik, Principles of Physics, PHI Learning Pvt. Ltd, 2006.
2. Dr. D. John Thiruvadigal, Dr. S. Ponnusamy, Dr. L. Sudha and M. Krishnamohan, Physics for Technologists, Vibrant Publication, 2013.
3. J. B. Rajam, S. Chand, Physics for Technologists, 1981.
4. Brijilal and Subramanian, Elements of properties of matter, S. Chand Limited, 1974.
5. M. W. Zemansky and R.H. Ditlman, Heat and Thermodynamics, Tata Mcgraw Hill, 2011.

SEMESTER III

Subject Code	Title of the Subject	CREDITS			
		L	T	P	C
APH1212	Allied Physics Practical-I	0	0	3	2
INSTRUCTIONAL OBJECTIVES					
(i)	To acquire basic understanding of laboratory techniques.				
(ii)	To educate the basics of instrumentation, data acquisition and interpretation of results.				
(iii)	To educate and motivate the students in the field of science.				
(iv)	To allow the students to have a deep knowledge of fundamentals of optics				

LIST OF EXPERIMENTS

1. Determination of Young's Modulus- Uniform bending Method
2. Determination of Young's Modulus- Non Uniform bending Method
3. Determination of Rigidity Modulus of a wire – Torsional pendulum
4. Determination of thermal conductivity of a bad conductor using Lee's disc method
5. Calibration of Voltmeter using potentiometer
6. Calibration of Ammeter using potentiometer
7. Determination of magnetic susceptibility using Quincke's Method
8. Determination of dispersive power of a prism using spectrometer
9. Determination of Cauchy's constant using spectrometer

Text Books

1. C.H. Bernard and C.D. Epp, John, Laboratory Experiments in College Physics Wiley and Sons, Inc., 1995.
2. S. K. Gupta, Engineering Physics Practical, Ninth Edition, Krishna Prakashan Media publishers, 2010.

References

1. G. L. Squires, Practical Physics, Fourth edition, Cambridge University Press, 2001.
2. Geeta Sanon, B. Sc., Practical Physics, 1st Edition. R. Chand & Co, 2007.
3. Benenson, Walter, and Horst Stöcker, Handbook of physics. Springer, 2002.
4. Chattopadhyay, D., Rakshit, P. C. and Saha, B., An Advanced Course in Practical Physics, 8th Edition, Books & Allied Ltd., 2007.
5. Indu Prakash and Ramakrishna, A Text Book of Practical Physics, 11th Edition, Kitab Mahal, New Delhi, 2011

SEMESTER III

Subject Code	Title of the Subject	CREDITS			
		L	T	P	C
VAE1231	Value Education	1	0	0	1
INSTRUCTIONAL OBJECTIVES					
1	To help individuals think about and reflect on different values.				
2	To deepen understanding, motivation and responsibility with regard to making personal and social choices and the practical implications of expressing them in				
3	To inspire individuals to choose their own personal, social, moral and spiritual values and be aware of practical methods for developing and deepening				

UNIT I

Value Education-Introduction – Definition of values-Why values? –Need for Inculcation of values –Object of Value Education-Sources of Value – Types

Values:

i) Personal values
ii) Social values
iii) Professional values
iv) Moral and spiritual values
v) Behavioral (common) values

UNIT 2

Personal values- definition of person - Self confidence – Self discipline – Self Assessment – Self-restraint – Self motivation – Determination – Ambition – Contentment – Humility and Simplicity – Sympathy and Compassion – Gratitude – Forgiveness – Honesty – Courtesy.

UNIT 3

Social values – Definition of Society – Units of Society – Individual, family, different groups – Community – Social consciousness – Equality and Brotherhood – Dialogue – Tolerance – Responsibility – Co-operation Freedom – Repentance and Magnanimity.

UNIT 4

Professional values – Definition – Competence – Confidence – Devotion to duty – Efficiency – Accountability – Respect for learning / learned – Willingness to learn-Open and balanced mind – Team spirit – Professional Ethic – Willingness for Discussion – Aims – Effort – Avoidance of Procrastination and slothfulness – Alertness.

UNIT 5

Behavioral values – individual values and group values – Good manners at home and outside – Equality – purity of thought, speech and action – Understanding the role of religion – Faith –

Understanding the commonness of religions – respect for other faiths – unity diversity – Living together – Tolerance – Non-violence – Truthfulness – Common aim – Unified efforts towards peace – Patriotism.

TOTAL 15

REFERENCE BOOKS

1. Dr. S. Ignacimuthu S.J., Values for life, Better yourself Books, Bandra Mumbai-600 050(1999).
2. Values (Collection of Essays)., Published by : Sri Ramakrishna Math, Chennai-4., (1996)
3. Prof.R.P.Dhokalia., Eternal Human Values NCRT-Campus Sri Aurobindo Marg., New Delhi -110 011.
4. Swami Vivekananda., Education., Sri Ramakrishna Math., Chennai-4(1957)
5. Tirukural (English Translation by Dr.G.Pope).
6. The Bible
7. The Kuran
8. The Bagavath Geetha

SEMESTER IV

Subject Code	Title of the Subject	Credits			
		L	T	P	C
CHE1341	General Chemistry-IV	3	2	0	4
INSTRUCTIONAL OBJECTIVES					
(i)	To understand the concepts of chemical bonding.				
(ii)	To learn the chemistry of p-block elements.				
(iii)	To learn the chemistry of organo halogen compounds.				
(iv)	To learn the chemistry and applications of carbonyl compounds.				
(v)	To study the second law of thermodynamics and their applications				

UNIT I Chemical Bonding-II

Ionic bond

Properties of ionic compounds, factors favoring the formation of ionic compounds-ionization potential, electron affinity, and electronegativity. Lattice Energy – Born – Haber Cycle – enthalpy of formation of ionic compound and stability. Polarizing power and Polarisability – partial ionic character from electro negativity – transitions from ionic to covalent character and vice versa – Fajan's rule - effects of polarization on solubility, melting points, and thermal stability of typical ionic compounds.

MO theory:

LCAO method, criteria of orbital overlap, types of molecular orbitals- σ and π - MO energy level diagram for homo and hetero diatomic molecules- H_2 to N_2, CO, NO, HCl . Bond order and stability of molecules, Difference between VB theory and MO theory.

UNIT II Chemistry of Elements of Group 16, 17 & 18

Paramagnetic nature of oxygen-preparation, properties, structure and uses of oxyacids of sulphur. Classification of oxides based on their chemical behaviour – acidic oxide, amphoteric oxide and neutral oxides, peroxides, super oxides, dioxides, sub oxides and mixed oxides.

General characteristics of halogen with reference to electronegativity, electron affinity, oxidation state and oxidizing power. Peculiarities of fluorine, Hydrides, oxides and oxo acids of halogens. Inter halogen compounds and pseudo halogens – basic nature of iodine.

Noble gases : Position in the periodic table – isolation from atmosphere – General characteristics – structure and shape of xenon compounds – XeF_4, XeF_6, XeO_3 and $XeOF_4$ – uses of noble gases.

UNIT III Alkyl and Aryl Halides

Nomenclature – General methods of preparation of haloalkanes – properties and uses – nucleophilic substitution reaction mechanisms (S_N1 , S_N2 and S_Ni) – stereochemical aspects of nucleophilic substitution reactions – general methods of preparation of halobenzenes - properties and uses – mechanism of electrophilic and nucleophilic substitution reactions.

UNIT IV Aldehydes and Ketones

Nomenclature – Laboratory preparation of aliphatic carbonyl compounds –properties and uses – molecular orbital picture of carbonyl group – nucleophilic addition mechanism at carbonyl

group – condensation reactions– Beckmann rearrangement – acidity of alpha-hydrogen. General methods of preparation of aromatic carbonyl compounds –properties and uses – effect of aryl group on the reactivity of carbonyl group- Perkin reaction, Knovenegal condensation reaction and Cannizzarro reaction.

UNIT V Thermodynamics II

Limitations of first law and the need for the second law – Heat engine – Carnot's cycle and its efficiency –thermodynamic principle of the working of refrigerator - 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 - DA and DG as criteria for thermodynamic equilibrium and spontaneity – advantage over entropy change. Variation of A and G with P, V and T – Gibbs Helmholtz equation and their applications.

Text Books

1. Puri B.R..,Sharma L.R., Kalia K.K., (1993): Principles of Inorganic Chemistry, 23rd edition, Shoban Lal Nagin Chand & Co, New Delhi.
2. Lee J.D., (2006): Concise Inorganic Chemistry, Black well science, UK.
3. Puri B.R..,Sharma L.R., Pathania M.S., (1993): Principles of Physical Chemistry, 23rd edition, Shoban Lal Nagin Chand & Co, New Delhi.

References

1. Glasstone S., Lewis D. (1960): Elements of Physical Chemistry, Mac Millan & Co. Ltd, London.
2. Morrison R.T. and Boyd R.N., (1976): Organic Chemistry, 6th edition, Allyn & Bacon Ltd, New York.
3. Bahl B.S. and Arun Bahl, (1997): Advanced Organic Chemistry, 12th edition, Sultan Chand & Co, New Delhi.

SEMESTER IV

Subject Code	Title of the Subject	Credits			
		L	T	P	C
CHE1342	Concepts in Physical Chemistry	3	1	0	4
INSTRUCTIONAL OBJECTIVES					
(i)	To understand the concepts of chemical kinetics				
(ii)	To understand the colligative properties of solutions				
(iii)	To learn the objectives of chemical equilibriums and thermodynamics				
(iv)	To acquire knowledge about the solutions of Non-electrolytes				
(v)	To understand the concepts of surface phenomena				

UNIT I Chemical Kinetics

Rate of a reaction – order and molecularity – derivation of rate constant for first and second order reactions - zero order reaction – pseudo order reaction. Hydrolysis of ethyl acetate, saponification of esters – methods of determining order of a reaction – half-life time method. Effect of temperature on reaction rates – concept of activation energy – Arrhenius equation – collision theory.

UNIT II Colligative Properties of Dilute Solutions

Solution- Dilute solutions-definition - Raoult's law for vapour pressure lowering (equation only) - van't Hoff equation (no derivation) – determination of molar mass from osmotic pressure measurement-reverse osmosis. Boiling point elevation-derivation of molal elevation constant (K_b)-determination of molar mass from boiling point elevation. Freezing point depression-derivation of molal depression constant (K_f)- determination of molar mass from freezing point depression.

UNIT III Chemical Equilibrium and Thermodynamics-III

Law of mass action- thermodynamic treatment of the law of mass action – van't Hoff reaction isotherm, temperature dependence of the equilibrium constant -relationship between K_p and K_c – van't Hoff isochore. Homogeneous equilibria - dissociation of PCl_5.- Factors affecting chemical equilibrium - Le-chatelier principle - application to Haber's process.

Zeroth and Third law of Thermodynamics

Zeroth law of thermodynamics – absolute temperature scale. Statement of third law - Nernst heat theorem - absolute entropy of solids, liquids and gases - evaluation of the standard entropy of oxygen on the basis of heat capacity - apparent exceptions to third law.

UNIT IV Solutions of Non Electrolytes

Solution of liquids in liquid - Raoult's law – chemical potentials of ideal and non-ideal solutions – Gibbs–Duhem – Margules equation. Fractional distillation of binary liquid systems - azeotropic mixture – steam distillation of immiscible liquids. Solubility of partially miscible liquids – phenol-water system - effect of impurities on critical solution temperature. Solutions of gases in liquids - factors influencing solubility of a gas - Henry's law – applications of Henry's law.

UNIT V Surface Phenomena

Catalysis:
General characteristics – types of catalysis – acid base catalysis – enzyme catalysis — explanation with suitable examples– Michaelis–Menten equation.
Adsorption:
Definition – difference between adsorption and absorption , physical and chemical adsorption – factors influencing adsorption –Freundlich adsorption isotherm – Langmuir adsorption isotherm – applications**.**

Text Books

1. Puri B.R, Sharma L.R., Pathania M.S., (2004) : Principles of Physical Chemistry, 41st edition, Shoban Lal Nagin Chand & Co, New Delhi.
2. Glasstone S., Lewis D., (1960): Elements of Physical Chemistry, Mac Millan & Co. Ltd, London.
3. Bahl B.S. and Arun Bahl, (1997): Physical Chemistry, 12th edition, Sultan Chand & Co, New Delhi.

References

1. P.L. Soni And O.P. Dharmara, (1979): Text of Physcial Chemistry, 11th Edition, Sultan Chand & Sons Educational Publishers , New Delhi.
2. Gilbert .W. Castellan (1985): ,Physical Chemistry, 3rd Edition, Narosa Publishing House**.**

SEMESTER IV

Subject Code	Title of the Subject	Credits			
		L	T	P	C
CHE13E3	Chemistry of Natural Products	3	1	0	4

INSTRUCTIONAL OBJECTIVES	
(i)	Introduction to chemistry of natural products like alkaloids and terpenoids.
(ii)	Understanding of the methods of isolation, purification and structural elucidation of natural products.
(iii)	An introduction to synthesis of important natural products.
(iv)	An appreciation of bio-activity of natural products

UNIT I Alkaloids

Introduction, occurrence, isolation and biological functions of alkaloids. General methods of preparation and structural elucidation of coniine, piperine, nicotine and papaverine.

UNIT II Terpenoids and Carotenoids

Terpenoids

Introduction, isoprene rule. Structural determination and synthesis of citral, menthol, Geraniol and camphor.

Carotenoids

Introduction, geometrical isomerism, structure determination and synthesis of β-carotene and vitamin-A

UNIT III Anthocyanins and Flavones

Anthocyanines:

Introduction to anthocyanins. Structure and general methods of synthesis of anthocyanins-Cyanidine.

Flavones:

Structure determination of flavone and flavonoids - Quercetin

UNIT IV Purines and Steroids

Purines:

Introduction, occurrence, isolation and biological importance. Synthesis and structural elucidation of Uric acid, Xanthine and Caffeine.

Steroids:

Introduction, stereochemistry and nomenclature, structural determination and synthesis of cholesterol. Synthesis of (±)-oestrone.

UNIT V Natural Dyes

Occurrence, isolation, purification, classification, colour and constitution. Structural determination and synthesis of indigotin and alizarin.

Text Books

1. Agarwal O. P. (1997): Chemistry of Natural Products, Vol 1, Goel Publishing House, Meerut.

2. Gurdeep Chatwal and S.K Anand, (2001)*:* Chemistry of Natural Products, Himalaya Publishing Co, New Delhi.

Reference

1. Finar I. L.*,* (1975): Organic Chemistry, Vol 2, 5th edition, Pearson education, London.

SEMESTER IV

Subject Code	Title of the Subject	Credits			
		L	T	P	C
CHE13E4	Pharmaceutical Chemistry	3	2	0	3
INSTRUCTIONAL OBJECTIVES					
(i)	To learn the fundamentals of drug properties				
(ii)	To understand the clinical and biochemical analysis				
(iii)	To learn the properties of common drugs.				
(iv)	To understand the basic concepts of biotechnology				

UNIT I Clinical Hygiene and Biochemical Analysis

Definition of health. Standards of WHO. Sterilization of surgical instruments. Disinfectants, antiseptics, sanitation. Biochemical analysis of urine, serum and fecal matter. Toxicity: Introduction and treatment for specific poisons-acids, alkalis, arsenic and mercury compounds.

UNIT II Common Drugs

Manufacture of drugs (e.g. quinine, reserpine, etoposide and d – tubocurarine) from Indian medicinal plants. Testing of drugs : biological variation, screening and toxicity. Use of pharmacoepia and therapeutic index. Types of drugs and their modes of action : Depressant drugs (special reference to sedatives and hypnotics). Anticonvulsant drugs (sodium valproate, hydantoins). Narcotic analgesics (only morphine compounds). Antipyretic analgesics (acetyl salicyclic acid, p – amino phenol derivatives). Nuclear medicine (Radiation therapy)

UNIT III Enzymes

Classification, specificity. coenzymes, cofactor, ATP, Mechanism of enzyme action and Immobilisation of enzymes.

UNIT IV Body Fluids

Blood volume, blood groups, coagulation of blood. Plasma lipoprotiens. Blood pressure. Arteriosclerosis, diseases affecting red cells: Hyperchromic and hypochromic anaemia. Blood tranfusion. Blood sugar and diabetes.

UNIT V Biotechnology

Heredity, recombinant DNA, Genetic engineering and its possible hazards, Gene splicing, manufacture of interferon and human insulin (Humulin), Drug manufacture based on fermentation(only antibiotics)

VISITS

One full day visit to a medical research laboratory and/or pharmaceutical industry.

Text Books

1. Jayashree Ghosh (1999): A Text Book of Pharmaceutical Chemistry, S.Chand and Co. Ltd.

2. S.C. Rastogi (1993): Biochemistry, Tata McGraw Hill Publishing Co.,
3. Ashutosh Kar (1993): Medicinal Chemistry, Wiley Eastern Limited, New Delhi.

References

1. Roy O.Le, (1976): Natural and synthetic organic medicinal compounds, Ealemi.
2. Oser B.L, Hawk's (1965): Physiological chemistry, 14th edition, Tata-McGraw – Hill Publishing Co.Ltd,
3. Kleiner O. and Martin J., (1974): Bio-Chemistry, Prentice-Hall of India (P) Ltd, New Delhi.

SEMESTER IV

Subject Code	Title of the Subject	Credits			
		L	T	P	C
CHE1343	Inorganic Volumetric Estimation–II (Practical)	0	0	3	2
INSTRUCTIONAL OBJECTIVES					
(i)	To enable the students to acquire the quantitative skills in volumetric analysis.				
(ii)	At the end of the course, the students should be able to plan experimental projects and execute them				

Volumetric Practical: Calibration of volumetric kits: burette, pipettes and standard flasks.

ESTIMATION OF THE FOLLOWING:

1. FAS (Link Ce^{4+})
2. $NaNO_2$ (Cerimetry)
3. Potassium permanganate using analar potassium dichromate (link thio)
4. Potassium dichromate using analar potassium dichromate (link thio)
5. Copper sulphate pentahydrate using analar copper sulphate pentahydrate (link thio)
6. Arseneous oxide using analar arsenious oxide (link I_2 solution)
7. Available chlorine in bleaching powder
8. Copper in brass
9. Temporary and permanent hardness of water sample (acidimetry - alkalimetry)
10. Mg^{2+} using analar $MgSO_4.7H_2O$ or $MgCl_2.6H_2O$ (link EDTA)
11. Zn^{2+} using analar $ZnSO_4.7H_2O$ (link EDTA)
12. Total and permanent hardness of water sample (EDTA method)

General scheme for distribution of marks in practical examination

Time: 3 h Marks: 50 (External) + 50 (Internal)

- Principle & table : 10 Marks
- Calculation : 10 Marks
- Procedure : 10 Marks
- Accuracy : 10 Marks
- Record : 10 Marks
- Internal : 50 Marks

Total : 100

References

1. Venkateswaran V., Veerasamy R. and Kulandaivelu A.R., (1997): Basic principles of Practical Chemistry, 2nd edition, Sultan Chand & son, New Delhi.
2. Sundaram, Krishnan, Raghavan, (1996)*:* Practical Chemistry (Part II), S. Viswanathan Co.
3. Furniss B.S, Hannaford A.J.,. Smith P.W. G,. Tatchell A.R, (2005): Vogel's Text Book of Practical Organic Chemistry. 5th Edn, Pearson Education.
4. Ganapragasam N.S. and Ramamurthy G., (1998): Organic Chemistry – Lab manual, S.Viswanathan Co. Pvt.,.

SEMESTER IV

Subject Code	Title of the Subject	Credits			
		L	T	P	C
APH1213	Allied Physics - II	4	1	0	4
INSTRUCTIONAL OBJECTIVES					
(i)	To understand the fundamentals of physics.				
(ii)	To emphasize the significance of Green technology and its applications.				
(iii)	To understand the structural, optical, nuclear and electronic properties of solids.				

UNIT I Energy Physics

Sources of conventional energy – Need for non – conventional energy – resources, Solar energy – solar cells and its applications, Wind energy – generation and applications, Bio mass energy – generation and applications, Geothermal energy – generation and applications, Tidal energy – generation and applications, Hydro energy – generation and applications.

UNIT II Modern Physics

Atomic structure, Alpha, beta and gamma radiation, Law of radioactive decay, decay constant, half life, mean life, nuclear energy - mass defect - Binding energy, fission and fusion, Biological effects of radiation. Black body radiation, Plank's quantum hypothesis, Photoelectric effect, Compton effect, De – Broglie equation, uncertainty principle.

UNIT III Optics – II

Wave nature of light; Huygens's principle, Interference - Young's double slit experiment, Coherence, interference from thin films, Michelson's interferometer. Newton's rings. Diffraction: wave theory of light, single slit experiment, diffraction grating, Polarization. Fiber optics, propagation of light in optical fiber, Acceptance angle, numerical aperture, attenuation; Types of optical fibers and its Applications

UNIT IV Crystal Physics

Space lattice - basis, Unit Cell, Lattice parameters, Bravais lattices and Crystal systems, Cubic crystal system, Crystal symmetry; Density & atomic packing fraction; Directions, planes and Miller indices; inter-planar distance; NaCl, Zinc sulphide, HCP structure.

UNIT V Electronics

Basic Electronics: P and N – type semiconductors, Junction Diode and their characteristics, half wave and full wave rectifiers, voltage regulations - Zener diode. Junction transistor – PNP. Digital electronics: AND, OR, NOT gates, NAND and NOR as universal building Blocks. Boolean algebra, Elementary ideas of integrated circuits (ICs).

Text Books

1. C. Kittel, Introduction to Solid state Physics, 8th Edition, Wiley Eastern Ltd. 2005
2. Malvino & Leach Digital Principles & their applications — TataMcGraw Hill. 2010.
3. R. Murukesan, *Modern Physics,* S. Chand & Co, 2005.
4. Brijilal & subramanyam, *A Textbook of Optics*, S. Chand Ltd, 2001.

References

1. A.K. Jha, I.K *A Textbook of Applied Physics,* International Publishing house pvt. Ltd, 2011.
2. Mansi Karkare and Rajni Bahuguna, I.K. *Applied Physics*, Volume – II International Publishing house pvt. Ltd. 2010.
3. Tasneem Abbasi, Abbasi S. A., *Renewable Energy Sources: Their Impact on Global Warming and Pollution* PHI Learning Pvt. Ltd.2013
4. K. Thyagarajan and Ajay Ghatak, *Introduction to Fiber Optics*, Cambridge, University Press, 1998.
5. B. Grob, McGrw *Basic Electronics*, 6th Edition– Mc Graw Hill, 2010.

SEMESTER IV

Subject Code	Title of the Subject	L	T	P	C
APH1214	Allied Physics Lab – II	0	0	3	2
INSTRUCTIONAL OBJECTIVES					
(i)	To familiarize with the concept of material properties.				
(ii)	To educate the basics of instrumentation, data acquisition and analysis.				
(iii)	To understand the optical and electronic properties of solids through experimentations.				
(iv)	To enhance the students to understand the concepts in integrated chips.				

LIST OF EXPERIMENTS

1. Air wedge – Thickness of the wire
2. P.O.Box – Specific resistance
3. Dielectric constant measurement
4. Hall effect – Hall coefficient determination
5. Quinke's method – Determination of magnetic susceptibility
6. Study of attenuation and propagation characteristics – optical fiber
7. Zener diode – Characteristics
8. Construction of AND, OR, NOT gates – Using diodes and transistors
9. NAND gate as a Universal gate.
10. Study of regulation properties and characteristics – Using IC

Books for a study and Reference

1. Allied Practical Physics by M.N. Srinivasan, S. Chand & Co.
2. Allied Practical Physics by M.Arul Thalapathy, compteck Publishers
3. Allied Practical Physics by Brij lal and Subramaniam

SEMESTER IV

Subject Code	Title of the Subject	Credits			
		L	T	P	C
BI1341	Basics of Bioinformatics	3	0	0	3
INSTRUCTIONAL OBJECTIVES					
(i)	To teach how to transform a chemical structure into a language for computer representation and manipulation				
(ii)	To provide how to extract knowledge from chemical reactions				
(iii)	To teach QSAR model generation and virtual screening				
(iv)	Provide applications of computational models				

UNIT I Representation and Manipulation of Chemical Structures

2D Chemical Structures: Computer representation of chemical structures, Structure and substructure searching, Reaction databases. 3D Chemical Structures: 3D Pharmacophore, Conformational search and analysis of 3D database, Methods to derive 3D pharmacophores.

UNIT II Introduction to Protein Modeling

Amino acids, Protein structure and conformational properties, Ramachandran Plot and dihedral angles, Enzyme mechanisms: Michaelis–Menten kinetics, Introduction of Protein Data Bank (PDB): file format.

UNIT III Computational Models

Introduction, Deriving a Quantitative Structure Activity Relationship (QSAR) Equation: Simple and Multiple Linear Regression, Designing a QSAR Experiment: Selection of Descriptors, Experimental Design, Indicator variables, Molecular field analysis and Partial Least Squares.

UNIT IV Drug Design and Development

Drug Discovery Process, Target Identification and Validation, Lead Discovery, Lead Modification, Identification of active part: Pharmacophore, functional group modification,

UNIT V Application of Computational Chemistry

Prediction of properties of compounds, Lead finding and Optimization, Molecular docking: Searching and scoring algorithm, Computer assisted synthesis design, Design of Combinatorial Chemistry.

Text Books

1. Andrew R Leach, Valerie J Gillet, (2003.): "An Introduction to Chemoinformatics", Kluwer Academic publishers.
2. Rick NG. (2004): "Drugs: from Discovery to Approval", John Wiley & sons.
3. Andrew R Leach, (1996): "Molecular Modelling- Principles and applications", 2nd Edition, Prentice Hall

References

1. Johann Gasteiger, Thomas Engel (2003): "Chemoinformatics - A Textbook", Wiley- VCH.
2. Jürgen Bajorath, "Chemoinformatics: Concepts, Methods, and Tools for Drug Discovery", Humana Press, 2004.
3. Garland R Marshall (2006): "Chemoinformatics in Drug Discovery", John Wiley & Sons.

SEMESTER IV

Subject Code	Title of the Subject	Credits			
		L	T	P	C
CDC 1241	Quantitative Aptitude and Logical Reasoning-I	1	1	-	2

INSTRUCTIONAL OBJECTIVE

This module would train the students on the quick ways to solve quantitative aptitude problems and questions applying logical reasoning, within a short time span given during the placement drives

Mock interviews on one-on-one basis

Quantitative aptitude

Partnership

Simple Interest, Compound Interest

Profit and Loss

Problems on Clock, Calendar and Cubes

Permutation and Combination

Allegation and mixtures

Logical Reasoning

Letter and Symbol series

Number series

Analyzing arguments

Making judgments

SEMESTER IV

Subject Code	Title of the Subject	Credits			
		L	T	P	C
NYS1211 NYS1212 NYS1213 NYS1214	EXTENSION ACTIVITY NSO/YOGA/NSS/NCC	0	0	1	1

SEMESTER V

Subject Code	Title of the Subject	Credits			
		L	T	P	C
CHE1351	Inorganic Chemistry	3	2	0	4
INSTRUCTIONAL OBJECTIVES					
(i)	To learn about the chemistry of transition and inner transition metals				
(ii)	To learn the concepts of acids and bases				
(iii)	To understand nuclear chemistry				
(iv)	To understand the uses of inorganic complexes				

UNIT I Transition Metals (d – Block Elements)

First, second and third transition series - general characteristics –metallic character, atomic and ionic radii – oxidation states, color, 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 $K_2Cr_2O_7$.

UNIT II Inner Transition Metals (f – Block Elements)

Lanthanides: lanthanide series - occurrence - abundance, - lanthanide contraction- color and magnetic properties - extraction of mixture of lanthanides from monazite sand and separation of lanthanides. Uses of lanthanides.

Actinides: Actinide series - occurrence - abundance – preparation of transuranic elements-electronic configuration – oxidation states – ionic radii – color of ions – comparison with lanthanides- extraction of thorium and uranium - uses.

UNIT III Acids and Bases

Theories of acids and bases - Arrhenius, Bronsted-Lowry theory, Lewis theory, solvent system Definition. Relative strengths of acids and bases – dissociation constant of acids and bases – leveling effect of water. Hard and soft acids and bases (HSAB). Nonaqueous solvents – classification- liquid ammonia as solvent.

Oxidation and Reduction Reactions -Oxidation number concept – Balancing redox equations by oxidation number method and ion-electron method – Equivalent weight of oxidizing and reducing agents.

UNIT IV Nuclear Chemistry and Radioactivity

Radioactivity Natural and artificial radioactivity and half life period.Applications of radio isotopes in reaction mechanism, medicine, agriculture and carbon dating.

Nuclear Chemistry Isotopes, isobars, isotones, mass defect, binding energy. Nuclear fission and fusion with examples.

UNIT V Industrially Important Compounds

Titanium dioxide, cis-$[Pt(NH_3)_2C1_2]$, $CoAl_2O_4$ (Cobalt blue), autocatalyst, vanadium pentaoxide, potassium dichromate, potassium permanganate, zirconyl chloride, uranyl nitrate.

Text Books

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

Reference

1. D.F.Shriver and P.W.Atkins : (1999) Inorganic Chemistry, W.H.Freeman and Co, London.

SEMESTER V

Subject Code	Title of the Subject	Credits			
		L	T	P	C
CHE1352	Organic Chemistry	3	2	0	4
INSTRUCTIONAL OBJECTIVES					
(i)	To learn the chemistry of carboxylic acids and their uses				
(ii)	To learn the chemistry of organo nitrogen compounds				
(iii)	To understand the molecular rearrangements				
(iv)	To learn about heterocyclic compounds				
(v)	To learn the chemistry of vitamins and proteins				

UNITI Carboxylic Acids and their Functional Derivatives

Nomenclature and classification of aliphatic and aromatic carboxylic acids.Preparation, acidity and reactions - reduction and oxidation.Preparation and properties of dicarboxylic acids such as oxalic, malonic, succinic, adipic and phthalic acids and unsaturated carboxylic acids such as acrylic, crotonic and cinnamic acids.Preparation and reactions of acid chlorides, acid anhydrides, amides and esters, trans-esterification.

UNIT II Chemistry of Nitrogen containing Compounds

Nitrocompounds: aliphatic and aromatic nitro compounds, classification, general Properties - Preparation by nitration.Reduction reactions. Di- and tri-substitution of aromatic nitro compounds: synthesis of o-, m-, p- dinitrobenzenes and trinitrobenzene.

Aliphatic and aromatic amines - preparation of primary, secondary and tertiary amines - reactions and basicity of amines, effect of substituents on basicity of aromatic amines.

Diazonium salts: Preparation, diazotisation reactions, replacement reactions (Sandmeyer, Gatterman and Gomberg reaction), coupling reactions.

UNIT III Molecular Rearrangements

Molecular rearrangements - types of rearrangement (nucleophilic and electrophilic) – mechanism for the following rearrangements: pinacol - pinacolone, benzil - benzilic acid, benzidine, Claisen, Fries, Hofmann and Beckmann.

UNIT IV Chemistry of Heterocyclic Compounds

Heterocyclic compounds - nomenclature - preparation, properties and uses of furan, pyrrole, thiophene. Synthesis and reactions of quinoline, isoquinoline and indole with special reference to Skraup, Fischer Napieraloki and Fisher.

UNIT V Chemistry of Proteins and Vitamins

Amino acids - general methods of preparation and reactions of amino acids, zwitter ion - isoelectric point, action of heat on α, β, and γ amino acids. Peptides and proteins - peptide linkage.Classification of protein structure.Denaturation and colour reactions of proteins. Vitamins (no structural elucidation) - classification, biological importance of vitamins A, B1, B2, B6, B12 and C.

Text Books

1. Finar I.L. (1996): Organic Chemistry, Vol 1&2, 6th Edition, Addison Wesley Longman Ltd, England.
2. Morrison R.T., Boyd R.N., (1976): Organic Chemistry, 4th Edition, Allyn & Bacon Ltd, New York.
3. Bahl B.S, Arun Bahl, (1986): Advanced Organic Chemistry, 12th Edition, Sultan Chand and Co, New Delhi.

Reference

1 Pine S.H., (2008): Organic Chemistry, 5th edition, McGraw - Hill International Book Company , New Delhi.
2. Seyhan N. Ege, (2004): Organic Chemistry, Houghton Mifflin Co., New York

SEMESTER V

Subject Code	Title of the Subject	Credits			
		L	T	P	C
CHE1353	Physical Chemistry	3	2	0	4
INSTRUCTIONAL OBJECTIVES					
(i)	To learn about the principles and applications of electrochemistry				
(ii)	To understand phase equilibria				
(iii)	To learn the principles of photochemistry				
(iv)	To know the fundamentals of group theory				

UNIT I Electrochemistry-I

Faraday's laws of electrolysis- properties of electrolytes -Ionic strength of solutions – van't Hoff factor. Electrical transport and conductance in metal and in electrolytic solution.specific conductance and equivalent conductance - variation of conductance with concentration – equivalent conductance at infinite dilution - Kohlrausch's law and its applications. Arrhenius theory of electrolytic dissociation and its limitation - weak and strong electrolyte according to Arrhenius theory - Ostwald's dilution law - applications and limitation.

UNIT II Electrochemistry-II

Electrolytic & galvanic cells - reversible and irreversible cells. Types of reversible electrodes - gas/metal ion - metal/metal ion; metal/insoluble salt/ anion and redox electrodes - electrode reactions - conventional representation of electrochemical cells. Electromotive force of a cell and its measurement- computation of E.M.F - calculation of thermodynamic quantities of cell reactions (ΔG. ΔH, ΔS and K) – relationship between concentration and E.M.F - Nernst equation.

UNIT III Phase Rule

Phase rule, meaning of the terms - phase, component, degrees of freedom – derivation of Gibbs phase rule – application of Clapeyron-Clausius equation in phase transitions. Phase diagrams of one component systems (water and sulphur systems) –Phase diagrams of two component systems: (i) Simple eutectic - Lead-silver system (ii) Formation of compound with congruent melting point - Ferric chloride–water system. Freezing mixtures – $CuSO_4$-water system – Efflorescence – Deliquescence.

UNIT IV Photo Chemistry

Consequences of light absorption - Jablonski diagram- radioactive and non-radioactive transitions. Laws of photo chemistry: Lambert – Beer, Grothus - Draper and Stark – Einstein. Quantum efficiency. Rate law and kinetics of photo chemical reactions: H_2-Cl_2 reaction. Comparison of thermal and photochemical reactions.Photo sensitization and quenching.Fluorescence, phosphorescence and chemiluminescence.Laser and uses of lasers.

UNIT V Group Theory

Symmetry elements and symmetry operations - group postulates and types of groups - Abelian and non Abelian. Illustration of symmetry operation for H_2O molecule - construction of multiplication table for H_2O molecule - point group - definition – elements of symmetry operations of the following point groups: C_n (C_2, C_3), C_V (C_{2V}, C_{3V}) and C_h (C_{2h}, C_{3h}).

Text Books

1. Maron S.H. and Lando J.B. (1974): Fundamentals of Physical Chemistry, Macmillan, New York.
2. Puri B.R., Sharma L.R., and Pathania B.K. (1993): Principles of Physical Chemistry, 23rd Edition, Vishal Publishing Company.
3. Rajaram and Kuriacose (1986): Thermodynamics for students of chemistry, Shoban Lal Nagin Chand.

References

1. Glasstone S. and Lewis D (1960): Elements of Physical Chemistry, Macmillan
2. Jain D.V.S and Jainhar S.P., (1988): Physical chemistry, Principles and problems, Tata Mc Graw Hill, New Delhi

SEMESTER V

Subject Code	Title of the Subject	Credits			
		L	T	P	C
CHE1354	Material and Nano Chemistry	3	0	0	3
INSTRUCTIONAL OBJECTIVES					
(i)	To learn about the different properties and applications of materials				
(ii)	To understand nanomaterials and their advantages				

UNIT I Ionic Conductivity and Solid Electrolytes

Types of ionic crystals – alkali halides – silver chloride - alkaline earth fluoride – simple stoichiometric oxides.Types of ionic conductors – halide ion conductors – oxide ion conductors – solid electrolytes – applications of solid electrolytes. Electrochemical cell – principles – batteries, sensors and fuel cells – crystal defects in solids – line and plane defects – point defects - schottky and frenkel defects. Electronic properties and band theory; metals, semiconductors – Inorganic solids – colour, magnetic and optical properties, luminescence

UNIT II Magnetic Materials

Introduction – types of magnetic materials – diamagnetism – paramagnetism, ferromagnetism. Ferrites : Preparation and their applications in microwave, floppy disk and magnetic bubble memory. Insulating Materials: Classification on the basis of temperature – Blymer insulating materials and ceramic insulating materials. Ferro electric materials: examples and applications of ferroelectrics.

UNIT III Modern Engineering Materials

Shape memory alloys: introduction – examples – application of SMA – advantages and disadvantages. Biomaterials : Introduction –metals and alloys in biomaterials –ceramic biomaterials, composite biomaterials-polymer biomaterials.

UNIT IV Nanophase Materials

Introduction – techniques for synthesis of nanophase materials –sol-gel synthesis-electrodeposition, inert gas condensation and mechanical alloying (Elementary level) - properties and applications of nanophase materials.

UNIT V Nano technology

Introduction –importance –various stages of nanotechnology –nanotube technology – nanoparticles –fullerenes-nanodendrimers –nanopore channels, fibres and scaffolds – CVD diamond technology –FCVA technology and its applications – nanoimaging techniques.

Text Books

1. Anthony R. West, (1989): Solid state chemistry and its applications, John Wiley & Sons.
2. Raghavan V.R., (2001): Materials Science and Engineering, Printice Hall (India) Ltd.

Reference

1. Kenneth J. Klabunde, Nanoscale Materials In Chemistry, A. John Wiley and Sons Inc. Publication

SEMESTER V

Subject Code	Title of the Subject	Credits			
		L	T	P	C
CHE1355	Gravimetric Estimation	0	0	5	3
INSTRUCTIONAL OBJECTIVES					
(i)	To enable the students to acquire the quantitative skills in gravimetric analysis				
(ii)	Preparative skills in organic and inorganic preparations.				
(iii)	At the end of the course, the students should be able to plan experimental projects and to execute them				

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. Estimation of Magnesium as magnesium oxinate
6. Estimation of Barium as barium sulphate.
7. Estimation of Iron as Iron (III) oxide.

General scheme for distribution of marks in practical examination

Time: 3 h Marks: 50 (External) + 50 (Internal)

- Principle & table : 10 Marks
- Calculation : 10 Marks
- Procedure : 10 Marks
- Accuracy : 10 Marks
- Record : 10 Marks
- Internal : 50 Marks

Total: 100

References

1. Venkateswaran V. Veerasamy R. Kulandaivelu A.R., (1997): Basic principles of Practical Chemistry, 2nd edition, New Delhi, Sultan Chand & sons
2. Sundaram, Krishnan, Raghavan, 1996: Practical Chemistry (Part III), S. Viswanathan Co. Pvt.,
3. Vogel's (1989): Text Book of Quantitative Chemical Analysis. 5th Edition, ELBS/Longman England.

SEMESTER V

Subject Code	Title of the Subject	Credits			
		L	T	P	C
CHE1356	Preparation of Organic Compounds	0	0	5	3
INSTRUCTIONAL OBJECTIVE					
(i)	To enable the students to develop analytical skills in preparation of organic compounds				

ORGANIC PREPARATION :

Preparation of Organic Compounds involving the following chemical transformations
1. Oxidation 2. Reduction 3. Hydrolysis 4. Nitration 5. Bromination 6. Diazotization 7. Osazone formation

DETERMINATION OF PHYSICAL CONSTANTS

Determination of boiling /melting points by semimicro method.

General scheme for distribution of marks in practical examination

Time: 5 hr (One day Examination) Marks: 50 (External) + 50 (Internal)

- Organic Preparation :30
- Recrystallization : 5
- Physical Constants : 5
- (melting/ boiling point)
- Record : 10

Internal : 50 Marks

References

1. Venkateswaran V. Veerasamy R. Kulandaivelu A.R., (1997): Basic principles of Practical Chemistry, 2nd edition, New Delhi, Sultan Chand & Sons .
2. Sundaram, Krishnan, Raghavan, 1996: Practical Chemistry (Part III), S. Viswanathan Co. Pvt.,
3. Vogel's (1989): Text Book of Quantitative Chemical Analysis. 5th Edition, ELBS/Longman England.

SEMESTER V

Subject Code	Title of the Subject	Credits			
		L	T	P	C
CDC 1251	Quantitative Aptitude and Logical Reasoning-II	1	1	0	2
INSTRUCTIONAL OBJECTIVE					
This module is designed to suit the need of the outgoing students and to acquaint them with frequently asked patterns in quantitative aptitude and logical reasoning.					

Mock interviews on one-on-one basis

Quantitative aptitude

Time and Distance

Height and Distance

Problems on Ages, Trains

Pipes and Cistern Boats and Streams

Probability

Logical Reasoning

Direction Sense test

Venn diagrams

Seating arrangements

Cause and effect

Blood relation test

Dice

Logical verbal puzzles

SEMESTER VI

Subject Code	Title of the Subject	Credits			
		L	T	P	C
CHE1361	Organic Reagents and Reaction Mechanisms	3	2	0	4

INSTRUCTIONAL OBJECTIVES	
(i)	To learn the chemistry of carbohydrates
(ii)	To understand the principles of aromaticity
(iii)	To understand the chemistry and application of compounds containing active methylene group
(iv)	To study the applications of organometallics reagents in organic synthesis
(v)	To understand the mechanisms of name reactions

UNIT I Common Reagents in Organic Synthesis

Structure and applications (no mechanism) of $AlCl_3$, BuLi, B_2H_6, DCC, Grignard reagent, NBS.

UNIT II Redox Reagents in Organic Synthesis

Structure and applications (no mechanism) of the following oxidants and reductants.

Oxidants: PCC, H_2O_2, m-CPBA, MnO_2, OsO_4.

Reductants: $NaBH_4$, Li/Liq.NH_3, Raney Ni, Lindlar's catalyst and Wolf-Kishner reductants.

UNIT III Carbohydrates

Nomenclature – classification – monosaccharides – epimerization – mutarotation – interconversion of glucose and fructose. Ascending and descending the aldose series (pentoses to hexoses and vice-versa). Structural elucidation of glucose & fructose – configuration. Sucrose – structure (only) – properties and uses. Starch and cellulose – structure (only) and applications.

UNIT IV Aromaticity and Active Methylene Group

Aromaticity

Stability of benzene –Reasonance structure of benzene - Huckel's rule: $(4n+2)\ \pi$ electron rule – annulenes – aromatic, antiaromatic and nonaromatic compounds.

Active methylene group– Malonic and acetoacetic esters: Characteristic reactions of active methylene group, synthetic uses of malonic and acetoacetic ester. Diazomethane and diazoacetic ester: Preparation, structure and synthetic applications.

UNIT V Name Reactions

Aldol, Perkin, Knovenegal, benzoin, Claisen condensation, Cannizaro reaction, Reformatsky reaction, Hoffmann elimination, Michael addition reactions with mechanism.

Text Books

1. Soni P.L & Chawla H.M, (2010). : Organic Chemistry , 29th Edition, Sultan Chand & Sons
2. Sanyal S N, (2010): Reactions, Rearrangements and Reagents, Bharati Bhawan Publishers and Distributors, Ranchi.

Reference

1 Meharotra Anirudh Singh R.C., (1991): Organometallic Chemistry, Wiley-Eastern Ltd., New Delhi.

SEMESTER VI

Subject Code	Title of the Subject	Credits			
		L	T	P	C
CHE1362	Coordination and Solid State Chemistry	3	2	0	4
INSTRUCTIONAL OBJECTIVES					
(i)	To understand the principles and rules governing coordinate compounds				
(ii)	To know about the chemistry of biologically important inorganic complexes				
(iii)	To understand the principles of solid state chemistry				
(iv)	To study the chemistry and applications of organometallic compounds				

UNIT I Coordination Compounds-I

Coordination complexes and complex ions – coordination number - types of ligands.Werner's theory of complexes - Nomenclature of coordination complexes - EAN rule. Isomerism (structural and stereo) in coordination complexes –stability, stability constant and Factors affecting the stability of complexes.Labile and inert complexes.VB theory- applications to some complexes and limitations.

UNIT II Coordination Compounds-II

Crystal Field theory. Crystal field splitting in octahedral, tetrahedral and square planar fields – factors influencing the magnitude of crystal field splitting –magnetic properties and color of coordination complexes.

UNIT III Bio-inorganic Chemistry

Biologically important coordination compounds - chlorophyll, haemoglobin, vitamin B12 - structure and applications.

UNIT IV Solid State Chemistry

Introduction-Classification of solids – differences between crystalline and amorphous solids - types of crystal symmetry – interfacial angle —point group – space lattice and unit cell – bravais lattices-seven crystal systems – law of rationality of indices and Miller indices. X-ray diffraction and crystal structure. Bragg's equation– types of crystals – ionic crystals - structure of sodium chloride and CsCl- covalent crystals.

UNIT V Organometallic Chemistry

Valence electron count (16/18 electron rules). Synthesis and structure of metal carbonyl and nitrosyl compounds.Dinitrogen and dioxygen as ligands in organometallic compounds.

Text Books

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

References

1. K. Hussain Reddy, (2007): Bioinorganic Chemistry,1st Edition, New Age International Publishers.
2. Ajay Kumar Bhagi and Chatwal G.R., (2003): Bio inorganic and supramolecular Chemistry, 1st Edition, Himalaya Publishing House.

SEMESTER VI

Subject Code	Title of the Subject	Credits			
		L	T	P	C
CHE1363	Fundamentals of Spectroscopy	3	2	0	4
INSTRUCTIONAL OBJECTIVES					
(i)	To learn the fundamentals of spectroscopic techniques				
(ii)	To understand the application of spectroscopy for the structural identity of organic molecules				

UNIT I Spectroscopy I

Interaction of low energy radiation with matter - Electromagnetic radiation - quantisation of energies in molecules (Translational, rotational, vibrational and electronic) – transitions between energy levels in atoms and molecules - Absorption and emission spectra. Boltzman distribution (formula only). Relative population of translational, rotational, vibrational and electronic energy levels .

UNIT II Electronic Spectroscopy

Absorption laws, calculations involving Beer – Lambert's law, verification and its limitations. Instrumentation of photocolorimeter and spectrophotometer- block diagram. Types of electronic transitions - chromophores and auxochromes - absorption bands and intensity - factors governing absorption maximum and intensity.

UNIT III Infrared Spectroscopy

Principle, types of stretching and bending vibrations, vibrational frequencies, instrumentation-block diagram-IR spectrum of simple compounds.

UNIT IV NMR Spectroscopy

Principle of nuclear magnetic resonance, basic instrumentation, block diagram. Shielding mechanism, chemical shift, number of signals, splitting of signals - coupling constants - Applications of NMR to simple organic compounds-ethanol.

UNIT V Mass Spectrometry

Basic principles of mass spectrum, molecular peak, base peak, isotopic peak, metastable peak and their uses, fragmentation – nitrogen rule. Instrumentation - block diagram - mass spectrum of simple organic compounds – alkanes.

Text books

1. Sharma Y. R., (1980.)Elementary Organic Spectroscopy, 1st Edition, Sultan Chand and Sons.
2. Banwell C. N. and Mccash E. M., (2007): Fundamentals of Molecular Spectroscopy, 4th edition. Tata McGraw-Hill Pvt. Ltd.

Reference

1. Puri, B.R Sharma L.R. and Madan S. Pathania, (2006): Principles of Physical chemistry, 43rd edition, Vishal Publishing Co.

SEMESTER VI

Subject Code	Title of the Subject	Credits			
		L	T	P	C
CHE1364	Qualitative Analysis of Organic Compounds (Practical)	0	0	5	3
INSTRUCTIONAL OBJECTIVES					
(i)	To enable the students to develop analytical skills in organic qualitative analysis and preparative skills in organic preparations				

Systematic analysis of monofunctional organic compounds

Analysis of Simple Organic compounds (a) characterization of functional groups (b) confirmation by preparation of solid derivatives / characteristic color 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.

General scheme for distribution of marks in practical examination

- Aromatic/ Aliphatic : 10 Marks
- Sat/Unsat : 10 Marks
- Spl. Element : 10 Marks
- Functional group & Derivative : 10 Marks
- Record : 10 Marks
- Internal : 50 Marks

Total : 100

References

1. Venkateswaran V., Veerasamy R. and Kulandaivelu A.R., (1997): Basic principles of Practical Chemistry, 2nd edition, New Delhi, Sultan Chand & sons.
2. Sundaram, Krishnan, Raghavan, (1996): Practical Chemistry (Part III), S. Viswanathan Co. Pvt.
3. Vogel's (1989):Text Book of Quantitative Chemical Analysis. 5th Edition, ELBS/Longman England.

SEMESTER – VI

Subject Code	Title of the Subject	Credits			
		L	T	P	C
CHE1365	Physical Chemistry-Practical	0	0	5	3
INSTRUCTIONAL OBJECTIVES					
(i)	To understand the principles potentiometry and conductometry.				
(ii)	To impart knowledge with respect to the phase transformation of different systems.				

LIST OF EXPERIMENTS:

1. Critical Solution Temperature
2. Effect of impurity on Critical solution Temperature
3. Transition Temperature
4. Rast Method
5. Phase Diagram (Simple eutectic system)
6. Kinetics of Ester Hydrolysis
7. Partition Co-efficient of iodine between water and carbon tetrachloride.
8. Conductometric Acid-Base Titration
9. Potentiometic Redox Titration
10. Determination of cell constant

General scheme for distribution of marks in practical examination

- Principle & table : 10 Marks
- Calculation : 10 Marks
- Procedure : 10 Marks
- Accuracy : 10 Marks
- Record : 10 Marks
- Internal : 50 Marks

Total: 100

References

1. Venkateswaran V. Veerasamy R. Kulandaivelu A.R., (1997): Basic principles of Practical Chemistry, 2nd edition, New Delhi, Sultan Chand & sons.
2. Sundaram, Krishnan, Raghavan, (1996): Practical Chemistry (Part III), S. Viswanathan Co. Pvt.,.
3. Vogel's(1989): Text Book of Quantitative Chemical Analysis. 5th Edition ELBS/Longman England.

SEMESTER VI

Subject Code	Title of the Subject	Credits			
		L	T	P	C
CDC1261	Behavioral Skills	2	0	0	2

INSTRUCTIONAL OBJECTIVES

This course identifies the behavioral skills required for promoting individual competence by implementing the principles of interpersonal communication, value-based living and individual environment consciousness thereby meeting the market expectations.

Topics

Job Search – Scope of job opportunities / higher education for the courses undertaken – Knowledge of all prominent companies/ concerns related to the respective fields/departments – Employer's expectations – Practical exposure through industrial visits.

Interpersonal and intrapersonal communication – Ways to communicate in different scenarios – job interview, business meeting, project submission/proposal, informal gathering, speech for a large audience, a debate, etc, – Dress code, Eye contacts, body language and handshakes - survey and reporting (Role of IT in Environment and human health).

Human Rights Education-

A. Concept of Human Rights – Indian and International Perspectives
B. Broad classification of Human Rights and Relevant Constitutional Provisions – Right to Life, Liberty and Dignity, Right to Equality, Right against Exploitation, Cultural and Educational Rights, Economic Rights, Political Rights, Social Rights, Human Rights of Women and Children.
C. Social Practice and Constitutional Safeguards - (i) Female Foeticide and Infanticide (ii) Physical assault and harassment (iii) Domestic violence (iv) Conditions of Working Women
D. Institutions for Implementation - a. Human Rights Commission b. Judiciary
E. Violations and redressal - a. Violation by State b. Violation by Individuals c. Nuclear Weapons and terrorism d. Safeguards

Ethics and human values –Personal, Social, Moral, Professional and Behavioral values – importance, learning through case studies, personal experiences and similar inspirational stories of great personalities.

Environmental studies – Natural Resources – Uses, Crisis, Solutions – Role of individual in conservation of natural resources – Ecosystem- concept, food chain, food web, Ecological pyramid, Bio-geo chemical cycles, Forest, Grassland, Desert and Aquatic ecosystems

a) Biodiversity – At global, national and local levels – threats – endangered and endemic species of India – Conservation

b) Environmental Pollution – Air, Water, Soil, Marine, Noise, Thermal and Nuclear Hazards – Role of an individual in pollution control – Human health – Population growth – Welfare programs by the Government and other NGOs

SEMESTER VI

Subject Code	Title of the Subject	Credits			
		L	T	P	C
CHE1366	Project	0	0	3	2

B.Sc projects should be socially relevant and research oriented ones.

Each student is expected to do an individual/Group project.

The project internally will be evaluated by the concerned guide.

The method of assessment

Assessment Tool weightage

Internal - 50 Marks
External - 50 Marks