GOBI ARTS & SCIENCE COLLEGE (AUTONOMOUS) : GOBICHETTIPALAYAM

SCHEME OF EXAMINATIONS - B.Sc. (CHEMISTRY-ALLIED MATHS) (17 BATCH)

No.	Code	Subject Title	Hrs	CIA	EOSE	Total	Credit
SEMESTER : 1							
1	17U1TM01	PART I : TAMIL - I	3	25	75	100	3.0
2	16U2EN01	PART II : ENGLISH - I	3	25	75	100	3.0
3	11UACH01	PART III : MAJOR CORE : GENERAL CHEMISTRY-I	3	25	75	100	4.0
4	14UBMA05	PART III : ALLIED CORE : MATHEMATICS PAPER-I	3	25	75	100	3.0
5	14UBMA06	MATHEMATICS PAPER-II	3	25	75	100	2.0
6	17U4HE01	PART-IV: i)HUMAN EXCELLENCE:PAPER-I BASICS OF YOGIC LIFE	3	25	75	100	1.0
SEMESTER : 2							
7	17U1TM02	PART I : TAMIL - II	3	25	75	100	3.0
8	16U2EN02	PART II : ENGLISH - II	3	25	75	100	3.0
9	10UACH02	PART III : MAJOR CORE : GENERAL CHEMISTRY-II	3	25	75	100	4.0
10	14UBMA07	PART III : ALLIED CORE : MATHEMATICS PAPER-III	3	25	75	100	2.0
11	14UBMA08	MATHEMATICS PAPER-IV	3	25	75	100	3.0
12	15UACHP1	MAJOR CORE PRACTICAL-I INORGANIC QUALITATIVE ANALYSIS	3	25	75	100	5.0
13	17U4HE02	PART-IV : i)HUMAN EXCELLENCE:PAPER-II SUBLIMATION AND SOCIAL WELFARE	3	25	75	100	1.0
14	13U4HEP1	PRACTICAL – I: YOGA PRACTICE-I		100		100	1.0
15	12U4FN01	ii)FOUNDATION SUBJECT:A GENERAL AWARENESS	1.5		100	100	1.0
SEMESTER : 3							
16	17U1TM03	PART I : TAMIL - III	3	25	75	100	3.0
17	16U2EN03	PART II : ENGLISH - III	3	25	75	100	3.0
18	11UACH03	PART III : MAJOR CORE : GENERAL CHEMISTRY-III	3	25	75	100	4.0
19	14UBPH03	PART III : ALLIED CORE : PHYSICS	3	25	75	100	3.0
20	17U4HE03	PART-IV : i)HUMAN EXCELLENCE: PAPER-III MENTAL PROSPERITY AND HUMAN EXCELLENCE	3	25	75	100	1.0
21		ii)FOUNDATION SUBJECT:B	3		100	100	2.0

Contd....

SEMESTER : 4

22	17U1TM04	PART I : TAMIL - IV	3	25	75	100	3.0
23	17U2EN04	PART II : ENGLISH - IV	3	25	75	100	3.0
24	11UACH04	PART III : MAJOR CORE : GENERAL CHEMISTRY-IV	3	25	75	100	4.0
25		PART III : ALLIED OPTIONAL	3	25	75	100	5.0
26	09UACHP2	MAJOR CORE PRACTICAL-II VOLUMETRIC ANALYSIS	3	25	75	100	3.0
27	08UACHP3	MAJOR CORE PRACTICAL – III ORGANIC QUALITATIVE ANALYSIS	3	25	75	100	3.0
28	10UACHP4	MAJOR CORE PRACTICAL – IV COMPUTER APPLICATIONS IN CHEMISTRY	3	25	75	100	2.0
29	08UBPHP2	ALLIED CORE PHYSICS PRACTICAL	3	25	75	100	2.0
30	17U4HE04	PART-IV : i)HUMAN EXCELLENCE: PAPER-IV SCIENCE OF DIVINITY AND REALIZATION OF SELF	3	25	75	100	1.0
31	13U4HEP2	PRACTICAL – II: YOGA PRACTICE-II		100		100	1.0
32		ii)FOUNDATION SUBJECT-B	3		100	100	2.0
33		PART V : CO-CURRICULAR ACTIVITIES					1.0

SEMESTER : 5

34	11UACH05	PART III : MAJOR CORE : INORGANIC CHEMISTRY	3	25	75	100	4.0
35	08UACH06	ORGANIC CHEMISTRY-I	3	25	75	100	4.0
36	15UACH07	PHYSICAL CHEMISTRY-I	3	25	75	100	4.0
37	08UACH08	MAJOR ELECTIVE:I PHARMACEUTICAL CHEMISTRY	3	25	75	100	4.0
38		PART-III : MAJOR OPTIONAL	3	25	75	100	4.0

SEMESTER : 6

39	08UACH09	PART III : MAJOR CORE : MOLECULAR SPECTROSCOPY	3	25	75	100	4.0
40	17UACH10	ORGANIC CHEMISTRY-II	3	25	75	100	4.0
41	15UACH11	PHYSICAL CHEMISTRY-II	3	25	75	100	4.0
42	08UACH12	MAJOR ELECTIVE:II ENVIRONMENTAL CHEMISTRY	3	25	75	100	4.0
43	13UECH01	MAJOR SKILL BASED PAPER : INDUSTRIAL CHEMISTRY	3	25	75	100	4.0
44	15UACHP5	MAJOR CORE PRACTICAL-V GRAVIMETRIC ANALYSIS AND PREPARATION OF INORGANIC COMPLEXES	3	25	75	100	5.0
45	15UACHP6	MAJOR CORE PRACTICAL-VI APPLICATION ORIENTED PRACTICALS	3	25	75	100	5.0
46	15UACHP7	MAJOR CORE PRACTICAL-VII PHYSICAL CHEMISTRY	3	25	75	100	5.0
47	16UECHP1	MAJOR SKILL BASED PRACTICAL	3	25	75	100	4.0

CREDIT:

PART I : 12 PART II : 12 PART III : MAJOR : 88
ALLIED : 20
---> 108

PART IV : 11 PART V : 1 TOTAL : 144

GOBI ARTS & SCIENCE COLLEGE (AUTONOMOUS) : GOBICHETTIPALAYAM

SCHEME OF EXAMINATIONS - B.Sc. (CHEMISTRY-ALLIED BOTANY) (17 BATCH)

No.	Code	Subject Title	Hrs	CIA	EOSE	Total	Credit
		SEMESTER : 1					
1	17U1TM01	PART I : TAMIL – I	3	25	75	100	3.0
2	16U2EN01	PART II : ENGLISH - I	3	25	75	100	3.0
3	11UACH01	PART III : MAJOR CORE : GENERAL CHEMISTRY-I	3	25	75	100	4.0
4	17UBBO01	PART III : ALLIED CORE : BOTANY PAPER-I: GENERAL BOTANY-I	3	25	75	100	4.0
5	17U4HE01	PART-IV: i)HUMAN EXCELLENCE:PAPER-I BASICS OF YOGIC LIFE	3	25	75	100	1.0
		SEMESTER : 2					
6	17U1TM02	PART I : TAMIL - II	3	25	75	100	3.0
7	16U2EN02	PART II : ENGLISH - II	3	25	75	100	3.0
8	10UACH02	PART III : MAJOR CORE : GENERAL CHEMISTRY-II	3	25	75	100	4.0
9	17UBBO02	PART III : ALLIED CORE : BOTANY PAPER-II: GENERAL BOTANY-II	3	25	75	100	4.0
10	15UACHP1	MAJOR CORE PRACTICAL-I INORGANIC QUALITATIVE ANALYSIS	3	25	75	100	5.0
11	14UBBOP1	ALLIED CORE: BOTANY PRACTICAL	3	25	75	100	2.0
12	17U4HE02	PART-IV : i)HUMAN EXCELLENCE:PAPER-II SUBLIMATION AND SOCIAL WELFARE	3	25	75	100	1.0
13	13U4HEP1	PRACTICAL – I: YOGA PRACTICE-I		100		100	1.0
14	12U4FN01	ii)FOUNDATION SUBJECT A: GENERAL AWARENESS	1.5		100	100	1.0
		SEMESTER : 3					
15	17U1TM03	PART I : TAMIL - III	3	25	75	100	3.0
16	16U2EN03	PART II : ENGLISH - III	3	25	75	100	3.0
17	11UACH03	PART III : MAJOR CORE : GENERAL CHEMISTRY-III	3	25	75	100	4.0
18	14UBPH03	PART III : ALLIED CORE : PHYSICS	3	25	75	100	3.0
19	17U4HE03	PART-IV : i)HUMAN EXCELLENCE: PAPER-III MENTAL PROSPERITY AND HUMAN EXCELLENCE	3	25	75	100	1.0
20		ii)FOUNDATION SUBJECT:B	3		100	100	2.0

Contd....

SEMESTER : 4

21	17U1TM04	PART I : TAMIL - IV	3	25	75	100	3.0
22	17U2EN04	PART II : ENGLISH - IV	3	25	75	100	3.0
23	11UACH04	PART III : MAJOR CORE : GENERAL CHEMISTRY-IV	3	25	75	100	4.0
24		PART III : ALLIED OPTIONAL	3	25	75	100	5.0
25	09UACHP2	MAJOR CORE PRACTICAL-II VOLUMETRIC ANALYSIS	3	25	75	100	3.0
26	08UACHP3	MAJOR CORE PRACTICAL – III ORGANIC QUALITATIVE ANALYSIS	3	25	75	100	3.0
27	10UACHP4	MAJOR CORE PRACTICAL – IV COMPUTER APPLICATIONS IN CHEMISTRY	3	25	75	100	2.0
28	08UBPHP2	ALLIED CORE PHYSICS PRACTICAL	3	25	75	100	2.0
29	17U4HE04	PART-IV : i)HUMAN EXCELLENCE: PAPER-IV SCIENCE OF DIVINITY AND REALIZATION OF SELF	3	25	75	100	1.0
30	13U4HEP2	PRACTICAL – II: YOGA PRACTICE-II		100		100	1.0
31		ii)FOUNDATION SUBJECT-B	3		100	100	2.0
32		PART V : CO-CURRICULAR ACTIVITIES					1.0

SEMESTER : 5

33	11UACH05	PART III : MAJOR CORE : INORGANIC CHEMISTRY	3	25	75	100	4.0
34	08UACH06	ORGANIC CHEMISTRY-I	3	25	75	100	4.0
35	15UACH07	PHYSICAL CHEMISTRY-I	3	25	75	100	4.0
36	08UACH08	MAJOR ELECTIVE:I PHARMACEUTICAL CHEMISTRY	3	25	75	100	4.0
37		PART-III: MAJOR OPTIONAL	3	25	75	100	4.0

SEMESTER : 6

38	08UACH09	PART III : MAJOR CORE : MOLECULAR SPECTROSCOPY	3	25	75	100	4.0
39	17UACH10	ORGANIC CHEMISTRY-II	3	25	75	100	4.0
40	15UACH11	PHYSICAL CHEMISTRY-II	3	25	75	100	4.0
41	08UACH12	MAJOR ELECTIVE:II ENVIRONMENTAL CHEMISTRY	3	25	75	100	4.0
42	13UECH01	MAJOR SKILL BASED PAPER : INDUSTRIAL CHEMISTRY	3	25	75	100	4.0
43	15UACHP5	MAJOR CORE PRACTICAL-V GRAVIMETRIC ANALYSIS AND PREPARATION OF INORGANIC COMPLEXES	3	25	75	100	5.0
44	15UACHP6	MAJOR CORE PRACTICAL-VI APPLICATION ORIENTED PRACTICALS	3	25	75	100	5.0
45	15UACHP7	MAJOR CORE PRACTICAL-VII PHYSICAL CHEMISTRY	3	25	75	100	5.0
46	16UECHP1	MAJOR SKILL BASED PRACTICAL	3	25	75	100	4.0

CREDIT:

PART I : 12 PART II : 12 PART III : MAJOR : 88
ALLIED : 20
---> 108
PART IV : 11 PART V : 1 TOTAL : 144

SYLLABUS B.Sc. CHEMISTRY
SEMESTER –I
CORE: GENERAL CHEMISTRY-I

Instructional Hrs: 90

Objectives: 1. To understand the basic concepts of chemical bonding, hybridization and geometry of molecules.
2. To learn about the basic concepts of bonding in organic chemistry.
3. Understanding the concepts of nuclear chemistry and the fundamentals of thermodynamics.

UNIT –I **18Hrs**

The Covalent bond: Hybridisation and geometry of molecules – $BeCl_2$, BF_3, CH_4 - PCl_5, SF_6, IF_7. VSEPR theory- shapes of molecules: H_2O, NH_3, CH_4. Valence bond theory- limitations of VBT. Molecular orbital theory- Sigma and pibonds. MOT for homonuclear and heteronuclear molecules: H_2^+ ion, H_2, HO_2^+, O_2, NO, CO. Comparison of MOT and VBT.

Metallic Bond: Properties of metals-Theories of metallic bond: free electron theory, VBT, M.O or band theory – conductors, insulators, semiconductors.

Volumetric analysis: Principle, Preparation of standard solutions, types of titration. Indicators: Theory and the choice in acid – base titration, redox titrations.
Fe^{+2} vs K_2 Cr_2 O_7 using internal and external indicators: Precipitation titration, $AgNO_3$ Vs Kcl:- Complexometric titration – EDTA Vs Mg^{+2}.

UNIT-II **18Hrs**

Basic concepts of bonding in organic chemistry: Hybridisation and geometry of Molecules- methane, ethylene, acetylene. Electron displacement: Inductive effect –Illustration- consequences of I-effect on the acidity of mono and dicarboxylic acids and basicity of aliphatic and aromatic amines. Inductomeric effect, electromeric effect, mesomeric effects- with illustration – effect of mesomeric effect on bond length, basicity of aniline, acidity of phenol and stability of free radicals. Hyper conjugative effect: Illustration – effect on stability of alkenes bond length and Dipolemoment.

Bonds: Homolytic and heterolytic fission: classification of reagents: Electrophiles, nucelophiles and free radicals. Reaction intermediates: Carbocations, Carbanions, Free radicals – stability. Difference between intermediate and transition state.

UNIT-III **18Hrs**

Cycloalkanes: IUPAC Nomenclature, preparation using Dieckmann's ring closure and reduction of aromatic hydrocarbons, Substitution reactions with Cl_2 and Br_2 and ring opening reactions of cycloproane with H_2, Br_2 and HBr, Bayer's strain theory.

Alkenes: IUPAC nomenclature, mechanisms of addition reactions with hydrogen halogen hydrogen halide (Markovnikoff's rule), HBr (peroxide effects), Hydration, Hydroboration, ozonolysis; hydroxylation using $KMnO_4$ and OsO_4 and allylic substitution by NBS.

Dienes: IUPAC nomenclature - classification – conjugated, isolated and Cumulated dienes and their stability. Butadiene-1, 2 and 1, 4 additions, Free radical additions. Diels – Alder reaction.

UNIT-IV **18Hrs**

Nuclear chemistry: Artificial radio activity – artificial transmutation - Synthesis of artificial radio isotopes and elements- nuclear reactions. Mass defects and binding energy-stability of nucleus –n/p ratio-C^{14} dating.

Dipole moment: Determination of dipole moment of polar gases, liquids and solids-Application of dipole moment.

UNIT-V **18Hrs**

The laws of thermodynamics:

Thermodynamic terms: Definition: work and heat. Work of expansion- work of compression, maximum and minimum quantities of work – reversible and irreversible transformations. Energy and the first law of thermodynamics-Properties of the energy changes in relation to changes in properties of system. Isothermal and adiabatic changes. meaning of thermodynamic state function Vs path function. Properties of exact and inexact differentials. Joule – Thomson experiment, Relation between E and H, Cp and Cv. The Zeroth law of thermodynamics.

Thermochemistry:

Application of the first law of thermodynamics to chemical reactions. The heats of reaction - conventional value of H- determination. The heats of formation-Sequences of reactions. Hess's law; heat of combustion, bond energies, resonance energies- heats of solution (Integral and differential) and heat of dilution. Heats of reaction at constant volume and at constant pressure. Dependence of the heat of reaction on temperature – Kirchoff's equation.

SEMESTER – I
ALLIED CORE : MATHEMATICS PAPER – I FOR CHEMISTRY

Instructional Hrs: 60

Objectives: 1. To study Binomial, Exponential and logarithmic series.

2. The students will able to handle with confidence a wide range of trigonometric identifies.

3. Able to express linear combinations of sine and cosine in any of the forms R sin ($\theta \pm a$) or R cos ($\theta \pm a$) and familiar with inverse trigonometric functions.

UNIT – I 12 Hrs

Binomial, Exponential and Logarithmic theorems (statements only). Summations related to Binomial, Exponential and Logarithmic series.

UNIT – II 12 Hrs

Theory of equations: Relation between roots and Coefficients, formation and solution of equation with imaginary and irrational roots. Transformations of an equation into.

i) those of the given equation with different signs.
ii) those of the given equation multiplied by a given number.
iii) those of the given equation increased or diminished by a given number
iv) the reciprocals of those of the given equation, Horner's and Newton's methods of finding approximate roots. (correct to two decimal places only)

TRIGONOMETRY

UNIT – III 12 Hrs

Expansions: Expansion of $\cos n\theta$, $\sin n\theta$ and $\tan n\theta$ (n – being a positive integer) Expansion of $\cos^n\theta$, $\sin^n\theta$ in a series of the sines and cosines of multiple of θ. Logarithm of complex numbers: Definition, principal value, separation of real and imaginary parts.

UNIT – IV 12 Hrs

Hyperbolic functions: Euler's formula for $e^{i\theta}$, definition of hyperbolic functions. Relations between the circular and hyperbolic functions, Formula involving hyperbolic functions.

Expansion of sinhx and coshx in powers of x. Inverse hyperbolic functions $\sinh^{-1}x$ and $\cosh^{-1}x$ interms of logarithmic functions. Separation of real and imaginary parts of $\sin(x + iy)$, $\cos(x + iy)$, and $\tan(x + iy)$.

UNIT – V 12 Hrs

Fourier series: Definition, finding Fourier co–efficients for a given periodic function with period 2π odd and even functions, half range series.

Text Books:

1. Ancillary Mathematics Book I T.K.M.PILLAY & Others.
2. Trigonometry – TKM Pillay and T.Natarajan.

SEMESTER – I
ALLIED CORE : MATHEMATICS PAPER – II FOR CHEMISTRY

Instructional Hrs: 75

Objectives: 1. The students able to know the basic concepts of derivatives and Leibniz formula for n^{th} derivative.

2. To find the reduction formulae and to evaluate multiple integrals.

3. To find the approximate root of a given equation by using different methods in Numerical methods.

UNIT –I 15 Hrs

Higher order derivatives: n th derivative of standard functions. Leibnitz theorem (statement only) Application to simple problems.

Partial differentiation: Total differential Co-efficient – partial derivatives of a function of two functions – Jacobian of three variables.

UNIT –II 15 Hrs

Bernoulli's formula for integration by parts – Definite integrals – (properties and problems) – Reduction formula for

$\int e^{ax} x^n dx$, $\int \sin^n x\, dx$, $\int \cos^n x dx$,

$\int \sin^m x \cos^n x dx$, $\int e^{-x} x^n dx$,

$\int_0^{\pi/2} \sin^n x\, dx$, $\int_0^{\pi/2} \cos^n x dx$, $\int_0^{\pi/2} \sin^m x \cos^n x dx$

and problems based on these

Evaluation of integrals of type:

$$\int \frac{dx}{\sqrt{(x-a)(b-x)}}, \quad \int \sqrt{\frac{(x-a)}{(b-x)}}\, dx, \quad \int \sqrt{(x-a)(b-x)}\, dx \text{ and } \int \frac{dx}{a^2\cos^2 x + b^2 \sin^2 x + c}$$

UNIT –III 15 Hrs

Multiple integrals: Definition, evaluation of the double and trible integrals in simple cases – double integrals only in Cartesian Co-ordinates.

UNIT –IV 15 Hrs

Solution of Algebraic and Transcendental equations: Introduction – Bisection method – Newton – Raphson method.

Solution of simultaneous, linear equations: Gauss elimination method, Gauss seidel method and Games Jacobi's method.

UNIT –V 15 Hrs

Numerical Differentiation and Integration: Newton's formula for derivatives – Trapezoidal rule – Simson's rules.

Solution of ordinary differential equations:
Taylor's series method – Euler's method – Modified Euler's method.

Text Books:

1. Ancillary Mathematics Book II – T.K.Manickkavasagam Pillay, S.Narayanan.
2. Introductory method of Numerical Analysis –S.S.Sastry.

QUESTION PAPER PATTEREN

CORE SUBJECTS IN B.Sc. MATHEMATICS,
ALLIED SUBJECTS IN B.Sc. Physics / Physics (CA) / Chemistry
MAX. MARKS: 75

SECTION –A

MARKS: 5 x 2 =10

UNIT – I 1 or 2
UNIT – II 3 or 4
UNIT – III 5 or 6
UNIT – IV 7 or 8
UNIT - V 9 or 10

SECTION –B

Marks: 5 x 4 = 20

UNIT – I 11 or 12
UNIT – II 13 or 14
UNIT – III 15 or 16
UNIT – IV 17 or 18
UNIT - V 19 or 20

SECTION –C

Marks: 5 x 9 = 45

UNIT – I 21 or 22
UNIT – II 23 or 24
UNIT – III 25 or 26
UNIT – IV 27 or 28
UNIT - V 29 or 30

In Section C Sub divisions may be numbered as a, b if necessary

ALLIED BOTANY

(SYLLABUS FOR CHEMISTRY MAIN STUDENTS)
(Effective from 2017-18 batch onwards)

SEMESTER - I
PAPER – I: GENERAL BOTANY – I

Instructional hrs: **105**
Objectives: 1. To get a basic knowledge about major plant communities
2. To study the basic cytological and embryological characters
3. To know the basics of genetics

UNIT – I **24 Hours**
Algae :- Structure and reproduction of *Nostoc, Chlorella* and *Gracillaria*.
Fungi :- Structure and reproduction of *Saccharomyces and Penicillium*. Economic importance of Algae & Fungi, Algal Biofertilizer – Mass Culture and Application of Blue Green Algae.

UNIT – II **20 Hours**
Bacteria :- Structure, Nutrition, Reproduction & Economic importance. **Viruses**: General characters, structure and multiplication of TMV and T4 Bacteriophage; Virus Transmission.

UNIT – III **20 Hours**
Plant Taxonomy:- General Characters and economic importance of the following families: Annonaceae, Capparidaceae, Rutaceae, Cucurbitaceae, Acanthaceae, Lamiaceae and Poaceae. Herbarium Techniques.

UNIT – IV **21 Hours**
Cytology :- Ultra structure of Plant Cell, Ribosome, Chloroplast, Mitochondria, Nucleus and Chromosome. **Embryology**: - Structure of Mature Anther, Ovule and Embryo sac. Types of endosperms.

UNIT – V **20 Hours**
Genetics :- Structure and Functions of DNA and RNA; Laws of Mendel; Interaction of factors- Monohybrid and Dihybrid Cross and Complementary; Mutation types:- Physical and Chemical (Outline only) and Mutagens.

Text books:

1. Pandey, B.P. Algae.
2. Pandey, B.P. Fungi.
3. Pandey, B.P. College Botany Vol. I.
4. Vasishta, P.C. Taxonomy of Angiosperm.
5. Pandey, B.P. Plant anatomy.
6. Gupta S.K. Embryology of Angiosperms.
7. Meyyan, R.P. Genetics.

DEPARTMENT OF BOTANY

Question Paper Pattern

(Common for B.Sc., Botany, Allied Botany and Major Optional students with effect from 2017-2018 Batch and onwards)

Total Marks: 75 **Time: 3 Hours**

SECTION - A (10 x 1 = 10 Marks)

Short Answer Questions. Answers should be in **one** or **two** sentences. Two questions from each unit.

(Question numbers from 1 to 10)

SECTION - B (5 x 5 = 25 Marks)

Answer **ANY FIVE** of the following. Answers not exceeding **two pages** (Open choice – **FIVE** out of **SEVEN** questions)
Questions should be distributed in all the units and not more than **TWO** questions from one unit

(Question numbers from 11 to 17)

SECTION - C (5 x 8 = 40 Marks)

Answer **ANY FIVE** of the following Answers not exceeding **two pages** (Open choice **– FIVE** out of **SEVEN** questions covering all the **FIVE** units and not more than **TWO** questions from one unit)

(Question numbers from 18 to 24)

SEMESTER-II

CORE: GENERAL CHEMISTRY-II

Instructional Hrs: 90

Objectives:
1. To learn about preparation and properties of rare and inter halogen compounds.
2. Understanding the basic concepts of reaction mechanism of organic compounds.
3. To understand second law of thermodynamics and the ability to use the power of computers in applications in chemistry.

UNIT-I **18Hrs**

Comparison of the properties of rare gases. Occurrence- isolation-uses of inert gases. Comparative study of halogens. Oxides and oxy acids of halogens (structure only). Interhalogens compounds: Preparation, properties, structure and uses. Pseudohalogens - Preparation, Properties and uses of cyanogen and thiocyanogens - comparision of pseudohalogens with halogens. Chemistry of astatine.
Oxygen family: Ozone and hydrogen peroxide – preparation, properties, structure and uses. Per acids of sulphur- preparation, properties and structure.

UNIT-II **18Hrs**

Alkynes: IUPAC nomenclature, Acidity of alkynes – Addition of water, $HgSO_4$ catalyst, Hydroboration and formation of alkynides ozonolysis, reduction using Lindlar catalyst. Benzene: Resonance structure.
Electrophilic Substitution reaction: Mechanism of nitration, sulphonation, Halogenation, Friedel-craft's alkylation (its use in the preparation of alkyl and acyl benzenes), diazo couping. Orientation and reactivity in disubstitution (directive influence). Aromaticity: Huckel's (4n +2) rule- Benzenoid aromatic compounds and non-benzenoid aromatic compounds-cyclopentadienyl anion and tropylium cation.

UNIT-III **18Hrs**

Polynuclear hydrocarbons: Naphthalene and antracene – isolation, properties, synthesis and uses.
Aliphatic nucleophilic substitutions: Mechanism of SN^1, SN^2 and SN^i reactions- Effect of structure of substrates, nucleophiles, solvents and leaving groups.

Elimination:
Mechanism of E1, E2 and cis elimination. Hofmann and saytzeff's rules.
Elimination Vs substitution. Relative reactivity of Ethyl, Methyl, Vinyl and benzyl halides towards substitution. Neighbouring group participation. Aromatic nucleophilic substitution- intermediate complex and benzyne mechanisms.

UNIT-IV **18Hrs**

Second law of thermodynamics:
Different statements:
Entropy: Definition- Entrophy changes in isothermal transformations. Trouton's rule, Relation of the entropy changes in the other properties of the system. Entropy as a function of temperature and volume. Entropy as a function of temperature and pressure. The temperature dependence of entropy. Entropy changes in the ideal gas. Standard state for the entropy of ideal gas. Entropy of mixing of ideal gases.
Spontaneity and Equilibrium: The Clausius inequality. The general conditions for equilibrium and spontaneity. Definition of the Helmholtz free energy A and
Gibbs free energy G. Conditions for equilibrium and spontaneity under constraints. Driving forces for natural changes. The fundamental equations of thermodynamics. Maxwell relation. Thermodymic equations of state. The properties of A and G.Temperature dependences of the free energy and the Gibb's Helmholtz equation.

UNIT –V **18Hrs**

Fundamentals of computers - computer system organization - the operating systems-DOS commands-problem solving in computers - algorithm-flow chart-program execution-fundamentals of Basic language-character set-constants and variables- operators- flow chart and program-to compute normality, molality and molarity values for the given solution- rate constant and half life for a first order reaction-molecular weight from osmatic pressure.

SEMESTER – II

ALLIED CORE : MATHEMATICS PAPER –III FOR CHEMISTRY

Instructional Hrs: 60

Objectives: 1. To know the basic concepts of ordinary and partial differential equations.

2. To study the Laplace transforms.

3. To define fourier transform and use it to solve wave and heat equations.

UNIT –I 12 Hrs

Equations of first order but not of the first degree; i) equations solvable for p, ii) equations solvable for y, iii) equations solvable for x & iv) Clairaut's form (Simple cases only).

HIGHER ORDER:

Linear differential equations of higher order with constant co-efficients. Evaluation of particular integral of the equation – special methods; when x is x^m, or x^m v, e^{ax} v where v is a function of x of the form e^{bx} or Sin ax or cos ax or x^m.

UNIT –II 12 Hrs

PARTIAL DIFFERENTIAL EQUATIONS:

Formation of partial differential equations by eliminating arbitrary constants and arbitrary functions. Definition of complete solution, singular solution, general solution. Solution of first order equation in their standard forms: i) f (p, q) = 0 ii) f_1 (p, x) = f_2 (q, y), iii) f= px+ qy + f (p, q) iv) f_1(x, p, q) = 0, f_2(y, p, q) = 0, f_3 (z, p, q) = 0

UNIT –III 12 Hrs

LAPLACE TRANSFORMS:

Transforms of functions e^{-at}, sinat, cosat sinhat coshat and t^n where n is a positive integer. First shifting theorem. Inverse Laplace transforms relating to the above standard forms.

UNIT –IV 12 Hrs

Fourier Transforms - Infinite F.T. – Properties of F.T. – Shifting theorem – convolution theorem – Infinite Fourier Cosine Transform – Sine Transform – Fourier Transform of derivatives – Applications of Boundary value problems – Wave equation - Heat equations.

UNIT –V 12 Hrs

Finite F.T. - Sine Transform - Consine Transform – Inversion Formula – Applications of Boundary value problems - Wave equation- Heat equations.

Treatment Books:

1.Calculus Vol – III TKM Pillai, S.Narayanan.
- for Unit – I, Unit – II, Unit – III

2.Engineering Mathematics – Vol 3 – by P.Kandasamy.
- for Unit-IV, Unit - V

SEMESTER – II
ALLIED CORE: MATHEMATICS PAPER –IV FOR CHEMISTRY

Instructional Hrs: 75

Objectives: 1. To provide students with skills in using algebra as a main tool in investigation and useful properties of configurations involving points, straight lines and curves.

2. Develop the skills and ability to work efficiency in this field.

3. To analyze and solve word problems in practical situations.

UNIT –I System of Circles 15 Hrs

Radical axis of two circles – Orthogonal circles – coaxial system – Limiting points.

UNIT –II 15 Hrs

Ellipse: Co-Normal and concyclic points – conjugate diameters of an ellipse.
Hyperbola: Conjugate diameters of hyperbola.

UNIT–III Polar Equations: 15 Hrs

Distance between the points – Transformation of polar Co-ordinates into Cartesian Co-ordinates – Area of a triangle – Equation of a straight line- parallel and perpendicular straight

Lines –Chord joining the points – polar equations of a conic of the form $\frac{|}{r} = 1 + e\cos\theta$

(Except tracing of the conic and pair of tangents to the conic $\frac{|}{r} = 1 + e\cos\theta$)

UNIT –IV Three Dimensions 15 Hrs

The plane: General equation – Equation of the plane making intercepts a, b, c on the Co-ordinate axes – The equation of the plane in terms of the direction cosines. Angle between two planes – Length of the perpendicular – Equation of plane passing through the line of intersection of two given planes. ___

The straight Line:

Equation of the line – condition of intersections – The shortest distance between the lines.

UNIT –V 15 Hrs

The Sphere

Equations of a sphere-tangent plane section of a sphere – Intersection of two spheres – Equation of a circle – Equation of a sphere through a given circle.

Treatment as in

Analytical Geometry, Part-I – Two Dimensions T.K.M.Pillay and T.Natarajan, S.Viswanthan(Printers & Publisher) PVT.Ltd. (2005).

Unit – I – Chapter V – Sections 1,2,2.1,4,4.1,4.2,4.3,5,5.1).
Unit – II – Chapter VII – Sections 12, 12.1, 13, 15, 16.1, 16.3

Treatment as in:

Ancillary Mathematics Book IV by T.K.M.Pillay and others, S.Viswanthan (Printers & Publisher PVT.Ltd. (1994)

Unit – III – Chapter – I – Sections 1 to 2 (except 9.2)
Unit – IV – Chapter – II – Sections 1 to 8, Chapter-III – Sections 1 to 7.
Unit – V – Chapter – IV – Sections 1 to 9

QUESTION PAPER PATTEREN

CORE SUBJECTS IN B.Sc. MATHEMATICS,
ALLIED SUBJECTS IN B.Sc. Physics / Physics (CA) / Chemistry

MAX. MARKS: 75

SECTION –A

MARKS: 5 x 2 =10

UNIT – I	1 or 2
UNIT – II	3 or 4
UNIT – III	5 or 6
UNIT – IV	7 or 8
UNIT - V	9 or 10

SECTION –B

Marks: 5 x 4 = 20

UNIT – I	11 or 12
UNIT – II	13 or 14
UNIT – III	15 or 16
UNIT – IV	17 or 18
UNIT - V	19 or 20

SECTION –C

Marks: 5 x 9 = 45

UNIT – I	21 or 22
UNIT – II	23 or 24
UNIT – III	25 or 26
UNIT – IV	27 or 28
UNIT - V	29 or 30

In Section C Sub divisions may be numbered as a, b if necessary

PAPER – II: GENERAL BOTANY – II

Instructional hrs: **105**

Objectives: 1. To study the impact of biotechnology
2. To know the functions of metabolic activities of plants
3. To study the Nitrogen fixing mechanism

UNIT – I **21 Hours**

Biotechnology: Scope and importance. **Impact of Biotechnology on Human Welfare** (Healthcare and Agriculture); Biotechnology in India and Global Scenerio; Plant tissue culture – preparation of medium (MS medium), Sterilization and culture techniques.

UNIT – II **21 Hours**

Physiology: T**ranspiration:-** Types and Factors affecting Transpiration and Significance. **Photosynthesis**:- Mechanism, Light reaction, Photophosphorylations (cyclic and non-cyclic), Dark reaction (C3 cycle), factors influencing.

UNIT – III **21 Hours**

Respiration: Glycolysis, Kreb's cycle and E.T.S.(Oxidative phosphorylation).
Cellular enzymes: Structure, composition, properties, mode of action and classification.

UNIT – IV **21 Hours**

Ecology: Morphological and Anatomical features of Hydrophyte (*Hydrilla*), Xerophyte (*Nerium*) and Halophyte (*Rhizophora*). Structure and Function of Pond and Forest Ecosystem. Vegetational type of India.

UNIT – V **21 Hours**

Pharmacognosy: Definition; Ancient systems of medicine (Siddha, Ayurveda and Unani). Basic Outline of Drugs and Adulteration. Sources of Drugs:- Leaf (*Centella*), Rhizome (Turmeric) and Seed (Neem),

Text books:

1. Kumaresan, V. Biotechnology.
2. Jain, V.K. Plant physiology.
3. Kumaresan, V. Plant ecology and Phytogeography.
4. Sharma,P.D. Ecology and environment

PRACTICAL: GENERAL BOTANY I & II

(Instructional Hours: 30)

a) Description of plants in technical terms and assigning them to their respective families prescribed in the syllabus.
b) A detailed study of the genera given under cryptogams.
c) Microslides, book diagrams, photographs and 2" x 2" photo-slides of bacteria and viruses.
d) Physilogy: Experiments to demonstrate the physiological activities mentioned in the syllabus.
e) Ecology: A study of morphological and anatomical features of hydrophytes and xerophytes.
f) Cytology: Book diagrams / photographs / 2" x 2" slides to show structure of plant cell / cell organelles.
g) Embryology: Micro-slides showing mature anther, ovule, embryo sac and endosperm.

DEPARTMENT OF BOTANY

Question Paper Pattern

(Common for B.Sc., Botany, Allied Botany and Major Optional students with effect from 2017-2018 Batch and onwards)

Total Marks: 75 **Time: 3 Hours**

SECTION - A (10 x 1 = 10 Marks)

Short Answer Questions. Answers should be in **one** or **two** sentences. Two questions from each unit.

(Question numbers from 1 to 10)

SECTION - B (5 x 5 = 25 Marks)

Answer **ANY FIVE** of the following. Answers not exceeding **two pages** (Open choice – **FIVE** out of **SEVEN** questions)
Questions should be distributed in all the units and not more than **TWO** questions from one unit

(Question numbers from 11 to 17)

SECTION - C (5 x 8 = 40 Marks)

Answer **ANY FIVE** of the following Answers not exceeding **two pages** (Open choice **– FIVE** out of **SEVEN** questions covering all the **FIVE** units and not more than **TWO** questions from one unit)

(Question numbers from 18 to 24)

SEMESTER- I & II
MAJOR CORE PRACTICAL - I

Instructional Hrs: 90

Inorganic Qualitative Analysis

Objectives: 1. The ability to work effectively and safely in a laboratory environment.
2. To develop the basic skill in finding the inorganic ions.
3. The ability to work in the preparation of inorganic complexes.

a) Qualitative Inorganic analysis (Semi micro method) Reactions of the following radicals

Cations – Lead, copper, bismuth, aluminium, zinc, cobalt, nickel, Calcium, strontium, barium, magnesium, ammonium.

Anions – carbonate, sulphate, nitrate, fluoride, chloride, bromide, Oxalate, arsenite, borate, phosphate

i) Analysis of a mixture containing two cations and two anions of which one will be an interfering ion.

SEMESTER-III
CORE: GENERAL CHEMISTRY – III

Instructional Hrs: 75

Objectives:
1. To learn about the periodic properties of elements.
2. Understanding the basic concepts of organic oxidation and reduction reactions.
3. To understand third law of thermodynamics and its evaluation.

UNIT-I **15Hrs**

Interfering anions – nature of interference and method of elimination – chemistry behind the identification and confirmation of the various cations and anions.
Chemistry behind the separation of cations in to groups – solubility product and commonion effect.

Nitrogen family: Comparative study of nitrogen group elements. Chemistry of hydrazine and hydroxyl amine. Carbon family: Comparative study of carbon group elements, chemistry of Carborundum and Boron Carbide.

UNIT – II **15Hrs**

Boron family: Comparative study of Boron group elements. Preparation, properties and structure of diborane and borazole. Alums.
General Principles of metallurgy: Concentration of ores – froth flotation, gravity separation, magnetic separation. Isolation of metals - chemical reduction, metal displacement and complex formation followed by metal displacement. Refinning of metals- Electrolysis, Van-Arkel process, Zone refining.

Alkalimetals: A Comparative study of alkalimetals - Diagonal relationship between Li &Mg.

Alkaline earthmetals: Comparative study of Alkaline earth metals. Barilium- extraction and uses. Plaster of Paris.

UNIT-III **15Hrs**

Carbonyl Polarization: Reactivity of carbonyl group- acidity of α – hydrogen,
Mechanism of Aldol condensation, Perkin, Knoevenagal, Witig, Reformatsky,
Cannizaro, haloform reactions and Micheal additions.
Mechanisms of reduction of Carbonyl compounds- $LiAlH_4$, $NaBH_4$ Wolf-Kishner,Meerwin -pondorf Verley, Clemmensen, 1, 3- dithiane, Rosenmund reduction, Bayer - Villiger oxidation, Oppenauer oxidation, Darkin reaction.

UNIT-IV **15Hrs**

Carboxylic acids:

Halogenation of aliphatic acids – H.V. Z. reaction. Dicarboxylic acids: preparation and properties of oxalic, malonic, succinic and adipic acids.

Hydroxy acids: Preparation and properties of citric acid.

Preparation and synthetic uses of acetoacetic ester and malonic ester- Keto - enol tautomerism. Other tautomerisms – amido – imido and nitro – acinitro. Differences between tautomerism and resonance.

UNIT-V **15Hrs**

System of variable composition – chemical equilibrium – the concept of chemical potential- The properties of chemical equilibrium in a mixture of ideal gases. De Donder's concept of degree of advancement of the reaction- deviation and application of the Van't Hoff reaction Isotherm. Equilibrium constants – Kp, Kc and Kx- Temperature dependence of the equilibrium constant. The Van't Hoff isochore. Thermodynamic interpretation of the Lechatelier principles. The Gibbs-Duhem Equation.

The Third Law of Thermodynamics:

Need for the third law-the formulation of third law- contribution of Richards, Nernst and Planck. Evaluation of third law- thermal entropies. Exception to the third law.

SEMESTER – III

ALLIED CORE PHYSICS FOR CHEMISTRY

Instructional Hrs: 90

Objectives: 1. To acquire basic knowledge of Elasticity, Viscosity, Sound, Wave Mechanics and Relativity.

2. To apply the laws of Thermodynamics to Thermodynamical system.

3. To understand the important concepts in Electricity, Magnetism and Electronics.

UNIT – I: 18 Hours

Elasticity: Stress, Strain – Hooke's law – Types of modului of elasticity – Bending of beams – expression for bending moment – Experimental determination of Young's modulus by Uniform and Non – uniform bending – Theory of Compound Pendulum – Determination of 'g' – Torsional Pendulum – Determination of Rigidity modulus of a wire.

Viscosity: Newton's law of viscosity – Stream line flow – Turbulent flow – Poiseuille's formula for low Viscous liquid and Viscosity of a gas.

UNIT – II: 18 Hours

Thermodynamics: Zeroth law of thermodynamics – First law of thermodynamics – Isothermal, Adiabatic, Isochorie, Isobaric processes – Second law of thermodynamics – Carnot's Ideal heat engine – Carnot's cycle – Efficiency of Carnot's Engine – Third law of thermodynamics.

Thermal Conduction:Co-efficient of thermal conductivity – Temperature gradient – Dimensional formula – Thermal Diffusivity- Lee's Disc method of determining the thermal conductivity of a bad conductor.

Sound: Production of Ultrasonic Waves: Piezo electric method – Applications – Doppler Effect – Derivation.

UNIT –III: 18 Hours

Wave Mechanics: Foundation of Wave Mechanics – Inadequacy of Classical Mechanics – De-Broglie concept of Matter Waves – De-Broglie wavelength – Wave velocity, Group velocity and Phase velocity of De-Broglie waves – Experimental study of Matter Waves – G.P. Thomson's experiment – Heisenberg's Uncertainty Principle – Experimental verification – Diffraction of a beam of electron by a slit.

Relativity: Theory of relativity – Frames of reference – Galilean transformation equation – Postulates of special theory of relativity – Lorentz transformation equation – Length contraction, Time dilation – Addition of velocities – Variation of mass with velocity – Mass Energy equivalence.

UNIT – IV: **18 Hours**

Electromagnetic induction: Faraday's and Len's laws of electromagnetic induction – Self-induction – Anderson's method of determining Self-induction – Mutual induction – Determination of Mutual inductance.

Alternating current: Helmholtz equations of varying currents – Growth and decay of current in a circuit containing a resistance and an inductance - Charging and Discharging of a capacitor through a resistor – Principle of production of A.C – Average and RMS value of an alternating current.

UNIT – V: **18 Hours**

Electronics:P-N Junction diode:Effect of temperature on barrier voltage across the PN Junction – Width of the depletion region and percentage of dopping – Zener and Avalanche breakdown at a PN Junction – Limitations in the operating conditions of a PN Junction.

Special diodes:Construction, characteristics and application of zener diode, light emitting diode (LED), Photo diode and thermistors.

Transistor: Transistor - Transistor action - Characteristics of CB and CE configuration.

Books for study:

1) Properties of matter – Brijlal and N. Subramanyam.
2) Thermodynamics – Brijlal and N.Subramanyam.
3) Sound – Brijlal and N.Subramanyam.
4) Modern physics – R. Murugesan.
5) Electricity and magnetism – R. Murugesan.
6) Principles of Electronics – V.K. Metha.

Books for Reference:

1) Properties of matter, Sound of Thermal physics – R. Murugesan.
2) Electricity and magnetism – R. Murugesan.
3) A text book of applied electronics – R.S. Sedha.
4) Quantum Mechanics – Sathya Prakash.

DEPARTMENT OF PHYSICS
COURSE: B.Sc. Physics
QUESTION PAPER PATTERN

(Major, Elective, Skilled Based Paper, Major Optional, Allied Optional Subjects)

Time: 3 Hours **Max. Mark :75**

SECTION – A (10 * 1 = 10 Marks)

Answer ALL questions
Question Numbers : 1 to 10
Type : Objective type questions
No. of questions from each unit : 2

SECTION – B (5 * 4 = 20 Marks)

Answer ALL questions
Question Numbers : 11 to 15
Type of answer : Either or type; short answer
No. of questions from each unit : 1
(At least two subdivisions in this section may be problem)

SECTION – C (5 * 9 = 45 Marks)

Answer ALL questions
Question Numbers : 16 to 20
Type of answer : Either or type; Essay type
No. of questions from each unit : 1

SEMESTER-IV
CORE: GENERAL CHEMISTRY – IV

Objectives: 1. To understand the basic properties of d-block elements.
2. Understand the basic chemical and structural features of phenols and oxidation of alcohols.
3. Understanding the applications of 'C' programming in chemistry.

UNIT-I **15Hrs**

d- Block element-General characters of d-block elements. A comparative study of iron group elements.

A comparative study of copper group elements.

Fundamentals of C-programming-variables - characters-constants-operators-statement in 'C'.

Programs in 'C'-program for addition-program to compute Molarity and Normality.

Computer software in chemistry-chemical inventory system-electronic hand books-chemical.

structure and information database-molecular modeling program-chem.office-chem draw. Internet- Chemistry software site. Bio-informatics.

UNIT- II **15Hrs**

Phenols – Acidity of Phenol, explanation on the basis of the resonance stabilization.

Preparation of phenol: Reaction of monohydric phenol with mechanism – alkylation, acylation. Mechanism of Kolbe, Reimer – Tiemann, Gattermann, Houben-Hoesch reactions. Di and trihydric phenols – preparation and properties of catechol, resorcinol, Phloro glucinol, Alpha and Beta naphthols – Preparation and properties.

UNIT – III **15Hrs**

Oxidation of alcohols – Jones reagent, Pyridinium Chlorochromate, (PCC), Pyridinium dichromate (PDC), DMSO, DCC.Oxidative cleavage of 1, 2 – diols – Lead tetra acetate and periodic acid Nitromethane – preparation and properties. Aliphaticamines: preparation – reduction of alkyl cyanide, nitro compounds, Hoffmann degradation, Gabriel synthesis, curtius degradation. Comparison of properties of primary, secondary and tertiary amine. Separation of mixture of amines – Hoffmann and Hinsberg method. Diazo methane preparation and synthetic uses.

UNIT-IV **15Hrs**

Phase rule – phase equilibria in simple systems: The equilibrium conditions: Stability of phase of pure substance. Pressure dependence of μ versus T curves – The Clapeyron and Clapeyron – Clausius equation. Derviation of Gibb phase rule. Phase equilibria in one composent system – the phase diagrams for sulpur, H_2O and CO_2.

Solutions:

The ideal solution and colligative properties: Kinds of solution, definition of ideal solution. Chemical potential of the solute in a binary ideal solution – application of the Gibb's – Duhem equation.

Colligative properties: Relative lowering of vapour pressure, the freezing point depression, Elevation of boiling point, Osmatic pressure – Nernst Distribution law.

UNIT-V **15Hrs**

Solution of liquids:

The ideal and ideal dilute solution of one liquid in another – Raoult's law and Henry's law. Non – ideal solutions – Basic ideas regarding activity and activity coefficients.

Phase equilibria between condensed phases:

Liquid-liquid equilibria – temperature – composition diagram. Fractional distillation – azeotropes. Partially miscible liquid system. Phenol/water, triethylamine/water and Nicotine/water systems. Completely immiscible liquids – steam distillation.

SEMESTER – III & IV
MAJOR CORE PRACTICAL – II & III

Instructional Hrs: 90

Objectives: 1. To develop the experimental skill in volumetric analysis.
2. The ability to analyze the organic compounds.
3. The improve the practical skill in the preparation of organic compounds.

a) Volumetric Analysis

1) Acidimetry – alkalimetry
i) Estimation of Na_2CO_3

2) Permanganometry
i) Estimation of oxalic acid
ii) Estimation of ferrous ion

3) Dichrometry
i) Estimation of ferrous ion using internal indicator

4) Iodimetry
i) Estimation of copper
5) Complexometry
i) Estimation of Zn using EDTA
ii) Estimation of Mg using EDTA

b) Organic analysis & preparation of organic Compounds

6) Characterization of organic compounds by their functional groups and confirmation by preparation of derivatives.

<u>The following organic substances to be given</u>

Aromatic amines, ketones (acetophenone, benzophenone) aromatic aldehydes,
Aromatic acids, aliphatic acids (succinic acid)
Amides, phenols, naphthol (2 – naphthol), carbohydrates,
Aromatic nitro compounds, esters.

7) Preparation involving
a) Oxidation (benzaldehyde to benzoic acid)
b) Hydrolysis
c) Bromination
d) Acetylation

SEMESTER – IV
MAJOR CORE PRACTICAL – IV

Instructional Hrs: 30

Objectives: 1. To develop computer knowledge.
2. To develop computer program.
3. To know the internet application in chemistry.

Computer Applications in chemistry:

1. Program to compute Molarity and Normality of a solution.
2. Program to convert Fahrenheit to Centigrade.
3. Program to calculate the molecular weight of a molecule.
4. Program to calculate the average velocity and RMS velocity.
5. Entering data using windows excel and drawing graphs – Line graphs, Bar graph, Pie chart.
6. Chemical inventory system – using database for tracking chemicals and supplies.
7. Chemical structure and information database – applications.
8. Chem office – Drawing, modeling and Information.
9. Molecular modeling program.
10. Internet applications for chemistry.

References:

1. Computers in chemistry – K.V.Raman – Tata Mccraw – Hill
2. Computers and their applications in chemistry – Ramesh Kumari – Narosa Publishing House.
3. Computer applications in chemistry – Kishor Arora – Anmol Publications.

ALLIED CORE PHYSICS PRACTICALS

For B.Sc. Mathematics and Chemistry

SEMESTER – I & II / III & IV

Instructional Hrs: 90

Objectives: To get the practical knowledge of Mechanics, Properties of matter, Optics, Electricity and Magnetism.

Any Sixteen Experiments:

1. Young's modulus – Non uniform bending – Pin & Microscope.
2. Young's modulus – Uniform bending – Pin & Microscope.
3. Young's modulus – Static Cantilever.
4. Rigidity modulus – Static Torsion.
5. Rigidity modulus – Torsional Pendulum.
6. Y, n & σ – Searle's method.
7. Acceleration due to gravity – Compound Pendulum.
8. Specific heat of a liquid – Cooling Method.
9. Thermal conductivity – Lee's Disc method.
10. Joule's Calorimeter.
11. Sonometer – A. C. Frequency.
12. Spectrometer – Solid Prism.
13. Spectrometer – Hollow Prism.
14. Spectrometer – Grating – Minimum Deviation.
15. Newton's Rings – Radius of Curvature.
16. Air Wedge – Thickness of a wire.
17. Meter Bridge – Specific Resistance.
18. Meter Bridge – Temperature Co-efficient.
19. Potentiometer – Ammeter – Calibration.
20. Potentiometer – Low Range – Voltmeter – Calibration.
21. Moment of magnet – TanC Position.
22. Moment of magnet – Circuit Coil.
23. Characteristics of Junction & Zener Diodes.
24. Verification of Truth Tables of Logic Gates: AND, OR, NOT, NAND and NOR.
25. Verification of Demorgan's theorems – digital ICs.

SEMESTER - V
CORE: INORGANIC CHEMISTRY

Instructional Hrs: 60

Objectives: 1. To understand the chemistry of inner transition elements and co-ordination compounds.
2. To learn about basic knowledge in analytical chemistry.
3. To develop the knowledge in modern science like Nano chemistry.

UNIT: I **12Hrs**

Inner transition elements – Lanthanides – General characteristics of lanthanides – electronic structure – oxidation state – color and spectra – magnetic properties – lanthanide contraction- isolation of lanthanides by ion – exchange and solvent extraction method.

Actinides: General properties – oxidation state – electronic configuration – actinide contraction. Comparision between lanthanides and actinides – Transactinide elements – IUPAC naming – Extraction and uses of thorium and uranium.

UNIT – II **12Hrs**

Co-ordination compounds: IUPAC Nomenclature – Theories of Co-ordination Compounds – Werner's, Sidgwicks, VB, Crystal field, M.O. and their limitations.

Isomerism in Co-ordination compounds: Geometrical and optical isomerism in square planar, tetrahedral and octahedral complexes. Stability of Co-ordination complexes – factors affecting stability – substitution reactions in octahedral and square planar complexes.

UNIT- III **12Hrs**

Data analysis – Types of errors – idea of significant figures and its importance – Accuracy – methods of expression of accuracy – Error analysis – minimizing errors – precision – average deviation – standard deviation and confidence limits. Chromatographic techniques – principle of adsorption, thin layer, paper and column chromatography. Column chromatography – adsorbents, preparation of column, adsorption, elution, recovery of substances and applications. TLC – choice of adsorbent and solvent, preparation and applications $-R_f$ value paper chromatography – principle and solvents used, factors affecting R_f value – separation of amino acid mixtures.

UNIT – IV **12Hrs**

Principle, Experimental techniques and instrumentation and application of gas chromatography and high performance liquid chromatography.

Thermogravimetric and differential thermal analysis – principle – instrumentation. Characteristics of TGA and DTA curves. Factor affecting TGA and DTA curves. Thermometric titration – Application of TGA and DTA.

UNIT – V **12Hrs**

Nano science – Introduction – definition – types – quantum dots, wire and wells, nano rods, fullerenes and Carbon nanotubes – nanowires and crystals, nano composites and clusters – properties of nano materials – plasmon resonance. Preparation of Nano structured materials – Bottom up and Top down approaches – methods of preparation of nano materials – plasma arching, chemical vapour deposition, electrodeposition, sol -gel synthesis, ball-milling and use of natural nano particles.

Applications of Nanomaterials – catalysis, environmental and biomedical (drug delivery) applications. Nanomaterials – environmental hazards.

References:

1. M.Wilson, K.Kannangara, G.smith, M.Simmons and B.Ragase, Nanotechnology (2005)
2. R.Booker and E.Boysen, Nanotechnology (2007)
3. G.Timp, Nanotechnology
4. J.Ying, Nanostructured Materials
5. C.P.Poole Jr, F.J.Owens. Introduction to Nanotechnology.

SEMESTER – V
CORE : ORGANIC CHEMISTRY – I

Instructional Hrs: 60

Objectives: 1. To learn about the molecular rearrangements.
2. Understanding the basic concepts of stereoisomerism and geometrical isomerism.
3. To understand polymer science and structural elucidation of natural products.

UNIT- I **12Hrs**

Molecular rearrangements: Mechanism of pinacol – pinacolone (migratory aptitude), Beckmann, Hoffmann, curtius, Schmidt, Benzilic acid, Claisen, Cope and Fries arrangements. Difference between inter and intramolecular nature.

UNIT – II **12Hrs**

Stereoisomerism: Definition – classification into optical and geometrical isomersm. Optical isomerism – optical activity – specific rotations – condition for optical activity-stereogenic centre – chirality. Elements of symmetry – Enantiomers, dia stereomers and mesomers and their physical and chemical properties. Recermization – resolution – Asymmetric synthesis – Waltan inversion.
Projection formulae: Fisher and Sawhorse, erythro and threo representations.
Configuration – D, L and R, S. notations for optical isomers with one and two asymmetric Carbon.
Optical activity of biphenyls, allenes and spiranes.

UNIT – III **12Hrs**

Geometrical isomerism – Alkenes – cis – trans and E-Z notations. Geometrical isomerism in maleic, fumaric acids and in unsymmetrical oximes – methods of distinguishing geometrical isomers (dipolemoment, dehydration, cyclization and m.pts). Cis – trans isomerism in cyclopropane. Conformational analysis – Introduction of terms (conformation, conformer, configuration, dihedral angle, torsional strain, conformational analysis). Conformational analysis of ethane, n- butane and cyclohexane - axial, equatorial bonds and cis – trans – isomers in cyclohexane (chair form only) stability of cis and trans decalins - Elementary treatment.

UNIT – IV **12Hrs**

Macro molecule:

Polymer – definition and classification. Polymerisation – condensation, addition, radical chain, ionic and co – ordination and copolymerization.

Molecular weight concept:

Number, weight and viscosity average molecular weight . Measurement of molecular weights. Ebullioscopic, cryoscopic and ultracentrifuge methods.

Crystals structure and physical properties of polymer – crystalline melting point, Tm – the glass transition temperature, Tg. Relationship between Tm and Tg.

Polymer degradation – definition – oxidative and photo degradation.

UNIT – V **12Hrs**

Terpenes – Distinction between terpenes and terpenoids classification – isoprene – rule – special isoprene rule preparation, properties, structural elucidation and synthesis of geraniol, menthol, α – terpineol, α – pinene and camphor.

SEMESTER – V
CORE: PHYSICAL CHEMISTRY - I

Instructional: Hrs: 60

Objectives: 1. To understand the concepts of electro chemistry.
2. Understand the applications of conductance measurements.
3. Understanding the applications of electrochemical cells and energy storage devices.

UNIT – I **12Hrs**

Electro chemistry:

Electrical conduction – Electrical transport and the ohm's law – conduction in metals and in electrolytic solutions. The Arrhenius theory of electrolytic dissociation and the Ostwald's dilution law.The measurement of conductivity in electrolytic solution.Migration of ion, and the Kohl rauch's law of the independent migration of ion. The idea of strong and weak electrolytes.An Elementary treatment of the Debye – HuckelOnsagar equation for the equivalent conductivity of strong electrolytes.

UNIT – II **12Hrs**

Electrical Conduction:

Conductance at high fields and high frequencies – transference numbers. The determination of transference numbers by the Hittorf method and the moving boundary method.

Application of conductance measurements:

Determination of degree of dissociation of weak electrolyte- determination of dissociation constant of a weak organic acid.Determination of solubility product of sparingly soluble salt.Conductometric titrations.

UNIT – III **12Hrs**

Equilibria in Electrochemical Cells:

Types of reversible electrode: metal / metal-ion, Gas/ion, metal/metal insoluble salt / oxidation – reduction electrodes. Galvanic cells, reversible and irreversible cell. emf and its measurements – Weston saturated standard cell.

Reference electrodes: Standard hydrogen electrode, calomel electrode. Single electrode potential.Measurement of single electrode potentials using reference electrodes.Standard electrode potentials – sign convention. Electrochemical series and its significance: Computations cell Emf.

UNIT – IV **12Hrs**

Temperature dependence of cell Emf.Thermodynamic quantities of cell reactions.Determination ΔG, ΔH and ΔS. Emf and equilibrium constant.Nernst equation.

Concentration cells with and without transference. Liquid junction potential. Application of emf measurements: Determination of P^H using Hydrogen electrode, Quinhydrone electrode. Potentiometric Acid - base Titration. Determination of transport numbers, valency of ion and solubility products.

UNIT –V **12Hrs**

Lead acid storage battery fuel cell: $H_2 – O_2$ fuel cell, Hydrocarbon – Oxygen fuel Cell. Decomposition potential.Over voltage elementary treatment.

Polarography - principle – Concentration polarization, Diffusion current, Polarographic cell assembly, advantages of DME, The Ilkovic equation
(Derivation not required) and significance. Half wave potential. Application
of polarography, Amperometric titrations.

SEMESTER – V

ELECTIVE PAPER – I PHARMACEUTICAL CHEMISTRY

Instructional Hrs: 60

Objectives:
1. To know about important terminologies in pharmaceutical chemistry.
2. To develop the basic knowledge of different types of drugs and its applications.
3. Understanding the concepts of clinical chemistry and Antiviral drugs.

UNIT- I **12Hrs**

Important terminologies used in pharmaceutical chemistry – definition of the following terms – drug – pharmacology – pharmacognogy – pharmacy – pharmacodynamics – materia medica - therapeutics – chemotherapy – toxicology – pharmacopocia (IP, BP, USP) - pharmacophore – bacteria – Virus – fungi – synergism –antagonism – toxicology – therapeutic index.

The nature and sources of drugs – routes of drug administration – adsorption and bio – availability of drugs – distribution of drugs – bio – transformation of drugs – excretion of drugs – mechanism of drug action – drug receptors and biological response – different types of drug action – methods of prolonging the action of drugs- site of drug action – structure activity relationship SAR – factors modifying drug action – drug toxicity – adverse drug relationship ADR in man – treatment of acute drug poisoning – drug assay.
Relationship between the chemical structure and pharmacological activity.

UNIT – II **12Hrs**

Blood – composition – grouping – Rh factor – buffers in blood – clotting mechanism – coagulation of blood – thrombosis – anti coagulants example Heparin – coumarin – Hemostatic agents examples oxycel – fibrinogen – vitamin K.

Clinical chemistry – estimation sugar (glucose) in blood – Folin and Wu method –O. Toludine method – determination of serum cholestrol – Sackett's method – normal composition of urine – diagnostic tests for salts in serum and urine – detection and estimation of sugar in urine – Benedict's method – clinitest tablet –reagent strip method - titrimetric method – detection of bilirubin in urine – Fauchet test – detection of diabetes- detection of anemia – estimation of hemoglobin concentration – red blood cell count. Simple staining – gram staining.
Diabetes and hypoglycemic drugs – types – control- hypoglycemic drugs example – insulin – tolbutamide – chlorpropamide. Anaemia – causes and control – antianaemic drugs – haematinic products.

UNIT – III **12Hrs**

Analgesics – definition – different types of pain – superficial – deep non visceral - visceral – referred – psychogenic – classification of analgesics – Antipyretics and non steroidal anti inflammatory drugs (NASIDS) – classification – structure and therapeutic uses of acetyl salicylic acid (aspirin)

Paracetamal (acetaminophen, crocin, calpol) – heterocyclic aryl acetic acid derivatives – diclofenac (voveran) – selective COX-2 inhibitors. Nimesulide (nise) - propionic acid derivatives – ibuprofen – fenamates mefenamic acid (meftal) – opiod analgesics preparation – structure – therapeutic uses – of morphine – derivatives of morphine – heroin – pethidne – methadone

Muscle relaxants – neuromuscular blocking drugs ex suxamethonium chloride-centrally acting muscle relaxants ex – chlorozoxazone.

Central nervous system stimulants – definition – example caffeine-theophylline. Anthelmintics – definition – types of parasites – structure and mechanism of action of mebendazole – Antihistaminic – definition – example promethazinehydrochloride – chlorpheniraminemaleate.

UNIT-IV **12Hrs**

Cardiovascular drugs – structure and uses of – cardiac glycosides ex – digitoxin
Anti hypertensive and anti hypotensive drugs – ex clonidine, methyldopa – anti arrhythmic agent's example procainamide – vasopressor drugs example buphenine-Autonomic drugs – definition – example adrenalin – salbutamol – atropine. Diuretics-Definition – mersalyl sodium. Expectorants and antitussives – classification – example bromohexine hydrochloride.

Antibiotics – definition – classification – example – penicillins – cloxacillin-ampicillin – clavulanic acid – cefixime – streptomycin – chloramphenical – tetracycline. Antineoplastic agents – definition – classification – examples – vinblastin-colchicines. Sedatives and hypnotics – definition – examples – thiopental sodium – paraldehyde. Antipsychotic (tranquilizers) – definition – examples – reserpine – lysergic acid diethylamide – marijuana – diazepam.

UNIT –V **12Hrs**

Antiviral drugs – definition – names of diseases caused by virus – examples-interferon – ribavirin – methisazone – carbovir. AIDS – causes – prevention – treatment.
Antifungal agents – definition – classification – examples- griseofulvin- fluconazole -

Immunological agents – active and passive immunity – definition – vaccine and toxoids – examples – BCG, MMR, HEPATITIS, TETANUS TOXOID –anti snake-venom serum – immunoglobulin-

Vitamins - definition – classification – sources and deficiency symptoms of vitamins A, B, C, D, E and K – anti oxidants – definition – classification –Example – spirulina

Causes and treatment of common diseases – malaria – filariasis – plague-

diphtheria – whooping cough – influenza – measles – tuberculosis – cholera – typhoid-dysentery – jaundice – asthma – epilepsy – piles – leprosy.

Some important Indian medicinal plants- trees – spics – their medicinal uses**.**

References:

1. A text book of pharmaceutical chemistry – Jayashree Gosh – S.Chand
2. Pharmaceutical chemistry – S.Lakshmi – Sultan Chand
3. Pharmacology and pharmacotherapeutics – R.S.Satoskar and S.R.Bandarkar popular prakshnan
4. Bentley's text book of pharmaceutics – E.A.Raubins
5. Medicinal chemistry –
6. Medical laboratory technology –
7. Text book of Pharmacognosy – Arumugam and Murugesh
8. A concise text book of pharmacology – Murugesh

SEMESTER – VI

CORE: MOLECULAR SPECTROSCOPY

Instructional: Hrs: 60

Objectives: 1. To develop the basic concepts of spectroscopic techniques.
2. To know about the instrumentation of different spectra.
3. Understanding the applications of electromagnetic spectrum.

UNIT-I **12Hrs**

Electromagnetic Spectrum: Various regions of electromagnetic spectrum – properties of electromagnetic radiation. Microwave Spectra: Theory of rotational spectra-selection rule. Determination of moment of inertia and bond length from rotational spectra of hetero diatomic molecules – CO & HCl. Types of molecules – Isotopic mass from rotational spectra. Instrumentation (out line).

UNIT – II **12Hrs**

IR – Spectra: Theory – Molecular vibration – selection rule – force constant – zero point energy – deduction of molecular properties from vibrational spectra of H_2O, CO_2 and CO. Characteristic frequencies – Finger print region. Application of IR to organic compounds. Instrumentation. (Outline)

UNIT – III **12Hrs**

Raman Spectra: Theory – rotational Raman Spectra – comparison with IR Mutual exclusion rule – example H_2O and CO_2. Electronic Spectra: Theory – types of electronic transition – selection rule –Franck Condon principle. Chromophores and auxochromes. Absorption Intensity shifts. Determination of λ max for dienes and α, β – unsaturated Ketones.

UNIT- IV **12Hrs**

Proton magnetic resonance: Theory – chemical shift – factors affecting chemical shift. Spin – spin coupling, coupling constant – Vicinal, geminal coupling (elementary treatment only) PMR spectra of ethanol, diethyl ether, isopropyl chloride, benzoic acid. Instrumentation. (Outline)

UNIT –V **12Hrs**

Electron spin resonance spectroscopy: Theory – comparison with NMR – Derivative curves – Hyperfine splitting. Application – Structural determination of
methyl free radical, benzene anoin. Instrumentation (outline) Mass Spectra: Theory - basic principle- isotope abundance, base peak, molecular ion peak, meta stable ion. Mclaffarty rearrangements. Nitrogen rule – Instrumentation. (Outline)

SEMESTER – VI
ORGANIC CHEMISTRY – II

Instructional: Hrs: 60

Objectives: 1. To learn about photo chemistry and its applications.
2. Understanding the basic concepts of pericyclic reactions.
3. To understand the structural elucidation of alkaloids and the chemistry of hetero cyclic compounds.

UNIT – I 12 Hours

Organic photochemistry:

Principles of photochemistry. Electronic excitations – excited states – modes of dessipation of energy – Jablonsky diagram. Energy transfer – quantum efficiency-Photochemistry of carbonyl compounds. Photo reduction. Norrish type reaction. Photochemical reaction of cyclic ketones. The paterno – Buchi reaction. Barton reaction. Photochemistry of α,β– Unsaturated ketones and olefines.

UNIT – II 12 Hours

Pericyclic reaction:

Conservation of molecular orbital symmetry – Symmetry properties of molecular orbitals. Electrocyclic reactions: Interconversing of 1, 3 Butadiene –Cyclobutene system and 1, 3, 5 hexatriene, Cyclohexadiene system by correlation diagram, FMO and PMO methods. Cyclo addition reactions
– Diels Alder reaction by correlation diagram, FMO and PMO methods. Simple Claisen and Cope rearrangement by FMO method.

UNIT – III 12 Hours

Classification, constitution of glucose and fructose. Reactions of glucose and fructose, Osazone formation, mutarotation and its mechanism. Cyclic structure – Pyronse and furanose forms. Determination of ring size – Haworth projection formula. Configuration of monosaccharides – Epimerisation, interconversions –
D.Arabinase to D – glucose and vice versa.
D – glucose to D – fructose and vice versa.
Epimerisation D – glucose to D – mannose.
Disaccharides – chemistry and structure of Sucrose and lactose.
Polysaccharides – starch and cellulose chemistry – derivatives – cellulose nitrate, cellulose acetate, Ethyl cellulose.

UNIT – IV 12 Hours

Alkaloid: Classification – General methods of determination of structure- Zeisel method of determination of methoxy group – Hoffmann exhaustive methylation – Von Braun degradation – Herzig – Meyer method of determination of N – methyl group. Isolation properties, structural elucidation and synthesis (any one method) of the following alkaloids, coniine, piperine, nicotine, papaverine Atropine.

UNIT – V 12 Hours

Heterocyclic compounds – Aromaticity – preparation, properties and uses of furan, Pyrrole, thiophene and pyridine. Comparitive study of basicity of pyrrole and pyridine with amines.

Synthesis and reactions of quinoline, isoquinoline and indole with special reference to Skraup, Bischier and Napieralski and Fischer Indole synthesis.

SEMESTER – VI
CORE: PHYSICAL CHEMISTRY – II

Instructional Hrs: 60

Objectives: 1. To understand the basic concepts of chemical kinetics and its theoretical aspects.
2. To learn about the kinetics of photochemical reactions and surface chemistry.
3. Understanding the concepts of Quantum chemistry and its applications.

UNIT –I **12Hrs**

CHEMICAL KINETICS:

Empirical laws and experimental aspects – Rate laws – stoichoimetry – order and molecularity of reactions – setting up and solving simple differential equations for first order, second order, third order and zero order reactions. Expressions for half – life periods of first order, second order, zero order and third order reactions-determination of order of reactions.

UNIT – II **12Hrs**

Theoretical aspects: Effect of temperature on the rate constant. The activation energy the collision theory of reaction rates and its limitations. The theory of absolute reaction rates comparison of the collision theory with the absolute reaction rate theory. Significances of free energy of activation and entropy of activation Lindemann theory of unimolecular reactions.

UNIT – III **12Hrs**

Kinetics of photochemical reactions: Absorption of light and photochemical processes laws of photochemistry – Quantum yield photochemical reactions- chain reactions – H_2 – Br_2 reaction – comparison of the thermal and photochemical reactions – Kinetics of H_2 – Br_2 reaction, photo sensitized reactions – photophysical process – Fluorescence, phosphorescence, chemiluminescence applications of photochemistry.

UNIT – IV **12Hrs**

Adsorption: Adsorption Vs absorption - types of adsorption – physical and chemical adsorption and their differences. Adsorption isotherm – Freundlich adsorption isotherm – applications of adsorption.

Symmetry in crystal system – axis of symmetry. Plane of symmetry – centre – point groups – symmetry operating NH_3 and H_2O molecules.

UNIT – V **12Hrs**

Quantum chemistry:

Black body radiation and introduction of Planck's quantum theory. Photoelectric effect. Compton effect, De Broglie concept of wave – particle dualism. Heisenberg's uncertainity principle. Schrödinger's wave equation – derviation, significance of ψ and ψ^2, Eigen values and Eigen function. Particle in a box (one dimensional only) application to butadiene.

SEMESTER – VI
APPLICATION ORIENTED PAPER–II ENVIRONMENTAL CHEMISTRY

Instructional: Hrs: 60

Objectives:
1. To understand about the various kinds of pollution and its influence on eco system.
2. To know about radioactivity in the environment and it's monitoring.
3. To learn about the basic knowledge of instrumental techniques used in environmental.

UNIT – I **12Hrs**

An introduction – Environmental segments – environmental pollution – the effects of pollutants – toxic chemical in the environment – impact of toxic chemical on – enzymes- Arsenic, cadmium, lead, mercury, carbon monoxide, nitrogen oxides, sulphurdioxide, peroxyacetyl nitrate (PAN). Cyanide, pesticides, Methyl isocyanide.

UNIT – II **12Hrs**

Air pollution – Air pollutants – carbonmonoxide - oxides of nitrogen – Hydrocarbons and photochemical smog. SO_2 – Acid rain – particulates – radio activity – air pollution from automobiles – effects of atmospheric pollution – Air pollution control – Air quality Standards.

UNIT - III **12Hrs**

Water pollution – water pollutants – organic pesticides – detergents – marine oil pollution – inorganic pollutants – acid mine drainage – sediments – radio active materials. Thermal pollution – trace element in water – effects of water pollution –water quality parameters and standards – water pollution control – treatment of waste water.

UNIT – IV **12Hrs**

Noise pollution – noise pollution source – international standards – effect of noise pollution – noise threshold limit values – noise measuring equipments – noise control.

Radioactivity in the environment – its monitoring and the evaluation of its significance – effects on the environment – discharge of radio active materials into the sea – personal monitoring.

UNIT – V **12Hrs**

Instrumental techniques in environmental, chemical analysis – neutron activation analysis- anodic stripping voltammetry (ASV) – Atomic absorption Spectrophotometry (AAS) – Inductively coupled plasma emission spectrometry (ICPES) – X – ray fluorescence – non – dispersive IR spectrometry – Fourier transform IR (FTIR) spectroscopy – Gas chromatography – chemiluminescence - high performance liquid chromatography (HPLC).Ion selective electrodes – Ion chromatography.

SEMESTER – VI
MAJOR SKILL BASED PAPER
INDUSTRIAL CHEMISTRY

Instructional: Hrs: 60

Objectives: 1. To understand how to use chemistry knowledge in industries.
2. To learn about the basic knowledge in industrial production.
3. To learn about the various industrial products such as fibers, dyes, petrochemicals etc.

UNIT – I **\12Hrs**

Fibres – definition – classification – structure and properties of cotton – wool and silk - synthesis properties and uses of Rayon – Nylon 6,6 – Dacron.
General sequence of processing of textile fibres – sizing – desizing – singeing – scouring – bleaching – mercerization.

UNIT – II **12Hrs**

Dyes – classification of dyes based on chemical structure – mode of application – aurochrome - chromophore – MO theory of colour and constitution – Indigo dyes- Isolation – synthesis – application for cotton fabric – Natural dyes – Turmeric – Henna.

Machinery used – Jig dyeing – Beck dyeing – Jet dyeing.

Printing – style and types of printing – block printing – screen printing – roller printing.

UNIT – III **12Hrs**

Petrochemicals – classification of petrochemicals – composition of petroleum-Natural gas – purification and uses – petroleum – properties – classification of crude- refining – cracking – Thermal cracking mechanism – hydrocracking – fluid catalytic cracking. Octane number and antiknock compounds – cetane number.

Soaps - manufacture of soaps – hot batch process – Hot continuous process – Toilet soap – Transparent soap.

Detergent – classification – manufacture of detergent builders and additives.

UNIT – IV **12Hrs**

Glass – properties – raw materials – method of manufacture – shaping – Annealing – finishing – special classes.

Ceramics – classification – raw materials – manufacturing process – Glazing – Decoration.

Refractories – classification – properties – manufacture.

Enamels – raw materials – manufacture – applications.

UNIT – V **12Hrs**

Rubber – classification – source of natural rubber – manufacture of latex – Properties of natural rubber – synthetic rubber – chloroprene – isoprene – compounding of rubber – vulcanization – Buna – S, Buna-N.

Synthetic perfumes – Introduction – Esters – alcohols, ketones, aldehydes – production of Naturals perfumes – flower perfumes – Acacia – Jasmine – Lilly – Rose.
small scale units – safety matches – Agarbattis – naphthalene balls – Gumpaste –fountain pen ink.

References:

1. Industrial chemistry – B.K.Sharma
   Goel Publishing house

2. Industrial Chemistry – Singh, Arora
   Anmol Publications Ltd.

3. Industrial Chemistry – Vermani – Narula
   Galgotia Publications

SEMESTER – V &VI
MAJOR CORE PRACTICALS – V &VI

Instructional Hrs: 120

Objectives: 1. To develop the experimental skills in gravimetric analysis.
2. The ability to work in Quantitative estimations.
3. To improve the practical skill in the preparation standard solutions and reagents.

i.) Gravimetric analysis and application oriented practicals

Gravimetric estimation and Preparation of Inorganic complexes (Core Practical – V)

1.) Estimation of Pb as lead chromate

2.) Estimation of Ba as barium chromate

3.) Estimation of Ca as calcium oxalate

4.) Estimation of Ba as barium sulphate

ii) **Preparation of inorganic complexes**

1) Preparation of tetrammine copper (II) tetra hydrate
2) Preparation of sodium thio sulphate
3) Preparation of Prussian blue
4) Preparation potassium trioxalato chromate (III)
5) Preparation of tris- (thiourea)-copper (II) sulphate dihydrate

ii.) Application oriented practicals (Core Practical – VI)

1.) Determination of melting and boiling points

a) for melting points the following substances may be given benzoic acid, acetanilide, urea, naphthalene, biphenyl, benzamide, m – dinitro, benzene, salicylic acid, m-nitro benzoic acid, anthranilic acid

b) The following substances may be given for the boiling points: chloro benzene, toluene, ethyl benzoate, o-chloro phenol, p- chlorophenol, o- toluidine, benzaldehyde, aniline, acetophenone

2.) Quantitative estimations
a) Colorimetric estimation of Fe^{3+} and F^{-} ions
b) Spectrophotometric estimation of metal ions like Cu^{2+}, dyes etc.
c) Estimation of glucose using Benedict's reagent
d) Estimation of glucose using Fehling's solution
e) Estimation of Calcium content of milk using EDTA
f) Estimation of alkali content of antacid tablet

3.) Preparation of standard solutions and reagents.

MAJOR CORE PRACTICAL – VII
PHYSICAL CHEMISTRY

Instructional Hrs: 120

Objectives:
1. The basic analytical and technical skills to work effectively in the various fields of chemistry.
2. Understanding the practical knowledge in physical chemistry.
3. Determination of eutectic systems and transition temperature.

Experiments in physical Chemistry:

1. Distribution law:

   a. Distribution co- efficient of iodine between benzene and water
   b. Equilibrium constant of reaction $I_2 + I = I_3$
   c. Determination of Strength of unknown Kl

   } Demonstration only

2. Kinetics:
   a. Acid catalysed hydrolysis of an ester (methyl – acetate or ethyl acetate)

3. Heterogeneous Equilibria:
   a. Critical solution temperature.
      i) Phenol – water system UCST
      ii) Effect of impurity on UCST (upto 1 percent NaCl solution or upto 1 percent succinic acid solution)

   b. Eutectic systems:
      i) naphthalene and naphalamine

      ii) naphthalene and diphenylamine (only simple systems to be given)

   c) Determination of transition temperature – thermometric method. Sodium acetate, sodium thiosulphate, $SrCl_2$ $6H_2O$ and $MnCl_2$

4. Electrochemistry:

   a. Conductivity Experiments
      i) Cell constant
      ii) Equivalent conductance – HCl, KCl.
      iii) Titration: acid – base
      IV) Dissociation constant of week acids
   b. i) Potentiometric redox titration (Fe Vs $KMnO_4$)
      ii) Potentiometric acid – base titration

5. Determination of Mol..wt by Rast method.

SEMESTER - VI
MAJOR SKILL BASED PRACTICAL
INDUSTRIAL CHEMISTRY

Instructional Hrs: 30

Objectives: 1. To develop the experimental skills in textile fields.
2. To know about coloring cotton with various dyes.
3. To know about preparation of washing and dish wash powder.

1. Identification of Textiles fibres a) Burning Test b) Solubility test and swelling test
2. Colouring cotton with direct dyes.
3. Colouring of acid dyes on wool.
4. Colouring of cotton with Reactive dye- cold Brand.
5. Colouring of cotton with vat dyes.
6. Mordanting of animal fibres with Alum.
7. Colouring alum Mordantanted wool with turmeric.
8. Dyeing of cotton with Henna.
9. Dyeing of alum Mordanted fibres with anion.
10. Batik dyeing on cotton.
11. Printing of cloths with screen
12. Preparation of Washing powder.
13. Preparation of para red.
14. Preparation of Dish wash powder.

Reference:

1. Technology of Textile processing – Textile fibres Vol. I V.A. Shenai. 2. Techniques of Dyeing and printing - Hemalatta Jain.
3. Herbal perfumes and cosmetics – H.Panda
4. Industrial Chemistry B.K.Sharma.

QUESTION PAPER PATTERN
DEPARAMENT OF CHEMISTRY
(MAJOR AND ALLIED CHEMISTRY)
Effective from 2006 – 2007 and thereafter

Section - A

Questions for answer not exceeds one or two sentences with no choice
10 questions – 2 each from every unit (10 x 1 = 10)

Section - B

Short answer questions of either / or type
5 question – one each from every unit
(Answer – about 60 words) (5 x 4 = 20)

Section - C

Essay – type or sub – division type questions of either / or type
5 questions – one each from every unit
(Answer – about 200 words) (5 x 9 = 45)

Total = 75

ALLIED OPTIONAL
For students of other than Chemistry Department
SEMESTER-IV
GENERAL CHEMISTRY

UNIT – I (18 hours)

Chemical bonding – Ionic bond examples : NaCl, $MgCl_2$- Co-valent bond examples: H_2, N_2. The valence bond theory- sigma and pi bonds – Geometry and hybridization in $BeCl_2$, BF_3, CH_4, PCl_5, SF_6
Molecular orbital theory-bonding antibonding and non bonding orbitals – MO configuration of H_2, N_2, O_2, CO, HF- bond order

UNIT – II (18 hours)

Nuclear chemistry-composition of nucleus-nuclear binding energy-packing fraction- nuclear stability – theories of nuclear stability. Isotopes, Isobars and Isotones-definition – examples.Nuclear transformation – Artificial transmutation of elements- Nuclear fission – Atomic bomb – Nuclear reactors – Nuclear fusion – Hydrogen bomb – Applications of radio isotopes – Stellar energy.

UNIT-III (18 hours)

Dyes: Definition- chromophore-auxochrome, Theory of colour and constitution, VBT-MOT, Classification- according to structure and applications, preparation and uses of

(i) Azo dyes- methyl orange and Bismark brown
(ii) Triphenyl methane dyes – malachite green
(iii) Phthalein dyes – Phenolphthalein
(iv) Xanthane dyes - fluorescence
(v) Vat dye – Indigo
(vi) Anthraquinone dye – Alizarin

Chemotheraphy: Definition, prepapration and uses of the following: paraacetamol, pencillin, aspirin, sulphapyridine

UNIT-IV (18 hours)

Industrial chemistry: Synthesis, properties and uses of silicones.
Fues gases; Natural gas, water gas, semiwater gas, carbureted water gas, producer gas, oil gas.
Fertilizers: Preparation and uses of urea, ammonium sulphate, ammonium nitrate, potassium nitrate,. NPK fertilizer, Triple super phosphate.
Pollution: Air, water and soil – sources, remedies

UNIT-V (18 hours)

Chemical kinetics: Rate of reaction – order of reaction, molecularity
First order reactions: Derivation of rate constant – Half life period
Second order reactions: Derivation of rate constant – Half life period
Determination of order – Graphical method – Half life method – Effect of temperature on the rate of reaction – Arrhenius equation – energy of activation.
Catalysis - Definition, Types of catalysis, intermediate compound formation theory and adsorption theory. Applications of catalysis.

ALLIED OPTIONAL
For students of other than Chemistry Department
SEMESTER-IV

BIOCHEMISTRY

UNIT- I (18 hours)

Buffers – Definition, buffer system in blood. Carbohydrates – Definition and classification - Mono saccharides – basic structure, reactions of mono saccharides: fermentation, oxidation, reduction, reactions with HCN, acids, alkali, alanine, phenyl hydrazine, hydroxyl amine. Structure elucidation of glucose and fructose.

UNIT-II (18 hours)

Lipids: Definition, classification and properties – physical and chemical – biological roles – qualitative and quantitative tests for lipids.
Proteins: Amino acids-classification and properties, peptide bond- proteins- classification and structure – 1^o,2^o,3^o and 4^o structures and biological role of proteins. Test for proteins

UNIT-III (18 hours)

Nucleic acids: Definition – components – phosphoric acid – pentose sugar – nitrogenous base- purines and pyrimidines (structure only) – nucleosides – nucleotides – DNA – Watson – Crick model – double helical structure – replication of DNA – denaturation and renaturation of DNA. RNA – structure – Difference between DNA and RNA.

UNIT-IV (18 hours)

Enzymes: classification with example. Nomenclature, active sites – Lock and key, induced fit model, Mechanism of enzyme action. Factors affecting enzyme activity. Co- enzymes – clinical and industrial applications of enzymes

UNIT-V (18 hours)

Antibiotics: Classification of antibiotics – penicillin – structure – therapeutic uses – tetracycline – structure – therapeutic uses – streptomycin - structure – therapeutic uses (structural elucidation not necessary).
Vitamins: Classification, occurrence. Structure and importance of vitamins A, B, C, D only. Daily requirements. (Structural elucidation is not necessary)

References:

1. Introductory biochemistry – Sharma & Gupta
2. Fundamentals of biochemistry – Jain
3. Text book of biochemistry – Rama Rao
4. Text book of pharmaceutical chemistry – Jayashree ghosh
5. Biochemistry – U. Sthyanarayana.

QUESTION PAPER PATTERN
(MAJOR AND ALLIED CHEMISTRY)
Effective from 2006 - 2007 and thereafter

SECTION - A

Question for answer not exceeds one or two sentences with no choice 10 questions - 2 each from every unit (10 x 1 = 10)

SECTION - B

Short answer questions of either / or type
5 questions - one each from every unit
(Answer - about 60 words) (5 x 4 = 20)

SECTION - C

Essay - type or sub - division type questions of either / or type
5 questions - one each from every unit
(Answer - about 200 words) (5 x 9 = 45)

Total 75

MAJOR OPTIONAL
For students of other than Chemistry Department
SEMESTER - V
MAJOR OPTIONAL: CHEMISTRY IN EVERY DAY LIFE

UNIT-I FOOD 18 Hours

Sources of foods, types, advantages and disadvantages, constituents of foods, carbohydrate, protein, fats and oils, colours, flavours, natural toxicants.

UNIT-II FOOD POISONING 18 Hours

Sources, causes and remedy- Causes and remedies for acidity, gastritis, indigestion and constipation

UNIT-III FOOD PRESERVATION AND PROCESSING 18 Hours

Processing principles: Canning, chilling, freezing, dehydration, control of water activity, CA and MA storage, fermentation, hurdle technology, addition of preservatives and food additives. Processing by heating- sterilization, pasteurization.

Food spoilage, causes of food spoilage, types of food spoilage, preservation.

UNIT-IV MINERALS 18 Hours

Mineral elements in food- Principal mineral elements-source, function-deficiency and daily requirements - Na, K, Mg, Fe, S and P

UNIT-V MEDICINE 18 Hours

Chemicals in medicine: analgesics, tranquilizers, antiseptics, disinfectants, antimicrobials, antifertility drugs, antibiotics, antacids, antihistamines (elementary idea of antioxidants.

REFERENCE BOOKS:

1. Seema Yadav : –Food Chemistry‖ ,Anmol publishing (P) Ltd,New Delhi

2. Car H. Synder : – The Extraordinary Chemistry for ordinary things‖ ,John Wiley & sons inc..,New York,1992.

3. Sivasankar – Food Processing and Preservation PHI.(Eastern Economy Editions)

QUESTION PAPER PATTERN
(MAJOR AND ALLIED CHEMISTRY)
Effective from 2006 - 2007 and thereafter

SECTION - A

Question for answer not exceeds one or two sentences with no choice 10 questions - 2 each from every unit (10 x 1 = 10)

SECTION - B

Short answer questions of either / or type
5 questions - one each from every unit
(Answer - about 60 words) (5 x 4 = 20)

SECTION - C

Essay - type or sub - division type questions of either / or type
5 questions - one each from every unit
(Answer - about 200 words) (5 x 9 = 45)

Total 75