

MANNAR THIRUMALAI NAICKER COLLEGE
PASUMALAI, MADURAI- 625 004

(An Autonomous Institution Affiliated to Madurai Kamaraj University)

(Re-accredited with 'A' Grade by NAAC)



B.Sc., Chemistry

SYLLABUS AND REGULATIONS

UNDER
CHOICE BASED CREDIT SYSTEM (CBCS)
(For those who joined during 2017-2018 and after)

Qualification for Admission

Candidate should have passed the Higher Secondary Examination conducted by the Board of Higher Secondary Education, Government of Tamil Nadu with Chemistry as one of the subject in Higher Secondary Education.

Duration of the Course

The Students shall undergo the prescribed B.Sc (Chemistry) course of study for a period of three academic years (six semesters).

Subject of Study

Part I: Tamil

Part II: English

Part III:

1. Core Subjects
2. Allied Subjects
3. Electives

Part IV :

1. Non Major Electives
2. Skill Based Subjects
3. Environmental Studies
4. Value Education

Part V :

Extension activities

The scheme of Examination

The components for continuous internal assessment are:

Two tests and their average	--15 marks
Seminar /Group discussion	--5 marks
Assignment	--5 marks
Total	--25 marks

Pattern of the question paper (Summative Examinations)
(For Part I, Part II, Part III , NME & Skilled Paper in Part IV)

The question paper may have 3 parts.

Duration of the Summative Examinations is 3 hours

Part –A

Five questions (answer all)
 (One question from each Unit)

5 x 02 = 10 Marks

Part –B

Five questions (‘either or ‘ type)
 (One question from each Unit)

5 x 07 = 35 Marks

Part –C

Three questions out of five
 (One question from each Unit)

3 x 10 =30 Marks

Total

75 Marks

Minimum Marks for a Pass

40% of the aggregate (Internal + Summative Examinations)

No separate pass minimum for the Internal Examinations.

27 marks out of 75 is the pass minimum for the Summative Examinations.

MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF B.Sc CHEMISTRY
(For those who joined in 2017 and after)
COURSE PATTERN

Study Component	I Sem	II Sem	III Sem	IV Sem	V Sem	VI Sem	Total Hours	Total Credit	No. of course	Total marks
Part – I Tamil	6(3)	6(3)	6(3)	6(3)			24	12	4	400
Part –II English	6(3)	6(3)	6(3)	6(3)			24	12	4	400
Part –III										
Core subjects	4(4) 2(0)	4(4) 2(2)	4(4) 2(0)	4(4) 2(2)	5(5) 5(5) 4(4) 3(0) 3(0) 2(0)	5(5) 5(5) 4(4) 3(6) 3(5)	64	59	14	1400
Part-III Core Elective						4(4)	4	4	8	100
Allied Physics	4(4) 2(0)	4(3) 2(1)	4(4) 2(0)	4(3) 2(1)			24	16	6	600
Allied Mathematics			4(4)	4(4)	6(4)	6(4)	20	16	4	400
Part-IV										
Skill Based Subjects	2(2) 2(2)	2(2) 2(2)			2(2)	2(2)	12	12	6	600
Environment studies / value education	2(2)	2(2)					4	4	2	200
Non Major Elective			2(2)	2(2)			4	4	2	200
Part V										
Extension Activities				0(1)			0	1	1	100
Total	30 (20)	30 (22)	30 (20)	30 (23)	30 (20)	30 (35)	180	140	44	4400

SEMESTER – V							
Subject Code	Title of the Paper	No. of Courses	Hours /Week	Credits	Maximum Marks		
					Int	Ext	Total
	Part-III Core Subject						
17UCHC51	Organic Chemistry-II	1	5	5	25	75	100
17UCHC52	Physical Chemistry-II	1	5	5	25	75	100
17UCHCP3	Physical Chemistry experiments (Practical)		3	0			
17UCHCP4	Gravimetric Analysis and Organic Preparation(Practical)		3	0			
17UCHCP5	Organic Analysis and Estimation (Practical)		2	0			
17UCHA51	Part-III Allied Subject Allied Mathematics – III	1	6	4	25	75	100
17UCHE51	Part- III Core Elective Inorganic and Analytical Chemistry	1	4	4	25	75	100
17UCHE52	Bioinorganic Chemistry						
17UCHE53	Clinical and Medicinal Chemistry						
17UCHS51	Part-IV Skill Subject Drug Chemistry	1	2	2	25	75	100
	Total	5	30	20	125	375	500

SEMESTER – VI							
Subject Code	Title of the Paper	No. of Courses	Hours /Week	Credits	Maximum Marks		
					Int	Ext	Total
	Part-III Core Subject						
17UCHC61	Organic Chemistry-III	1	5	5	25	75	100
17UCHC62	Physical Chemistry-III	1	5	5	25	75	100
17UCHCP3	Physical Chemistry experiments (Practical)	1	3	6	40	60	100
17UCHCP4	Gravimetric Analysis and Organic Preparation(Practical)	1	3	5	40	60	100
17UCHCP5	Organic Analysis and Estimation (Practical)	1	2	4	40	60	100
17UCHA61	Part-III Allied Subject Allied Mathematics – IV	1	6	4	25	75	100
17UCHE61	Part- III Core Elective Applied Chemistry	1	4	4	25	75	100
17UCHE62	Nano chemistry						
17UCHE63	Applications of Computer in Green Chemistry						
17UCHS61	Part-IV Skill Subject Macromolecular Chemistry	1	2	2	25	75	100
	Total	8	30	35	245	555	800



MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF CHEMISTRY
 (For those who joined in 2017 and after)

Programme : UG	Part III : Core
Semester : V	Hours : 05
Subject Code : 17UCHC51	Credits : 05

ORGANIC CHEMISTRY –II

Course outcomes:

CO1: To know about the details of aromatic compounds and aromatic hydro compounds

CO2: To get knowledge in halogens, nitro and amino compounds

CO3: To study about the aromatic acids

CO4: To analysis the skills in polynuclear hydrocarbons

Unit-1: Aromatic Compounds - I

Introduction – General characteristics of aromatic compounds –Aromaticity and Huckel’s rule – Structure of benzene – Mechanism of aromatic electrophilic substitution (Halogenation, nitration, sulphonation and Friedel – Crafts reactions. Directive influence of substituents based on electronic effects (ortho/para/meta directing) –Trisubstituted benzenes – Steric hindrance – Mechanism of aromatic nucleophilic substitution, unimolecular, bimolecular and benzyne mechanisms

Unit-2: Aromatic Compounds - II

Aromatic aldehydes: Mechanism of cannizzaro, perkins, claisen, knoevenagal reaction and benzoin condensation – Preparation and properties of cinnamaldehyde and vannilin. **Phenolic ketones:** Phloroacetophenone – preparation – Houben – Hosch synthesis. **Phenols:** Acidity of phenols – effect of substituents on the acidity of phenol mechanism of Kolbe’s reaction.

Unit-3: Aromatic Hydrocarbons, Halogen, Nitro and Amino Compounds

Aromatic Hydrocarbons: Preparation, properties and uses of toluene xylene and mesitylene –**Aromatic halogen compounds:** preparation, Properties and uses of bromobenzene and benzyl bromide- Reactivity of aryl halides, distinction between nuclear and side chain halogenated derivatives. **Aromatic nitro compounds:** preparation and properties of nitrotoluenes. **Aromatic amino compounds:** Preparation by reduction of nitro compounds and from chlorobenzene – Effect of substituents on the basic character of aromatic amines – Comparison between aliphatic and aromatic amines – Preparation of aniline, sulphanilic acid, nitroanilines and phenylenediamines – Preparation and synthetic applications of benzene diazonium chloride

Unit-4: Aromatic Acids

Effect of substituent's on acidic character. **Substituted acids:** preparation, properties of salicylic acid and anthranilic acid. **Mono & Dicarboxylic acids:** preparation, properties of phthalic acid, phenylacetic acid, mandelic acid, cinnamic acid & coumarin. **Aromatic Sulphonic acids:** preparation, properties and uses of benzene sulphonic acid, saccharin, chloramine -T and dichloramine-T.

Unit -5: Poly Nuclear Hydrocarbons and Their Derivatives

Isolated systems: Preparation and properties of diphenyl, benzidine, diphenic acid, diphenylmethane, triphenylmethane and stilbene. **Condensed systems:** Preparation, properties, uses and structure of Naphthalene, Naphthylamines, Naphthols, Naphthaquinones, anthracene, anthraquinone, alizarin and phenanthrene.

Text Books

1. Arun Bahl and Bahl. B.S, A Textbook of Organic Chemistry, S. Chand & Co., 2012, New Delhi.

Reference Books

1. Jerry March, Advanced Organic Chemistry, 4th Edition, John Wiley and Sons, 1992, New York.
2. S.H. Pine, Organic Chemistry, 5th Edition, McGraw Hill International Edition, Chemistry Series, 1987, New York.
3. Seyhan N. Ege, Organic Chemistry, Structure and Reactivity, 3rd Edition, A.I.T.B.S., 1998, New Delhi.
4. Soni. P.L and Chawla. H.M, Textbook of Organic Chemistry, S. Chand & Sons, 2007, New Delhi.
5. Morrison. R.T and Boyd. R.N, Organic Chemistry, 6th Edition, Printice-Hall of India Ltd., 1992, New Delhi.



MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF CHEMISTRY
 (For those who joined in 2017 and after)

Programme : B.Sc (Chemistry)	Part III	: Core
Semester : V	Hours	: 05
Subject Code : 17UCHC52	Credits	: 05

PHYSICAL CHEMISTRY – II

Course outcomes:

- CO1:** To learn about particle and wave nature of electron
CO2: To get knowledge in colligative properties and dilute solution
CO3: To know about the principles of group theory
CO4: To gain knowledge on Spectroscopy

Unit – 1: Quantum Mechanics

Particle and wave nature of electron de Broglie's theory – Equation – Davison – Germer experiment – photoelectric effect – Compton effect – Heisenberg's uncertainty principle – The Schrodinger wave equation (Derivation not required). Postulates of quantum theory – Eigen values and eigen function – signification of ψ and ψ^2 - quantum number – Zeeman effect.

Unit – II: Colligative Properties and Dilution Solution

Colligative properties – Relative lowering of vapour pressure, Depression of freezing point, Elevation of boiling point and osmotic pressure – Determination of molecular weight and K_f by Rast macro method. Phase Rule - definitions – Gibb's phase rule – one component system – water carbon dioxide and sulphur – polymorphism – two components system – reduced phase rule – simple eutectic system – Pb-Ag System – KI-water system – Partially miscible liquid system – CST – completely immiscible liquid system. **Distribution Law:** Mathematical formulation – experimental verification – condition under which the law is obeyed.

Unit – III: Group Theory

Molecular symmetry elements and symmetry operations – operations – production of symmetry operations – properties of a group – classes and sub groups – groups multiplication table – C_{2v} . Point groups – classification of molecules into point groups – C_{2v} , C_{3v} , C_{2h} , D_{2h} , D_{3h} , D_{4h} , D_{6h} , T_d and O_h .

UNIT – IV: Spectroscopy – I

Introduction – electromagnetic radiation – different regions – absorption spectroscopy – molecular spectra – types of molecular spectra. Rotational spectra of diatomic molecules – Rigid rotator – selection rule-determination of moment of inertia and bond length – intensities of spectral line – effect of isotropic substitution – calculation of bond length. Vibrational spectra – IR spectra of diatomic molecules – Hooke's law – simple harmonic oscillator force constant – selection rule – Vibrational energy level diagram – Anharmonic oscillator –force constant determination. Modes of vibration in polyatomic molecules – linear (CO₂) and nonlinear (H₂O)

UNIT – V: Spectroscopy – II

Raman spectra – Raman effect – stokes and anti stokes lines – quantum theory of Raman effect – experimental study – comparison between IR and Raman spectra – applications of Raman spectra. Electronic spectra – Franck and Condon principle – Nuclear magnetic resonance spectroscopy – principle, instrumentation – interpretation of NMR spectra – spectra of ethanol – Electron spin resonance spectroscopy – principle – difference between NMR and ESR- Hyperfine structure in ESR spectrum – selection rule – Hydrogen atom ESR spectrum.

Text Books

1. Puri. B.S, Sharma. L.R and Pathania.S, Principles of Physical Chemistry, 47th Edition, ShobanLalNagin Chand & Co., 2012, New Delhi.

Reference Books

1. Gilbert W. Castellan, Physical Chemistry, 4th Edition, Narosa Publishing House, 2004, New Delhi.
2. Atkins. P.W, Physical Chemistry, 7th Edition, Oxford University, Press, 2001.
3. Dogra. S.K and Dogra. S, Physical Chemistry through Problems, 4th Edition, New Age International, 1996.



MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF CHEMISTRY
(For those who joined in 2017 and after)

Programme : UG	Part III	: Core
Semester : V&VI	Hours	: 03
Subject Code : 17UCHCP3	Credits	: 0-

PHYSICAL CHEMISTRY EXPERIMENTS (PRACTICAL)

Course outcomes:

CO1: To acquire knowledge in determination of molecular weight & CST

CO2: To develop skill in phase diagram, viscosity & kinetics

CO3: To gain knowledge in partition coefficient experiments.

CO4: To analysis the skill in conductivity.

- I. Determination of Molecular weight by**
- a) Transition Temperature method – Sodium thiosulphatepentahydrate
 - b) Rast Macro method – Naphthalene as Solvent
- II. Phase diagram involving**
- a) Simple eutectic
 - b) Compound formation
- III. Critical solution temperature (CST)**
- Determination of CST of phenol – water system and effect of impurity on CST –
 - Determination of Strength of NaCl.
- IV. Potentiometric titrations**
- (a) HClVsNaOH
 - (b) $K_2Cr_2O_7$ Vs $FeSO_4$.
- V. Partition Coefficient experiments:**
- Study of the equilibrium constant for the reaction
 - $KI + I_2 \leftrightarrow KI_3$
 - By determining the partition Co-efficient of I_2 between water an CCl_4
 - Determination of strength of given KI.
- VI. Kinetics:** Determination of relative strength of acids by hydrolysis of ester.
- VII. Conductivity:** Determination of cell constant and conductivity titration between as acid and a base (HClVsNaOH)

Text Book

1. Thomas. A.O and Mani, Textbook of Practical Chemistry, 4th Revised Edition, Scientific Publication, 1976.

Distribution of Marks (Max. marks – 100)

Duration of examination: 6 hrs

Regular Test in the Class	: 30 Marks
Observation note book	: 10 Marks

Total	: 40 Marks

Viva voce	: 10 marks
Record Note book	: 10 marks
For completion of the experiment	: 20 marks
Graph	: 2 marks
Calculation	: 5 marks
Tabulation	: 3 marks
Result	: 10 marks

Total	: 60 marks



MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF CHEMISTRY
(For those who joined in 2017 and after)

Programme : UG	Part III : Core
Semester : V&VI	Hours : 03
Subject Code : 17UCHCP4	Credits : -

GRAVIMETRIC ANALYSIS AND ORGANIC PREPARATION (PRACTICAL)

Course outcomes:

CO1: To develop skill in gravimetric analysis

CO2: To gain knowledge of various chemical properties

CO3: To get knowledge in the separation of mixtures

CO4: To analysis the preparation of various organic compounds

1. Gravimetric Analysis

1. Estimation of lead as lead chromate
2. Estimation of barium as barium chromate
3. Estimation of calcium as calcium oxalate monohydrate
4. Estimation of copper as cuprous thiocyanate
5. Estimation of nickel as Ni DMG.

2. Organic Preparation

1. Nitration
 - a. M-dinitrobenzene from nitrobenzene
 - b. Picric acid from phenol
2. Bromination:p-bromoacetanilide from acetanilide
3. Hydrolysis : Aromatic acid from (a) an ester (b) an amide
4. Oxidation: Benzoic acid from benzaldehyde.
5. Benzoylation: (a) Amine (b) phenols.
6. Acetylation : (a) Amine (b) phenols

Text Books

1. Thomas. A.O and Mani, Textbook of Practical Chemistry, 4th Revised Edition, Scientific Publication, 1976.
2. N.S. Gnanapragasam and G. Ramamurthy, Organic Chemistry Lab Manual, Viswanath.S. Printers & Publishers Pvt. Ltd., 2010, Chennai.

Distribution of Marks (Max.marks – 100)

Duration of examination: 6 hrs

Int: 40

Regular Test in the Class : 30 Marks

Observation note book : 10 Marks

Total : 40 Marks

Record Note Book - 10 Marks

Viva Voce - 10 Marks

Ext: 60

Organic preparation (10 Marks)

Gravimetric Estimation (30 Marks)

Procedure - 2 Marks

Crude sample - 6 Marks

Recrystallised sample - 2 Marks

Procedure - 10 Marks

Estimation - 20 Marks

Less than 2 % Error – 20 Marks

2-3% Error – 18 Marks

3-4% Error – 16 Marks

4-5% Error – 14 Marks

Greater than 5% Error – 8 Marks



MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF CHEMISTRY
(For those who joined in 2017 and after)

Programme : UG	Part III	: Core
Semester : V&VI	Hours	: 02
Subject Code : 17UCHCP5	Credits	: -

ORGANIC ANALYSIS AND ESTIMATION (PRACTICAL)

Course outcomes:

CO1: To acquire skill in organic analysis

CO2: To identify the functional groups

CO3: To analysis the side chain and halogen compounds

CO4: To gain knowledge in organic estimation

I. Organic Analysis

Analysis of an organic compound containing one or two functional groups and confirmation by the preparation of a solid derivative – acids, phenols, aldehydes, ketone, esters, nitro compounds, amines (primary, secondary and tertiary), aniline, aliphatic diamide, side chain and nuclear halogen compounds, diamide containing sulphur and monosaccharide.

II. ORGANIC ESTIMATION

1. Estimation of phenol
2. Estimation of aniline
3. Estimation of glucose

Text Books

1. Thomas. A.O and Mani, Textbook of Practical Chemistry, 4th Revised Edition, Scientific Publication, 1976.
2. Gnanapragasam. N.S and Ramamurthy. G, Organic Chemistry Lab Manual, Viswanath.S Printers & Publishers Pvt. Ltd., 2010, Chennai.

Distribution of Marks (Max.marks – 100)

Duration of examination: 6 hrs

Regular Test in the Class	: 30 Marks
Observation note book	: 10 Marks

Total	: 40 Marks

Organic estimation (30 Marks)

Record Note	- 10 marks
Procedure	- 5 marks
Estimation	- 15 marks
Less than 3% Error	- 15 Marks
3-4% Error	- 13 Marks
4-5% Error	- 10 Marks
Greater than 5%	- 8 Marks

Organic analysis (30 Marks)

Viva Voce	- 10 marks
Preliminary reaction	- 2 marks
Elements present	- 4 marks
Aliphatic or aromatic	- 3 marks
Saturated / Unsaturated	- 3 marks
Functional group	- 6 marks
Derivative	- 2 marks



MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF CHEMISTRY
(For those who joined in 2017 and after)

Programme : UG

Semester : V

Subject Code : 17UCHE51

Part III : Core Elective

Hours : 04

Credits : 04

INORGANIC AND ANALYTICAL CHEMISTRY

Course outcomes:

CO1: To learn about Acids, Bases and bio inorganic chemistry.

CO2: To study about the analytical and analysis of experimental results.

CO3: To learn about the knowledge of solid state

CO4: To analysis the knowledge on types of defects

UNIT – I: Acids & Bases

Acids and bases – Arrhenius concept – Lowry Bronsted concept:- Conjugate acid – base pairs, relative strengths of acids and bases – Lux & Flood concept – limitations – Lewis concept – Levelling effect – Usanovich concept – hard and soft acids. Non aqueous solvents: Classification of solvents – Chemical reaction in liquid ammonia – Precipitation reaction – Acid – base reactions in liquid ammonia – Protolysis – Ammonolysis.

UNIT – II: Bio Inorganic Chemistry

Metalloporphyrins – Porphyrins – Chlorophyll – Vitamin B₁₂. Myoglobin and hemoglobin – Structure – their role in biological systems – Hill constant, cooperativity effect, Bohr effect, Explanation for cooperativity effect in hemoglobin. Role of alkali and alkaline earth metal ions in biological systems – Role of Na⁺ and K⁺ ions – sodium pump – Role of Mg²⁺ and Ca²⁺ ions. Biological functions and toxicity of elements – Cr, Cu, As and radioactive elements.

UNIT – III: Analytical Chemistry

Methods of obtaining the Precipitate – Condition – Choice of Precipitant – merits and demerits of Organic Precipitants – Types – Specific and selective precipitants Sequestering agents – theory of precipitation – Dendrites – Paneth – Fajans – Hahn – law – Co precipitation – post precipitation – precipitation from homogeneous solution. Precision – Accuracy – Absolute and relative error – Classification of errors – Confidence Limit – Students Q-test – Rejection of experimental data – Sources and elimination of errors – Significant figures and computation.

UNIT – IV: Analysis of experimental results

Graphical method – Curve fitting – Method of least squares – Problems involving straight line graphs - Instrumental methods of Analysis - Beer – Lamberts Law – Principles of Colorimetric Analysis – Visual Colorimeter – Standard Series method – Balancing method – Estimation of Ni^{2+} , Fe^{2+} - Basic principles of common types of Chromatography – Column Chromatography – Thin layer Chromatography – Paper Chromatography – Ion exchange Chromatography Applications of each technique.

UNIT – V: Solid State

X-ray diffraction – Bragg's equation – Experimental method of determination of interplanar spacing – X-ray spectrophotometer – Debye Scherrer method. Types of Crystals – Ionic crystals – Analysis of NaCl, KCl, CsCl – determination of Avagadro number – Molecular crystals – Water and Ammonia – Covalent crystals – Diamond and Graphite – Metallic crystals – Metallic bond in metals, Conductors, Insulators and Semiconductors – Frankel and Schottky defects.

Text Books

1. Puri. B.R, Sharma. L.R and Kalia. K.C, Principles of Inorganic Chemistry, ShobanLalNagin Chand & Co., 1996, New Delhi.
2. Guldeep R. Chatwal and Shank K. Anand, Instrumental Methods of Chemical Analysis, Himalaya Publishing House, 2008, Mumbai.
3. SathyaPrakash, G.D. Tulil, S.K. Basu and R.D. Madan, A Textbook of Advanced Inorganic Chemistry, S. Chand & Co., 2014, New Delhi.

Reference Books

1. Sharma. Y.R, Elementary Organic Spectroscopy, S. Chand & Co., 1990, New Delhi.
2. Huheey, J.E, Keiter. E.A and Keiter.R.L, Inorganic Chemistry, 4th Edition, Harper Collins, 1993, New York.
3. Cotton. F.A, Wilkinson. G, Murillo. C and Bochman. M, Advanced Inorganic Chemistry, 6th Edition, John Wiley, 1999, New York.
4. Gopalan. R, Analytical Chemistry, S. Chand & Co., 2004, New Delhi.



MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF CHEMISTRY
(For those who joined in 2017 and after)

Programme : UG

Semester : V

Subject Code : 17UCHE52

Part III : Core Elective

Hours : 04

Credits : 04

BIOINORGANIC CHEMISTRY

Course outcomes:

CO1: To gain knowledge about the role of metal ions in biological system

CO2: To understand the theory of enzyme catalysis

CO3: To gain knowledge on metals in medicine

CO3: To analysis the skills about various agents in medicine

UNIT – I: Metals in Biology

Introduction – Essential Chemical Elements – Metals in Biological Systems – Biological Metal Ion Complexation – Electronic and Geometric Structures of Metals –Metals in Biological Systems – Metals containing proteins and enzymes.

UNIT – II: Fundamentals of Biomolecules

Proteins – Amino Acid Building Blocks – Protein Structure – Protein Sequencing and Proteomics – Protein Function, Enzymes, Classification of enzymes – Enzyme Kinetics – Enzyme Inhibition

UNIT – III: Myoglobin and Hemoglobin

Myoglobin and Hemoglobin: Structure of the Prosthetic Group – Mechanism for Reversible Binding of Dioxygen and Cooperativity of Oxygen Binding – Behavior of Dioxygen Bound to Metals – Structure of the Active Site in Myoglobin and Hemoglobin – Binding of CO to Myoglobin, Hemoglobin.

UNIT – IV: Copper and Nitrogen Enzymes

Copper Enzymes: Occurrence – Structure – Function – Discussion of Specific Enzymes: Superoxide Dismutase – Hemocyanin.

Enzyme Nitrogenase: Iron–Sulfur Clusters – Fe–Protein Structure – Detailed Mechanistic Studies.

UNIT – V: Role of Metals in Medicine

Inorganic Medicinal Chemistry - Metal Toxicity and Homeostasis – Anti-cancer agents: Cisplatin and related compounds - Chelation therapy – Cancer treatment – Anti-arthritis drugs – Gadolinium MRI Imaging Agents.

Text Books

1. Hussain Reddy. K, Bioinorganic Chemistry, New Age International, 2003, New Delhi.
2. Malik. W.U, Tuli. G.D, Madan. R.D, Selected topics in Inorganic Chemistry, 7th Edition, S. Chand & Co., 2003, New Delhi.

Reference Books

1. Rosette M. Roat Malone, Bioinorganic Chemistry: A short course, Wiley – Interscience, John Wiley & Sons, Inc., 2002.
2. Miessler. G.L and Donald A. Tarr, Inorganic Chemistry, Pearson Publication, 2002.
3. James E. Huheey, Ellen Keiter and Richard Keiter, Inorganic Chemistry: Principles of Structure and Reactivity, Pearson Publication, 1993.
4. Lippard. S.T and Berg. T.M, Principles of Bioinorganic Chemistry, Panima Publishing Co., 1997, New York.



MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF CHEMISTRY
(For those who joined in 2017 and after)

Programme : UG

Semester : V

Subject Code : 17UCHE53

Part III : Core Elective

Hours : 04

Credits : 04

CLINICAL AND MEDICINAL CHEMISTRY

Course outcomes:

CO1: To learn about the disinfectants and antiseptics

CO2: To understand the important drugs and the mode of actions

CO3: To gain knowledge on Enzymes

CO3: To analysis the knowledge about Body fluids

UNIT – I: Clinical Hygiene and Biochemical Analysis

Definition of health. Sterilization of surgical instruments. Disinfectants, antiseptics, sanitation. Biochemical analysis of urine, serum and fecal matter. Treatment for specific poisons-acids, alkalis, arsenic and mercury compounds.

UNIT – II: Common Drugs

Manufacture of drugs (e.g. quinine, reserpine, atropine and d – tubocurarine) from Indian medicinal plants. **Testing of drugs:** biological variation – screening and toxicity – Use of pharmacopeia 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 compds) – Antipyretic analgesics (acetyl salicylic acid, p – amino – phenol derivatives) – Muscle relaxants.

i. Acting at neuromuscular junction (d – tubocurarine chloride).

ii. Acting at spinal cord alone (glycerylguaiacolate, diazepam). Antibiotics (penicillin, streptomycin, tetracyclin, chloramphenicol)

Cardiovascular drugs-nitrates, beta blockers (propranolol and atenolol) and calcium channel blockers.

UNIT – III: Enzymes

Classification, specificity. Coenzymes, Cofactor, ATP, Mechanism of enzyme action and Immobilisation of enzymes.

UNIT – IV: Body Fluid

Blood volume, blood groups, coagulation of blood. Plasma lipoproteins. Blood pressure. Arteriosclerosis, diseases affecting red cells: Hyperchromic and hypochromic anaemia. Blood transfusion. 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)

Text Books

1. Jayashree Ghosh, A Textbook of Pharmaceutical Chemistry, S. Chand & Co., New Delhi, 1999.
2. Rastogi. S.C, Biochemistry, Tata McGraw Hill Publishing Co., 1993.
3. Ashutosh Kar, Medicinal Chemistry, Wiley Eastern Ltd., 1993, New Delhi.

Reference Books

1. Le Roy, O, Natural and Synthetic Organic Medicinal Compounds, Ealemi, 1976.
2. Oser, B.L, Hawk's Physiological Chemistry, 14th Edition, Tata McGraw Hill Publishing Co., 1965.
3. Kleiner. O and Martin. J, Biochemistry, Prentice-Hall of India, 1974, New Delhi.



MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF CHEMISTRY
(For those who joined in 2017 and after)

Programme : UG	Part IV	: Skill
Semester : V	Hours	: 02
Subject Code : 17UCHS51	Credits	: 02

DRUG CHEMISTRY

Course outcomes:

- CO1:** To acquire knowledge in different systems of medicine
CO2: To have the basic idea in chemotherapy and applications
CO3: To study about the synthetic drugs
CO4: To gain basic knowledge in hormones and vitamins

UNIT – I: Introduction to the different systems of medicine

Different systems of medicine: Ayurveda, Siddha, Homeopathy and Allopathy – History of medicinal chemistry – discovery of drugs – Introduction. Analgesics and Antipyretics – Narcotic analgesics – Morphine and derivatives. Total synthetic analgesics pethidine and methadones. Antipyretic analgesics – salicylic acid derivatives, Indole derivatives and p-amino phenol derivatives (Medicinal uses and structure only). Antibiotics – Definition, Penicillin – Tetracycline (Aureomycin & Terramycin) – Streptomycin and Chloramphenicol – drug action and uses.

UNIT – II: Anaesthetics

Gaseous anaesthetics – Vinyl ether – Cyclopropane – Halohydrocarbons – Chloroform – Haloethane – Trichloro ethylene – Intravenous anaesthetics – Thiopentone – Local anaesthetics – Cocaine and its derivatives . (Therapeutic use only)

UNIT – III: Chemotherapy and Application of a Few Drugs (Elementary study)

Sulpha drugs – Sulphadiazine, prontosil and prontosil-S. Antimalarials – quinine and its derivatives. Arsenical drugs – Salvarsan – 606 – Neosalvarsan.

UNIT – IV: Synthetic Drugs

Synthetic drugs and its therapeutic function of paracetamol – Aspirin – naproxen – Amoxycillin – ciprofloxacin – Ibuprofen.

Visit to an Industry and submission of Report. For industrial visit / Assignment = 5 marks internal) Contact District Industrial Centre (DIC for visits)

UNIT – V: Hormones and Vitamins

Definition and Classification Testosterone, Progesterone, Thyroxine, Vitamin C, Structure only
(Structural elucidation not necessary)

Text Book

1. Jayashree Ghosh, A Textbook of Pharmaceutical Chemistry, S. Chand & Co., 1999, New Delhi.

Reference Books

1. Charles R. Craig and Robert E. Stitzel, Modern Pharmacology, 3rd Edition, Little Brown and Co., Boston, 1990.
2. Corwin Hansch, Peter G. Sammer, John B. Taylor and Peter D.K. Kennewell, Comprehensive Medicinal Chemistry, Pergmon Press, Great Britain, 1990.
3. Bertram G. Katzung, Basic and Clinical Pharmacology, Lange Medical Publications, Atos, 1982, California.



MANNAR THIRUMALAI NAICKER COLLEGE(Autonomous)
DEPARTMENT OF CHEMISTRY
(For those who joined in 2017 and after)

Programme : UG **Part III : Core**
Semester : VI **Hours : 05**
Subject Code :17UCHC61 **Credits : 05**

ORGANIC CHEMISTRY – III

Course outcomes:

CO1: To learn about the knowledge of civetone & Muscone

CO2: To have a basic knowledge in molecular rearrangements and heterocyclic compounds

CO3: To know about principles of spectroscopy

CO4: To gain basic knowledge about Applications of Spectroscopy

UNIT – I: Alicyclic compounds, Conformational analysis, Civetone and Muscone

Alicyclic compounds: General methods of preparation and properties of cycloparaffines – Baeyer’s strain theory and its modification. **Conformational Analysis:** Difference between configuration and conformation- Fisher- Saw horse and Newman Projection formulate – Conformational analysis of ethane, n-butane 1,2– dichloroethane, cyclohexane and monosubstituted cyclohexane.Civetone and Muscone any one method of synthesis – Structure only (no Structural elucidation)

UNIT – II: Molecular rearrangement and Free radicals

Molecular rearrangements: Detailed mechanisms of the following: pinacolPinacolone, Hofmann, Curtiusbenzil-benzilic acid, claisen, benzidine, Beckmann Fries and Wagner-Meerwein rearrangements.**Free radicals:** Definition – preparation and reactions of short lived and long lived free radicals – stability of free radicals – detection of free radicals – chain reactions – photochemical reactions of olefins cis-trans isomerisation. Mechanism of Sand Meyer reaction, Gomberg reaction and Hofmann-Loeffler reaction.

UNIT – III: Heterocyclic compounds

Heterocyclic compounds:Introduction and definition, Preparation and basic properties of pyrrole, pyridine, quinoline and isoquinine.**Alkaloids:** Definition – occurrence and extraction of alkaloids – general methods for determining the structure of alkaloids – classification of alkaloids – structural elucidation – coniine, piperine, nicotine and papavarine.**Terpenes:**Introduction, classification, occurrence and isolation – general properties – isoprene rule – general methods of determining structure. Properties and structure of citral, terpeniol.

UNIT – IV: Proteins and Nucleic acids

Proteins: Definition – Classification of proteins – colour reactions of proteins – primary, secondary, tertiary and quaternary structure of proteins (an elementary idea only). **Nucleic acids:** Definition – Classification of Nucleic acids – nucleosides – nucleotides – RNA and DNA general structure.

UNIT – V: Principles and Applications of Spectroscopy

UV: Introduction – Type of electronic transition – absorption law bathochromic shift and hypsochromic shift – hyperchromic and hypochromic effect – applications of UV to organic compounds – Woodward Fieser calculation of λ_{\max} . **IR:** Introduction – Instrumentation – different regions of IR, finger print regions – fundamental, overtone, Hot bands and combination bands – applications of IR to organic compounds – effect of hydrogen bonding – NH_2 . **NMR:** Introduction – chemical shift – shielding and deshielding effects factors influencing chemical shift – solvent used (TMS) – splitting of signals – NMR spectra of simple ethanol and anisole. Conditions for NMR active

Text Books

1. Bahl, B.S and Arun Bahl, A Textbook of Organic Chemistry, S. Chand & Co., 2012, New Delhi.
2. Soni, P.L and Chawla, H.M, A Textbook of Organic Chemistry, S. Chand & Co., 2007, New Delhi.

Reference Books

1. Jerry March, Advanced Organic Chemistry, 4th Edition, John Wiley & Sons, 1992, New York.
2. Pine, S.H, Organic Chemistry, 5th Edition, McGraw Hill International Edition, Chemistry Series, 1987, New York.
3. Sehan N. Ege, Organic Chemistry – Structure and Reactivity, 3rd Edition, A.I.T.B.S., 1998, New Delhi.
4. Morrison, R.T and Boyd, R.N, Organic Chemistry, 6th Edition, Printice-Hall of India Ltd., 1992, New Delhi.



MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF CHEMISTRY
 (For those who joined in 2017 and after)

Programme : UG	Part III	:Core
Semester : VI	Hours	: 05
Subject Code : 17UCHC62	Credits	: 05

PHYSICAL CHEMISTRY – III

Course outcomes:

CO1: To acquire elaborate knowledge in thermodynamics.

CO2: To get more knowledge in photochemistry

CO3: To learn about electrode and electrolytic cells in electrochemistry

CO4: To analysis the basic knowledge in potentiometric titrations

Unit – I: Thermodynamics – I

Definition of thermodynamic terms: system, surroundings – types of systems, intensive and extensive properties – State and path functions and their differentials – Thermodynamic process – Concept of heat and work – Definition of internal energy and enthalpy. Heat capacity – Heat capacities at constant volume and pressure and their relationship – Joule-Thomson effect – Joule-Thomson coefficient and inversion temperature – Calculation of w , q , dU & dH for the expansion of ideal gases under isothermal and adiabatic conditions for reversible process – Hess's Law of constant heat summation and its applications

UNIT – II: Thermodynamics - II

Need for the second law-different statements of the second law-Carnot cycle and efficiency-Carnot's theorem – Thermodynamic scale of temperature – Entropy as state function – entropy as a function of pressure and volume – Entropy changes of an ideal gas – physical significances of entropy – Clausius inequality – entropy as criteria of spontaneity and equilibrium. Gibbs function (G) and Helmholtz function (H) as thermodynamics quantities – Gibbs-Helmholtz equation. Need for the third law of thermodynamics – Nernst heat Theorem – statement of the third law of thermodynamics and its applications third law of Thermodynamics.

UNIT– III: Photochemistry

Definition of photochemical reactions – comparative study of thermal and photochemical reactions – laws of photochemistry – Lambert and Beer Law – Grothus – Draper law – Stark – Einstein law – quantum efficiency and its determination – Jablonski diagram – Photophysical processes – fluorescence phosphorescence and other deactivating processes. Photochemical processes – kinetics of photochemical reactions – Photochemical equilibrium – flash photolysis – photosensitization chemiluminescence – bioluminescence.

UNIT – IV: Electrochemistry - I

Specific conductance – equivalent conductance – variation of equivalent conductance with dilution – Migration of ions - Kohlrausch's law – Arrhenius theory of electrolyte dissociation and its limitations - Ostwald's dilution law – Debye-Huckel-Onsager's equation for strong electrolytes (elementary treatment only) – Definition of transport number – determination by Hittorf's method – Application of conductivity measurements – conductometric titrations – HCl vs NaOH , CH_3COOH vs NaOH .

UNIT– V: Electrochemistry - II

Single electrode potential, sign convention, Reversible and irreversible cells, conditions for a cell to be a reversible and irreversible – Nernst Equation – Reference electrode, Standard Hydrogen electrode, calomel electrode, Indicator electrode, metal – metal ion electrode, Inert electrode, Determination of EMF of cell, Applications of EMF measurements. Potentiometric titrations – HCl vs NaOH and $\text{K}_2\text{Cr}_2\text{O}_7$ vs FeSO_4

Text Book

1. Puri. B.R, Sharma. L.R and Pathania. S, Principles of Physical Chemistry, 47th Edition, ShobanLalNagin Chand & Co., 2017.

Reference Books

1. Gilbert W. Castellan, Physical Chemistry, 3rd Edition, Narosa Publishing House, 1985.
2. S. Glasstone, Textbook of Physical Chemistry, McMillan and Co., 1974, London.
3. Soni. P.L and Dharmarha, Textbook of Physical Chemistry, S. Chand & Co., 1991, New Delhi.
4. ArunBahl, B.S. Bahl and Tuli. G.D, Essentials of Physical Chemistry, S. Chand & Co., 2014, New Delhi.
3. Dogra. S.K and Dogra. S, Physical Chemistry through Problems, 4th Edition, New Age International, 1996.



MANNAR THIRUMALAI NAICKER COLLEGE(Autonomous)
DEPARTMENT OF CHEMISTRY
(For those who joined in 2017 and after)

Programme : UG	Part III	: Core
Semester : VI	Hours	: 03
Subject Code : 17UCHCP3	Credits	: 06

PHYSICAL CHEMISTRY EXPERIMENTS (PRACTICAL)

Course outcomes:

CO1: To acquire knowledge in determination of molecular weight & CST

CO2: To develop skill in phase diagram, viscosity & kinetics

CO3: To gain knowledge in partition coefficient experiments.

CO4: To analysis the skill in conductivity.

I. Determination of Molecular weight by

- a) Transition Temperature method – Sodium thiosulphatepentahydrate
- b) Rast Macro method – Naphthalene as Solvent

II. Phase diagram involving

- a) Simple eutectic
- b) Compound formation

III. Critical solution temperature (CST)

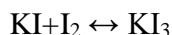
Determination of CST of phenol – water system and effect of impurity on CST –
Determination of Strength of NaCl.

IV. Potentiometric titrations

- (a) HClVsNaOH
- (b) $K_2Cr_2O_7$ Vs $FeSO_4$.

V. Partition Coefficient experiments:

- a) Study of the equilibrium constant for the reaction



By determining the partition Co-efficient of I_2 between water an CCl_4

Determination of strength of given KI.

VI. Kinetics: Determination of relative strength of acids by hydrolysis of ester.

VIII. Conductivity: Determination of cell constant and conductivity titration between as acid and a base (HClVsNaOH)

Text Book

1. Thomas. A.O and Mani, Textbook of Practical Chemistry, 4th Revised Edition, Scientific Publication, 1976.

Distribution of Marks (Max. marks – 100)

Duration of examination: 6 hrs

Regular Test in the Class	: 30 Marks
Observation note book	: 10 Marks

Total	: 40 Marks

Viva voce	: 10 marks
Record Note book	: 10 marks
For completion of the experiment	: 20 marks
Graph	: 2 marks
Calculation	: 5 marks
Tabulation	: 3 marks
Result	: 10 marks

Total	: 60 marks



MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF CHEMISTRY
(For those who joined in 2017 and after)

Programme :UG	Part III	: Core
Semester : VI	Hours	: 03
Subject Code : 17UCHCP4	Credits	: 05

GRAVIMETRIC ANALYSIS AND ORGANIC PREPARATION (PRACTICAL)

Course outcomes:

CO1: To develop skill in gravimetric analysis

CO2: To gain knowledge of various chemical properties

CO3: To get knowledge in the separation of mixtures

CO4: To analysis the preparation of various organic compounds

1. Gravimetric Analysis

1. Estimation of lead as lead chromate
2. Estimation of barium as barium chromate
3. Estimation of calcium as calcium oxalate monohydrate
4. Estimation of copper as cuprous thiocyanate
5. Estimation of nickel as Ni DMG.

2. Organic Preparation

1. Nitration
 - b. M-dinitrobenzene from nitrobenzene
 - c. Picric acid from phenol
2. Bromination:p-bromoacetanilide from acetanilide
3. Hydrolysis : Aromatic acid from (a) an ester (b) an amide
4. Oxidation: Benzoic acid from benzaldehyde.
5. Benzoylation: (a) Amine (b) phenols.
6. Acetylation : (a) Amine (b) phenols

Text Books

1. Thomas. A.O and Mani, Textbook of Practical Chemistry, 4th Revised Edition, Scientific Publication, 1976.
2. Gnanapragasam. N.S and Ramamurthy.G, Organic Chemistry Lab Manual, Viswanath. S Printers & Publishers Pvt. Ltd., Chennai, 2010.

Distribution of Marks (Max.marks – 100)

Duration of examination: 6 hrs

Int: 40

Regular Test in the Class : 30 Marks

Observation note book : 10 Marks

Total : 40 Marks

Record Note Book - 10 Marks

Viva Voce - 10 Marks

Ext: 60

Organic preparation (10 Marks)

Procedure - 2 Marks

Crude sample - 6 Marks

Recrystallised sample - 2 Marks

Gravimetric Estimation (30 Marks)

Procedure - 10 Marks

Estimation - 20 Marks

Less than 2 % Error – 20 Marks

2-3% Error – 18 Marks

3-4% Error – 16 Marks

4-5% Error – 14 Marks

Greater than 5% Error – 8 Marks



MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF CHEMISTRY
(For those who joined in 2017 and after)

Programme : UG	Part III	:Core
Semester : VI	Hours	: 02
Subject Code : 17UCHCP5	Credits	: 04

ORGANIC ANALYSIS AND ESTIMATION (PRACTICAL)

Course outcomes:

- CO1:** To acquire skill in organic analysis
CO2: To identify the functional groups
CO3: To analysis the side chain and halogen compounds
CO4: To gain knowledge in organic estimation

I. Organic Analysis

Analysis of an organic compound containing one or two functional groups and confirmation by the preparation of a solid derivative – acids, phenols, aldehydes, ketone, esters, nitro compounds, amines (primary, secondary and tertiary), aniline, aliphatic diamide, side chain and nuclear halogen compounds, diamide containing sulphur and monosaccharide.

II. ORGANIC ESTIMATION

1. Estimation of phenol
2. Estimation of aniline
3. Estimation of glucose

Text Books

1. Thomas. A.O and Mani, Textbook of Practical Chemistry, 4th Revised Edition, Scientific Publication, 1976.
2. Gnanapragasam. N.S and Ramamurthy. G, Organic Chemistry Lab Manual, Viswanath.S Printers & Publishers Pvt. Ltd., 2010, Chennai.

Distribution of Marks (Max.marks – 100)

Duration of examination: 6 hrs

Regular Test in the Class	: 30 Marks
Observation note book	: 10 Marks

Total	: 40 Marks

Organic estimation (30 Marks)

Record Note	- 10 marks
Procedure	- 5 marks
Estimation	- 15 marks
Less than 3% Error	- 15 Marks
3-4% Error	- 13 Marks
4-5% Error	- 10 Marks
Greater than 5%	- 8 Marks

Organic analysis (30 Marks)

Viva Voce	- 10 marks
Preliminary reaction	- 2 marks
Elements present	- 4 marks
Aliphatic or aromatic	- 3 marks
Saturated / Unsaturated	- 3 marks
Functional group	- 6 marks
Derivative	- 2 marks



MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF CHEMISTRY
(For those who joined in 2017 and after)

Programme :UG **Part III : Core Elective**
Semester : VI **Hours : 04**
Subject Code : 17UCHE61 **Credits : 04**

APPLIED CHEMISTRY

Course Outcomes

- CO1:** To enable the students to learn about water and sewage treatment,
CO2: To develop the basic skills of match, silicate and petrochemical chemistry
CO3: To gain basic knowledge in lacquer paint
CO4: To analysis the basic skills about fertilizers

UNIT – I: Water and Seweage Treatment

Water Treatment: Water Quality Analysis – Chemical and Physical Analysis of water - Quality Parameters – Standards prescribed for Water Quality by WHO and other Indian standards – Sea Water as a source of Drinking Water – Electro dialysis method and Reverse osmosis method for purifications of water. **Sewage Treatment:** Municipal Waste Water – Sewage Treatment – Aerobic and Anaerobic process – Miscellaneous Method of Sewage Treatment

UNIT – II: Insecticides, Pesticides and Preparation Of Chemicals

Insecticides and Pesticides: Definition – Classification – Inorganic pesticides: lead arsenate, Paris green, lime, sulphur, hydrocyanic acid – Organic pesticides, natural, synthetic (DDT, Gammaxene) – Fungicides – repellants. **Preparation of domestically useful chemical products:** Washing powder – Cleaning powder – Phenoyls (White, Black and Coloured) Shampoo, Liquid Blue, Blue, Red and Green inks, Soap Oil, Face powder, pain balm.

UNIT – III: Match and Silicate Industry

Match Industry: Pyrotechnics and explosives – Raw materials needed for match industry – Manufacturing process – Pyrotechniques – Coloured smokes. **Silicate Industry:** Cement Glass and Ceramics, Raw materials and manufacture of Cement, Glass and Ceramics.

UNIT – IV: Petrochemicals and Lacquer Paint

Petrochemicals: Elementary study – Definition – Origin – Composition – Chemicals from natural gas, Petroleum, Light Naphtha and Kerosene – Synthetic Gasoline. **Paints and lacquers:** Pigments – Paints – Ingredients in Paints – Manufacture – Lacquers – Varnishes.

UNIT – V: Fertilizers

Definition – nutrients for plants – role of various elements in plants growth – natural and chemical fertilizers-classification of chemical fertilizers –urea, super phosphate and potassium nitrate-mixed fertilizer-fertilizer industry in India.

Text Book

1. Sharma. B.K, Industrial Chemistry including Chemical Engineering, Goel Publishing House – 13th Revised and enlarged Edition, 2009, New Delhi.

Reference Books

1. Srilakshmi. B, Food Science, 3rd Edition, New Age International Pvt. Ltd., Publishers, 2002.
2. Jayashree Ghosh, Fundamental concepts of Applied Chemistry, S. Chand & Co., Publishers, 1998.
3. Thanlamma Jacob, Text Books of Applied Chemistry for Home Science and Allied Sciences, Macmillan, 2000.



MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF CHEMISTRY
(For those who joined in 2017 and after)

Programme : UG

Semester : VI

Subject Code : 17UCHE62

Part III : Core Elective

Hours : 04

Credits : 04

NANO CHEMISTRY

Course Outcomes

CO1: To enable the students to learn about the Nanoscale

CO2: To study about the Semiconductors and Quantum dots

CO3: To gain basic knowledge in Nanobiology and Nanosensor

CO4: To gain knowledge in Nanomedicine

UNIT – I: Investigating and Manipulating Materials in the Nanoscale

Introduction – difference between nanotechnology and biology –
electronic microscopies – scanning electron microscopy (SEM) - TEM.

UNIT – II: Semiconductors Quantum Dots

Introduction – synthesis of quantum dots – synthesis in confined media – molecular precursors. – Electronic structure of nanocrystals – How does we study quantum dots
Uses.

UNIT – III: Nanobiology

Interaction between biomolecules and nano particles surfaces – Nobel metal materials – semiconductor – Nanocrystals – Magnetic nanoparticles – Application of nanobiology.

UNIT – IV: Nanosensors

What is sensor – What make them possible – Electrochemical sensors – Sensor based on physical properties – Nano biosensors – Smart dust – Sensors of the future.

UNIT V: Nanomedicine

Nanoshells – Nanopores – Tectodendrimers – Nanotechnology in diagnostics application – Gold nanoparticles - Magnetic nano particles.

Text Book

1. Pradeep. T, Nano the essential, Tata McGraw Hill Co., 2007, New Delhi.

Reference Book

1. Kenneth J. Klabunde, Nanoscale Materials in Chemistry, Wiley Interscience – John Wiley & Sons Inc., New York, 2003.
2. Edelstein.A.S and Cammarata.R.C, Nanomaterials- Synthesis, Properties and Applications, Institute of Physics Publishing, 1998, London.
3. Ozin.G and Arsenault. A, Nanochemistry: A Chemical Approach to Nanomaterials, RSC Publishing, 2005.
4. Edward L. Wolf, Wiley-VCH, Nanophysics and Nanotechnology: An Introduction to Modern Concepts in Nanoscience, 2nd Reprint, 2005.



MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF CHEMISTRY
(For those who joined in 2017 and after)

Programme : UG

Semester : VI

Subject Code : 17UCHE63

Part III : Core Elective

Hours : 04

Credits : 04

APPLICATIONS OF COMPUTER IN GREEN CHEMISTRY

Course Outcomes

CO1: To gain basic knowledge about computer application in chemistry

CO2: To understand the basic concept of Green Chemistry

CO3: To gain basic knowledge of Green Chemistry

CO4: To analysis the knowledge skill in fundamentals of Green Chemistry

UNIT – I: Characteristics of Computer

Introduction to computer – Characteristics – Types of computer – Parts of computer – Input devices – Output devices.

UNIT – II: Types of Memory and System

Memory unit – types of memory – Hardware –Software – Algorithm – Flowchart – Programming languages – Number system – Decimal – Binary system – Octal number system

UNIT – III: Salient Features of Windows and MS word

Salient features of windows and MS word for typing texts and equation in Chemistry – Tabular columns – Advanced concepts. Basic concept of creating and accessing databases using MS access – Significance of chemdraw – Drawing chemical structure and pasting them in the text.

UNIT – IV: Introduction to Green Chemistry

Introduction to Green Chemistry – The need for Green Chemistry – Sustainability and cleaner production – Green Chemistry and Eco-efficiency – Environmental protection laws, changes ahead for a chemist – Green Chemistry education.

UNIT – V: Fundamentals of Green Chemistry

Introduction, Inception and evolution of Green Chemistry, Introduction – Twelve Principles of Green Chemistry – Atom economy Scope of Green Chemistry

Text Books

1. ArunBahl, B.S. Bahl and G.D. Tuli, Essentials of Physical Chemistry, S. Chand & Co., 2003, New Delhi.
2. RashmiSanghi and M.M. Srivastave, Green Chemistry, Narosa Publishing House, 2003.

Reference Books

1. Raman. K.V, Computers in Chemistry, Tata McGraw Hill Publishing Co., 1993, New Delhi.
2. Venit. S.M, Programming in Basic: Problem solving with structure and style.Jaico Publishing House: 1996, Delhi.
3. Engel. T and Reid. P, Physical Chemistry 2ndEdition Pearson, 2010.



MANNAR THIRUMALAI NAICKER COLLEGE (Autonomous)
DEPARTMENT OF CHEMISTRY
(For those who joined in 2017 and after)

Programme :UG	Part IV	: Skill
Semester : VI	Hours	: 02
Subject Code : 17UCHS61	Credits	: 02

MACROMOLECULAR CHEMISTRY

Course outcomes:

CO1: To learn about the different mechanisms involved in the polymer preparation

CO2: To learn about the different types of polymerization techniques

CO3: To study in detail about the glass transition temperature

CO4: To gain knowledge in polymer degradation

UNIT – I: Basic concepts of polymers

Definition – Polymerization - Monomer - Repeat unit - degree of polymerization - Classification of polymers -Stereochemistry of polymer - Nomenclature of stereo regular polymers - Chain polymerization, free radical polymerization - Ionic polymerization.

UNIT – II: Types of Polymerization

Coordination polymerization - Ziegler Natta catalyst. Step polymerization - Ring opening polymerization. Copolymerization - Random, block and graft co polymers - Polymerization techniques; bulk, solution, suspension and emulsion polymerization.

UNIT – III: Molecular Weight and Glass Transition Temperature

Measurement of molecular weight and size - Number average and weight average molecular weights - Glass transition temperature- Concepts of glass transition temperature and associated properties.

UNIT – IV: Glassy Solids and Polymer Crystallization

Glassy solids and glass transition - factors influencing glass transition temperature (T_g). Crystallinity in polymers - Polymer crystallization, structural and other factors affecting crystallisability - effect of crystallinity on the properties of polymers.

UNIT – V: Types of Polymers and Polymer Degradation

Synthetic resins and plastics - Manufacture and applications of polyethylene, PVC, Teflon, poly styrene, polymethylmethacrylate, poly urethane, phenol – formaldehyde resins, urea-formaldehyde resins and epoxy polymers.

Text Book:

1. Gowariker. R.V, Polymer Science, New Age International Publication, 2006.

Reference Books:

1. Young. R.J and Powell. P.A, Introduction to Polymers, 3rd Edition, CRC Press, 1991.
2. Ravve. A, Principles of Polymer Chemistry, 3rd Edition, Springer, 2012, New York.
3. Fred W. Billmeyer, Textbook of Polymer Science, 3rd Edition, John Wiley & Sons, 2007.