

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 2018-2019 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, CBSE Board with Chemistry as one of the subjects 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 questions paper for the continuous Internal Assessment

(For Part I, Part II, Part III , NME & Skilled Paper in Part IV)

The components for continuous internal assessment are:

Part –A	
Six multiple choice questions (answer all)	6 x 01= 06 Marks
Part –B	
Two questions (‘either or ‘type)	2 x 07=14 Marks
Part –C	
One question out of two	1 x 10 =10 Marks

Total	30 Marks

Pattern of the question paper for the Summative Examinations:

Note: Duration- 3 hours

Part –A	
Ten multiple choice questions	10 x 01 = 10 Marks
(No Unit shall be omitted; not more than two questions from each unit.)	
Part –B	
Five Paragraph questions (‘either or ‘type)	5 x 07 = 35 Marks
(One question from each Unit)	
Part –C	
Three Essay questions out of five	3 x 10 =30 Marks
(One question from each Unit)	

Total	75 Marks

The Scheme of Examination (Environmental Studies and Value Education)

Two tests and their average	--15 marks
Project Report	--10 marks*
Total	<u>--25 marks</u>

** The students as Individual or Group must visit a local area to document environmental assets – river / forest / grassland / hill / mountain – visit a local polluted site – urban / rural / industrial / agricultural – study of common plants, insects, birds – study of simple ecosystem – pond, river, hill slopes, etc.

Question Paper Pattern

Pattern of the Question Paper for Environmental Studies & Value Education only) (Internal)

Part –A

(Answer is not less than 150 words)

Four questions (‘either or ‘type) 4 x 05=20 Marks

Part –B

(Answer is not less than 400 words)

One question (‘either or ‘type) 1 x 10=10 Marks

	30 Marks
Total	30 Marks

Pattern of the Question Paper for Environmental Studies & Value Education only) (External)

Part –A

(Answer is not less than 150 words)

Five questions (either or type) 5 x 06 =30 Marks

(One question from each Unit)

Part –B

(Answer is not less than 400 words)

Three questions out of Five 3 x 15 = 45 Marks
each unit (One question from each Unit)

	75 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.

PROGRAMME SPECIFIC OUTCOMES

- PSO1:** To ability to employ critical thinking and efficient problem-solving skills in the areas of analytical, inorganic, organic, and physical chemistry.
- PSO2:** To demonstrate proficiency in writing and speaking about chemistry topics in a clear and concise manner to both chemists and non-chemists according to professional standards
- PSO3:** To conceptualize and apply the ideas of chemical sciences in the areas of organic synthesis, synthesis of materials, corrosion inhibition, environment sustainability etc.
- PSO4:** To demonstrate proficiency in the use of appropriate instrumentation to collect and record data from chemical experiments

MANNAR THIRUMALAI NAICKER COLLEGE(Autonomous)
DEPARTMENT OF B.Sc CHEMISTRY
(For those who joined in 2018 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) 3(0) 3(0) 2(0)	5(5) 5(5) 3(6) 3(5) 2(4)	60	55	13	1300
Core Elective					4(4)	4(4)	8	8	2	200
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 –III							
Subject Code	Title of the Paper	No. of Courses	Hours /Week	Credits	Maximum Marks		
					Int	Ext	Total
18UTAG31	Part –I Tamil காப்பிய இலக்கியமும் சிறுகதையும்	1	6	3	25	75	100
18UENG31	Part –II English Subject Exploring Language Through Literature-III	1	6	3	25	75	100
18UCHC31	Part-III Core Subject Physical Chemistry-I	1	4	4	25	75	100
18UCHCP2	Volumetric Analysis Practical	-	2	-	-	-	-
18UMCA32	Part-III Allied Subject Allied Mathematics-I	1	4	4	25	75	100
18UPHA31	Allied Physics – III (Electricity and Electronics)	1	4	4	25	75	100
18UPHAP2	Allied Physics Practical – II	-	2	0	-	-	-
18UCHN31	Part-IV Non Major Elective Waste Water Treatment	1	2	2	25	75	100
	Total	6	30	20	150	450	600

SEMESTER IV							
Subject Code	Title of the Paper	No. of Courses	Hours /Week	Credits	Maximum Marks		
					Int	Ext	Total
18UTAG41	Part –I Tamil பழந்தமிழ் இலக்கியமும் புதினமும்	1	6	3	25	75	100
18UENG41	Part –II English Subject Exploring Language Through Literature-IV	1	6	3	25	75	100
18UCHC41	Part-III Core Subject Inorganic Chemistry - II	1	4	4	25	75	100
18UCHCP2	Volumetric Analysis Practical	1	2	2	40	60	100
18UMCA42	Part-III Allied Subject Allied Mathematics – II	1	4	4	25	75	100
18UPHA41	Allied Physics - IV Optics, Spectroscopy and Modern Physics	1	4	3	25	75	100
18UPHAP2	Allied Physics Practical -II	1	2	1	40	60	100
18UCHN41	Part IV -Non Major Elective Polymer Chemistry	1	2	2	25	75	100
18UEAG40 - 18UEAG49	Part V- Extension Activities	1	0	1	100	-	100
	Total	9	30	23	330	570	900



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DEPARTMENT OF CHEMISTRY
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Programme : UG	Part III	: Core
Semester : III	Hours per week	: 04
Subject Code : 18UCHC31	Credit	:04

PHYSICAL CHEMISTRY – I

Course Outcomes:

CO1: To study the essentials of gaseous state and colloidal state of matter

CO2: To have the basic idea of chemical kinetics

CO3: To know about the adsorption & catalysis

CO4: To study the kinetics of chemical equation in various fields.

Unit -1: Gaseous State

- Postulates of kinetic theory gases – Derivation of ideal gas laws from the expression on the basis of kinetic theory of gases – Deviations – Vander Wall’s equation – Reduced equation of state – Law of corresponding states compressibility factor for gases – Boyle and inversion temperatures of gases.
- Maxwell – Boltzmann law of distribution of velocities (Derivation not necessary) graphical representation – Effect of temperature on various velocities – Experimental verification of Maxwell’s law.
- Mean free path – Viscosity of gases – Collision number – Brownian movement and determination of Avogadro number – Loschmidt number – Principle of equipartition of energy.

Unit -2: Colloidal State

- Colloidal State of matter – Various types – Classification
- Sols – Dialysis – Electro osmosis – Electrophoresis – Stability of colloids – Protective action – Hardy – Schulze law - Gold number
- Emulsion – Types of emulsions – Emulsifier with examples
- Gels – Classification – Preparation and applications of colloids

Unit -3: Adsorption

Adsorption: Definition of various terms – Adsorption of gases on solids characteristics of adsorption of gases on solids – Physisorption and chemisorption– Factors influencing adsorption – adsorption isotherm – BET (Elementary idea only) – Applications of adsorption

Unit-4: Catalysis

Catalysis: Definition – Characteristics – Theories of catalysis – Promoters - Poisons – Enzyme Catalysis – Mechanism – Michaleis Menten equation - acid base catalysis - Autocatalysis – Application of catalysis.

Unit -5: Chemical Kinetics

- a. Introduction – Rate of reaction – Rate law and Rate constant – Order and molecularity of a reaction. Reaction of first and pseudo unimolecular reaction Catalytic decomposition of hydrogen peroxide – Decomposition of dinitrogen pentoxide. Inversion of cane sugar and hydrolysis of ester by acid.
- b. Second, third and Zero order reactions – examples – rate equation – half period (no derivation required)
- c. Influence of temperature on the rate of reaction – Arrhenius rate equation and its significance – Measurement of parameters. Theory of reaction rates - Bimolecular collision theory – Unimolecular reactions – Lindemann hypothesis – Absolute Reaction Rate theory.
- d. Influence of ionic strength on reaction rate – primary and secondary salt effect – kinetics of fast reactions – Relaxation method.

Text Books

1. Arun Bahl, B.S Bahl & G.D. Tuli, Essentials of Physical Chemistry, S.Chand and Co, 2014, New Delhi.

Unit- 1: Page No's – 387-456

Unit -2: Page No's – 890-928

Unit-3: Page No's – 928-945

Unit -4: Page No's – 863-890

Unit -5: Page No's - 808-863

Reference Books

1. Gilbert.W. Castellan.W, Physical Chemistry, Narosa publishing house, third edition 1985.
2. Atkins. P.W, Physical Chemistry, 7th edition, Oxford university press, 2001.
3. Dogra. S.K and Dogra.S, Physical Chemistry Through Problems, New age international, 4th edition 1996.
4. Puri. B.R, Sharma. L.R and Pathania. S, Principles of Physical Chemistry, Shoban Lal Nagin chand and Co, 47th edition, 2017.
5. Maron. S.H and Lando. J.B, Fundamentals of Physical Chemistry, Macmillan limited, 1966, New York.



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Programme : UG	Part III	: Core
Semester : IV	Hours per week	: 02
Subject Code : 18UCHCP2	Credit	: -

Volumetric Analysis Practical

(A double titration involving the making up of the solution to be estimated and the preparation of a primary standard.)

Course Outcomes:

CO1: To develop skill in Acidimetric and alkalimetric analysis

CO2: To gain knowledge in redox, iodometry and dichrometry

CO3: To study about the argentimetry and EDTA titration

CO4: To determine the percentage of substance in Industry through volumetric analysis.

List of Experiments

I. Acidimetry and Alkalimetry

1. Estimation of Na_2CO_3
2. Estimation of NaOH / KOH
3. Estimation of oxalic acid.

II. Redox Titrations

a. Permanganometry

1. Estimation of ferrous ion
2. Estimation of oxalic acid
3. Estimation of calcium (direct method)

b. Dichrometry

1. Estimation of ferrous ion
2. Estimation of ferric ion using external indicator

III. Iodometry and Iodimetry

1. Estimation of potassium dichromate
2. Estimation of potassium permanganate
3. Estimation of copper

IV. Argentimetry

Estimation of Potassium Chloride

V. EDTA Titration

Estimation of Hardness of water using EDTA.

Distribution of Marks (Max.marks -100)

Duration of examinations: 3hrs

Int: 40

Class work	: 30 marks
Observation note book	: 10 marks

Total	: 40 marks

Ext: 60

Viva Voce	: 5 marks
Record Notebook	: 10 marks
Procedure writing	: 15 marks
Volumetric estimation	: 30 marks

TOTAL	: 60 marks

For Volumetric Estimation if the student have

Less than 2% Error	-	30 marks
2-3% Error	-	25 marks
3-4% Error	-	20 marks
3-5% Error	-	15 marks
Greater than 5%	-	10 marks

Text Book:

1. Vogel, Text book of Inorganic quantitative analysis, Longman Sc & Tech, 2008.

Reference Books:

1. Jeyavathana Samuel, Chemistry Practical Book, G.G.Printers, Chennai, 2012.
2. Vickie.M.Williamson, M.Larry Peck, Lab manual for General Chemistry, Cengage Learning India Private Limited, 2009, New Delhi.
3. Dr. V. V. Ramanujam, Inorganic Semimicro Qualitative Analysis, National Publishing Company, 3rd edition, 1974, Chennai.



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Programme	: B.Sc., Chemistry	Part III	: Allied
Semester	: III	Hours per week	: 04
Subject Code	: 18UMCA32	Credit	: 04

ALLIED MATHEMATICS – I

Course Outcomes:

CO1: To familiarize basic concepts of theory of equations.

CO2: To develop skills in solving equations.

CO3: To teach trigonometry and Expressing Trigonometric functions.

CO4: To develop skills in expanding Trigonometric functions.

Unit-I

Theory of Equations: Formation of Equations - Relation between the roots and coefficients.

Unit-II

Reciprocal Equations - Transformation of Equations.

Unit – III

Approximate solutions of Numerical Equations: Newton's Method - Homer's Method.

Unit - IV

Trigonometry: Applications of Demoivre's Theorem - Expression for $\sin n\theta$, $\cos n\theta$ and $\tan n\theta$.

Unit - V

Expression of $\sin^n \theta$ and $\cos^n \theta$ - Expansion of $\sin \theta$, $\cos \theta$ and $\tan \theta$ in powers of θ .

Text Book:

Dr. Arumugam. S and Thangapandi Isaac. A, **Ancillary Mathematics Paper I**, New Gamma Publishing House, 2007, Palayamkottai.

Unit I - Chapter 1: Sections: 1.1, 1.2

Unit II - Chapter 1: Sections: 1.3, 1.4

Unit III - Chapter 1: Section: 1.5

Unit IV - Chapter 4: Section: 4.1

Unit V - Chapter 4: Sections: 4.2,4.3

Reference Books:

- 1..Manickavashagam Pillai. T.K and Narayanan. S, **Algebra – Volume I**, Viswanathan. S Printers Publishers Pvt. Ltd, 2007, Chennai.
2. Manickavashagam Pillai.T.K and Narayanan.S, **Trigonometry**, Viswanathan.S Printers Publishers Pvt. Ltd, 2011, Chennai.
3. Dr.Arumugam.S and Isaac, **Classical Algebra**, New Gamma Publication House, 2003, Palayamkottai.



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Programme	: B.Sc (Mathematics & Chemistry)	Part III	: Allied
Semester	: III	Hours per week	: 04
Sub code	: 18UPHA31	Credit	: 04

ALLIED PHYSICS - III
ELECTRICITY AND ELECTRONICS

Course Outcomes

- CO1:** To enable the students to understand the basic concepts of electricity and electronics.
CO2: To understand the Gauss's law, Kirchhoff's laws and torque.
CO3: To study diodes and Binary number system.
CO4: To analyse the types of oscillator.

Unit I:

Gauss's law – Proof – Applications – Electric field due to a charged sphere – Field near a charged conducting cylinder - Coulomb's theorem – Electric potential – Relation between electric potential and electric field – Capacitors –Expression for C of a parallel plate, spherical (outer sphere earthed) and cylindrical capacitors – Energy of a charged capacitor – Loss of energy due to sharing of charges between two capacitors.

Unit II:

Kirchhoff's laws – Application of Kirchhoff's laws to Wheatstone's network – Carey Foster's Bridge – Measurement of resistance and temperature coefficient of resistance – Principle of Potentiometer – Calibration of ammeter and voltmeter(low & high range) – Measurement of resistance using potentiometer.

Unit III:

Torque on a current loop – Mirror galvanometer, dead beat and ballistic galvanometers – Current and voltage sensitiveness using B.G – Experiments for charge sensitiveness – comparison of emf's and comparison of capacitors.
 Electro motive force generated in a coil rotating in a uniform magnetic field – RMS and Mean values – LCR circuit -Series and parallel resonant circuits.

Unit IV:

Junction Diodes – Forward and reverse bias – Diode characteristics – Types of diodes (LED and Zener)-Bridge rectifier using Pi filter – Transistor – Characteristics(CE mode only) – Single transistor(CE) amplifier Frequency response - Hartley oscillator – OPAMP and its characteristics – OPAMP as adder and subtractor.

Unit V:

Decimal number system - Binary number system – Binary to decimal and decimal to binary conversions – Addition and subtraction of binary numbers – Logic circuits – Boolean algebra – Postulates and theorems of Boolean Algebra – De Morgan's theorem – OR, AND, NOT, NOR and NAND gates –NOR and NAND gates as universal building blocks - EX-OR gates.

Text Book:

1. Murugesan.R, **Electricity and Electronics**, S.Chand and Co, First Edition, June 2012, New Delhi.
Unit – I : 1.1 – 1.19
Unit – II : 2.1 – 2.10
Unit – III : 3.1 – 3.10, 3.11 – 3.16
Unit – IV : 4.1 – 4.18, 4.24, 4.25
Unit – V : 5.1 – 5.18

Reference Books:

1. Narayanamoorthy and Nagarathinam, **Electricity and Magnetism**, National Publishing Co, 1997
2. Sehgal, Chopra and Sehgal, **Electricity and Magnetism**, - Sultan chand and Sons, 1998, New Delhi.
3. Murugesan.R, **Electricity and Electromagnetism**, S.Chand and Co, 2004, New Delhi.
4. Brijlal and Subramaniyam, **Electricity & Magnetism**, S.Chand and Co, 20th revised edition, 2007.



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Programme	: B.Sc (Mathematics & Chemistry)	Part III	: Allied
Semester	: III & IV	Hours per week	: 02
Sub code	: 18UPHAP2	Credit	: -

ALLIED PHYSICS PRACTICAL – II

Course Outcomes

CO1: To develop experimental knowledge by handling various apparatus

CO2: To know the various components and its important

CO3: To know the circuit connections and functioning of experiments.

CO4: To create interest to develop oscillatory circuit.

Any 14 experiments.

1. Mirror Galvanometer - Voltage and current sensitiveness
2. LCR – Series resonance - Determination of L & Q factor
3. Air wedge - Thickness of a wire
4. Dispersive power of a prism – Spectrometer
5. Grating N and λ by Normal incidence – Spectrometer
6. Newton's rings - Determination of radius of curvature
7. Bridge rectifier - Pi filter
8. Transistor characteristics - CE mode
9. Single stage transistor amplifier
10. Hartley oscillator
11. Logic gates – AND, OR, NOT - Truth table verification Using Discrete Components.
12. Logic gates – NAND, NOR - Truth table verification Using Discrete Components.
13. Zener diode characteristics and break down voltage
14. OP AMP as an adder and subtractor
15. Comparison of capacitances - Desauty's method using headphone
16. LCR – Parallel resonance.



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Programme	: UG	Part IV	: NME
Semester	: III	Hours per week	: 02
Subject Code	: 18UCHN31	Credit	: 02

WASTE WATER TREATMENT

Course Outcomes:

CO1: To understand about the soft water and hard water.

CO2: To know about the various external conditional methods.

CO3: To discern on the treatment of boiler feed water.

CO4: It is useful to analyse water and become an analyst.

Unit I

Introduction - Types of impurities present in water - Hardness of water - Estimation of hardness by EDTA method - Domestic water treatment - water quality standards.

Unit II

Sterilization - Boiling - Ozone gas treatment - Ultraviolet treatment - Chlorination – Break point chlorination.

Unit III

Boiler feed water - Scale and sludge formation - Comparison of sludge and scale - Boiler corrosion - Removal of carbon dioxide and dissolved oxygen.

Unit IV

Caustic embrittlement - Priming - Foaming - Requirements of boiler feed water - Internal conditioning - Colloidal conditioning - Phosphate conditioning - Calgon conditioning - Carbonate conditioning.

Unit V

External conditioning - Demineralization process - Regeneration of ion exchangers -

Advantages and disadvantages of ion exchange process - Desalination - Reverse osmosis -

Difference between internal conditioning and external conditioning.

Text Book:

1. Sivakumar.R, Jeyaprakasam.R & Sivakumar.N, “Engineering Chemistry” TATA McGRAW-Hill Pvt Ltd, (2012), New Delhi.

References Books:

1. B.K.Sharma “Engineering chemistry” Krishna Prakasan Media (P) Ltd., Meerut (2001).
1. Sivasankar.B “Engineering Chemistry” Tata McGraw-Hill Pub.Co.Ltd, (2008), New Delhi.
3. P.C.Jain and Monica Jain, “Engineering Chemistry” Dhanpat Rai Pub, Co., New Delhi



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DEPARTMENT OF CHEMISTRY
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Programme : UG	Part III	: Core
Semester : IV	Hours per week	: 04
Subject Code : 18UCHC41	Credit	: 04

INORGANIC CHEMISTRY-II

Course Outcomes:

- CO1:** To gain the basic knowledge of metallurgy.
CO2: To understand the essentials of co-ordination compounds.
CO3: To learn about the general discussion of p-block elements.
CO4: Metallurgy unit is applicable to go Industry for students.

Unit - 1 - Metallurgy

Occurrence of metals – minerals – ores - types of ores – various steps involved in metallurgy- concentration of ore : physical and chemical methods - calcination - roasting -reduction methods - smelting, alumino-thermic, air and electrolytic methods - refining methods : cupellation, electrolytic, zone refining and vapour phase method - Extraction of Vanadium, Molybdenum and Tungsten from their ore.

Unit – 2 - p - Block Elements – I (Group III A, IV A & V A elements)

General characteristics : Electronic configuration, metallic character, oxidation states, - allotropy, oxidation states and catenation Preparation, properties, structure and uses of Diborane, Borazine- allotropes of carbon – detailed study of Carbides and Silicates – Preparation, properties and uses of Silicones, Carborundum, Stannous chloride, Red Lead and White Lead.- Nitrides: classification - preparation, properties and uses of microcosmic salt, Graham's salt and tartar emetic.

Unit – 3- p - Block Elements – II (Group VI A & VII A elements)

General characteristics : Electronic configuration, metallic and non-metallic character, atomicity, polymorphism, catenation and oxidation states – Anomalous behavior of oxygen - preparation, properties and uses of Caro's acid and Marshall's acid — isolation of fluorine by modern method bleaching powder : its manufacture (Modern method) and estimation of available chlorine in bleaching powder – relative strengths of oxoacids of the halogens - electropositive character of Iodine – Interhalogens & Pseudohalogens

Unit –4 - Coordination Chemistry – I

Double salts and coordination compounds – terminology: coordination sphere, coordination number, ligand and its types – nomenclature - Isomerism: structural isomerism and stereo isomerism - stability: thermodynamic and kinetic stability - factors affecting the stability of metal complexes – Experimental determination of composition of complexes by Job's method – Chelates:classification – chelate effect and application of the formation of chelated complexes in analytical chemistry.

Unit – 5 - Coordination Chemistry – II

Werner's coordination theory: postulates and experiment evidence - Sidgwick's concept: EAN rule – applications and limitations - Valence Bond Theory: assumptions and illustration to 4 and 6-coordination ions - hybridization and geometry - limitations - Crystal Field Theory: salient features - orbital splitting as applied to octahedral, tetrahedral and square planar complexes - CFSE and its calculation - spectrochemical series- magnetic moments and colour of transition metal complexes.

Text Books

1. Puri. B. R, Sharma. L. R, Kalia. K. C, Principles of Inorganic Chemistry, Shoban Lal Nagin Chand and Co., 2014, Delhi.

Unit- 1: Page No's – 328 - 339.

Unit -2: Page No's – 416 – 418, 432 – 434, 437-438, 443, 443, 452-455, 468-470,480-482, 486-487, 521-522, .

Unit-3: Page No's – 536-538, 540-541, 559-560. 570-571, 585-586, 589-590, 591-603.

Unit -4: Page No's – 743-772.

Unit -5: Page No's – 773-786.

Reference Books

1. Huheey. J. E, Keiter. E. A and Keiter. R. L, Inorganic Chemistry, 4th ed., Harper Collins, 1993, New York.
2. Cotton. F. A, Wilkinson.G, Murillo.C and M. Bochman, Advanced Inorganic Chemistry, 6th ed., John Wiley, , 1999, New York.
3. Moeller.T, Inorganic Chemistry: A Modern Introduction, Wiley, 1990, New York.
4. Madan. R.D, S.Chand, **Modern Inorganic Chemistry** band Co.Ltd, 2012, New Delhi.



MANNAR THIRUMALAI NAICKER COLLEGE(Autonomous)
DEPARTMENT OF CHEMISTRY
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Programme : UG

Semester : IV

Subject Code : 18UCHCP2

Part III : Core

Hours per week : 02

Credit : 02

Volumetric Analysis Practical

(A double titration involving the making up of the solution to be estimated and the preparation of a primary standard.)

Course Outcomes:

CO1: To develop skill in Acidimetric and alkalimetric analysis

CO2: To gain knowledge in redox, iodometry and dichrometry

CO3: To study about the argentimetry and EDTA titration

CO4: To determine the percentage of substance in Industry through Volumetric analysis.

List of Experiments

I. Acidimetry and Alkalimetry

1. Estimation of Na_2CO_3
2. Estimation of NaOH / KOH
3. Estimation of oxalic acid.

II. Redox Titrations

a. Permanganometry

1. Estimation of ferrous ion
2. Estimation of oxalic acid
3. Estimation of calcium (direct method)

b. Dichrometry

1. Estimation of ferrous ion
2. Estimation of ferric ion using external indicator

III. Iodometry and Iodimetry

1. Estimation of potassium dichromate
2. Estimation of potassium permanganate
3. Estimation of copper

IV. Argentimetry

Estimation of Potassium Chloride

V. EDTA Titration

Estimation of Hardness of water using EDTA.

Distribution of Marks (Max.marks -100)

Duration of examinations: 3hrs

Int: 40

Class work	: 30 marks
Observation note book	: 10 marks

Total	: 40 marks

Ext: 60

Viva Voce	: 5 marks
Record Notebook	: 10 marks
Procedure writing	: 15 marks
Volumetric estimation	: 30 marks

TOTAL	: 60 marks

For Volumetric Estimation if the student have

Less than 2% Error	-	30 marks
2-3% Error	-	25 marks
3-4% Error	-	20 marks
3-5% Error	-	15 marks
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2. Vickie.M.Williamson, M.Larry Peck, Lab manual for General Chemistry, Cengage Learning India Private Limited, 2009, New Delhi.
3. Dr. V. V. Ramanujam, Inorganic Semimicro Qualitative Analysis, National Publishing Company, 3rd edition, 1974, Chennai.



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DEPARTMENT OF CHEMISTRY
 (For those who joined in 2018-2019 and after)

Programme : B.Sc., Chemistry	Part III	: Allied
Semester : IV	Hours per week	: 04
Subject Code : 18UMCA42	Credit	: 04

ALLIED MATHEMATICS – II

Course Outcomes:

CO1: To familiarize Vector differentiation.

CO2: To introduce basic statistical concepts of interpolation.

CO3: To familiarize the concepts on attributes and index numbers.

CO4: To develop skills in finding various Index numbers.

Unit – I

Vector differentiation: Vector algebra – Differentiation of Vectors– Gradient.

Unit –II

Divergence and Curl- Solenoidalvectors - Irrotational vectors.

Unit-III

Interpolation: Newton's Formula (Problems only) - Lagrange's Formula (Problems only).

Unit – IV

Theory of Attributes: Introduction - Attributes.

Unit- V

Index Numbers- Aggregate Method- Average of Price Relatives Method - Weighted Index Number - Laspeyre's, Paasche's and Fisher's Index Number –Weighted Average of Price Relative Method: The Time reversal test – The factor reversal tests – The commodity reversal tests.

Text Books:

1. Arumugan.S and Thangapandi Isaac.A, **Analytical Geometry 3D and Vector Calculus**, New Gamma Publishing House, 2014, Palayamkottai.
2. Arumugam.S and Thangapandi Isaac.A, **Statistics**, New Gamma Publishing House, 2009, Palayamkottai.

Unit I – Text book 1 Chapter 5 – Sections: 5.0 – 5.3

Unit II – Text book 1 Chapter 5 – Section: 5.4

Unit III –Text book 2 Chapter 7 – Sections: 7.2, 7.3

Unit IV –Text book 2 Chapter 8 – Sections:8.0, 8.1

Unit V – Text book 2 Chapter 9 – Section: 9.1

Reference books:

1. Manicavasagam Pillai and Natarajan, **Analytical Geometry of three Dimensions and Vector Calculus**, S.Viswanathan Printers and Publishers Pvt. Ltd, Reprint 2001, Chennai.
2. Gupta. . S.C, Kapoor. V.K, **Elements of Mathematical Statistics**, Sultan Chand & Sons Publications, 2001, New Delhi.
3. Pillai. R.S.N and Bagavathi, **Practical Statistics**, S.Chand & Company Pvt Ltd, Reprint 2010, New Delhi.



MANNAR THIRUMALAI NAICKER COLLEGE (AUTONOMOUS)
DEPARTMENT OF CHEMISTRY
 (For those who joined in 2018-2019 and after)

Programme	: B.Sc (Mathematics & Chemistry)	Part III	: Allied
Semester	: IV	Hours per week	: 04
Sub code	: 18UPHA41	Credit	: 03

ALLIED PHYSICS - IV
OPTICS AND MODERN PHYSICS

Course Outcomes

- CO1:** To understand the basic concepts in optics.
CO2: To understand the properties of light like reflection, refraction, interference, diffraction and polarization
CO3: To study the infrared spectroscopy, Raman effect, Doppler Effect and fiber optic communication system.
CO4: To evaluate theory of relativity.

Unit I:

Deviation produced by thin lens – Focal length of two thin lenses in and out of contact – Cardinal points – Refraction through a thin prism – Dispersion – Dispersive power – Combination of thin prisms to produce (a) Deviation without dispersion and (b) Dispersion without deviation – Direct vision spectroscope – Chromatic aberration in lenses – Spherical aberration in lenses – Theory of primary and secondary rainbows.

Unit II:

Photography – Photographic camera – Depth of focus – Photographic film.
 Interference in thin films – air wedge – Newton’s rings (reflected beam only) – Determination of wavelength.

Unit III:

Double refraction – Nicol prism – Construction, action and uses – Quarter wave plate (QWP) – Half wave plate (HWP) – Optical activity – Biot’s laws – Specific rotatory power – Half shade polarimeter – Determination of specific rotatory power – Fibre optics – Light propagation in fibres – Fibre optic communication system - Advantages.

Unit IV:

Infra red radiations – Sources, properties and uses – Ultraviolet radiations – Sources, properties and uses – Planck’s quantum theory – Raman effect – Experimental study of Raman effect(simple theory) - Quantum theory of Raman effect – Applications – Photo electricity – Laws of photo electricity – Photo electric cells – Types(Photo emissive, Photoconductive and Photovoltaic cells) and their uses – Applications of photo electric cells.

Unit V:

Michelson–Moreley experiment – Significance of the negative results – Postulates of special theory of relativity – Lorentz transformation equations - Length contraction – Time dilation – Variation of mass with velocity – Mass energy equivalence.

Text Book:

1. Murugesan.R, **Optics, Spectroscopy and Modern Physics**, S.Chand and Company Ltd, 2010, New Delhi.

Unit – I : 1.1 – 1.24

Unit – II : 2.1 – 2.10

Unit – III : 3.1 – 3.21

Unit – IV : 4.1 – 4.14

Unit – V : 5.1 – 5.11

Reference Books:

1. Kakani and Bhandari Sultan, **Optics and Spectroscopy**, Chand and Sons, 2004, New Delhi.
2. Brijlal and Subramanyam, **A Text book of Optics**, S.Chand and Co, 2004, New Delhi.
3. B.K.Sharma, **Spectroscopy**, GOEL Publishing House, 2006, Meerut.
4. R.Murugesan and Kiruthiga Sivaprasath, **Modern Physics**, S.Chand and Co, Sixteenth Edition, 2012, New Delhi.



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DEPARTMENT OF CHEMISTRY
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Programme	: B.Sc (Mathematics & Chemistry)	Part III	: Allied
Semester	: III & IV	Hours per week	: 02
Sub code	: 18UPHAP2	Credit	: 01

ALLIED PHYSICS PRACTICAL – II

Course Outcomes

CO1: To develop experimental knowledge by handling various apparatus

CO2: To know the various components and its important

CO3: To know the circuit connections and functioning of experiments.

CO4: To create interest to develop oscillatory circuit.

Any 14 experiments.

1. Mirror Galvanometer - Voltage and current sensitiveness
2. LCR – Series resonance - Determination of L & Q factor
3. Air wedge - Thickness of a wire
4. Dispersive power of a prism – Spectrometer
5. Grating N and λ by Normal incidence – Spectrometer
6. Newton's rings - Determination of radius of curvature
7. Bridge rectifier - Pi filter
8. Transistor characteristics - CE mode
9. Single stage transistor amplifier
10. Hartley oscillator
11. Logic gates – AND, OR, NOT - Truth table verification Using Discrete Components.
12. Logic gates – NAND, NOR - Truth table verification Using Discrete Components.
13. Zener diode characteristics and break down voltage
14. OP AMP as an adder and subtractor
15. Comparison of capacitances - Desauty's method using headphone
16. LCR – Parallel resonance.



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DEPARTMENT OF CHEMISTRY
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Programme : UG **Part IV : NME**
Semester : IV **Hours per week: 02**
Subject Code : 18UCHN41 **Credit : 02**

POLYMER CHEMISTRY

Course Outcomes:

CO1: To realize about the Nomenclature of polymers.

CO2: To know the classification of polymers.

CO3: To study about the synthetic polymers.

CO4: To learn as good trainee in industrial level.

Unit I

Introduction-Functionality - Nomenclature of polymers- Tacticity - Classification of polymers -Thermoplastics and thermosetting resins.

Unit II

General purpose plastics-Engineering plastics - Addition and condensation polymerization – Vulcanization - Mechanism of vulcanization.

Unit III

Preparation, properties & uses of Poly Vinyl Chloride, Teflon, Lexan, Metlan, Perlon-U.

Unit IV

Preparation, properties & uses of Polyamides, Nylon-6, Nylon-66, Polyesters, Epoxy resins.

Unit V

Rubber -Introduction-Natural rubber-processing, uses and drawbacks of raw rubber - Synthetic rubber - Butyl rubber - GR 1- SBR - GR S - Compounding of rubber.

Text Book:

1. Arun Bahl and Bahl.B.S, Advanced Organic Chemistry, S.Chand & Company Ltd, 2010, New Delhi.
2. Dr.K.Ratinamuthu and Dr.R.Victoria, Ancillary Chemistry, R.Arun & Co., 2007, Madurai.
3. R.Sivakumar.R, Jeyaprakasam.R & Sivakumar.N, “Engineering Chemistry” TATA McGRAW-Hill Pvt Ltd, (2012), New Delhi.

References:

1. Sharma. B.K “Engineering chemistry” Krishna Prakasan Media (P) Ltd., (2001), Meerut.
2. Sivasankar.B “Engineering Chemistry” Tata McGraw-Hill Pub.Co.Ltd, (2008), NewDelhi.
3. Jain.P.C and Monica Jain, “Engineering Chemistry” Dhanpat Rai Pub, Co,(2002), New Delhi.