DEPARTMENT OF CHEMISTRY

B.Sc. CHEMISTRY

(For the candidates admitted from the year 2016-2017 onwards)

Programme Outcomes

1. Students have firm foundation in the fundamental and application of current chemical and scientific theories.
2. Students are able to design , carryout , record and analyse the results of chemical experiments.
3. Students are skilled in problem solving ,critical thinking and analytical reasoning.
4. Students are able to use modern library searching and retrieval methods to obtain information about a topic , chemical, chemical techniques and issue relating to chemistry.
5. Find gainful employment in industry, government, graduate or professional schools. Instructors or administrators.

Programme Specific Outcomes

1. Students have knowledge about chemistry basics, application of chemical and scientific theories.
2. Every branches of science is related to chemistry.
3. Students are well versed in qualitative and quantitative analysis of chemical laboratories and industries.
4. Students are familiar in different branches of chemistry like Analytical, Organic, Inorganic , Physical , Environment , Polymer and Biochemistry.
5. Students get the Entrepreneur skills in home- made consumer products , Water treatment skills (RO), Dyeing skill in fabrics by chemistry learning.

GOVERNMENT ARTS COLLEGE (AUTONOMOUS): KARUR – 639 005
B.Sc., CHEMISTRY COURSE STRUCTURE UNDER CBCS SYSTEM
(For the candidates admitted from the year 2016-2017 onwards)

SEMESTER	COURSE	SUBJECT TITLE	SUBJECT CODE	INSTR. HOURS WEEK	CREDIT	EXAM HOURS	MARKS INT	MARKS ESE	TOTAL
I	Tamil - I	Tamil – I	U16L1T1	6	3	3	25	75	100
	English - I	English – I	U16L1E1	6	3	3	25	75	100
	Core Course – I	General Chemistry – I	U16CH1C1	6	5	3	25	75	100
	Core Course – II	Volumetric Analysis (Practical)		3	-	-	-	-	-
	First Allied Course-I	Allied Physics – I	U16PH1A1	5	3	3	25	75	100
	First Allied Course – II	Allied Physics – II (Practical)		2	-	-	-	-	-
	Value Education	Value Education	U16VE1	2	2	3	25	75	100
				30	16				500
II	Tamil – II	Tamil – II	U16L2T2	6	3	3	25	75	100
	English – II	English – II	U16L2E2	6	3	3	25	75	100
	Core Course – II	Core Course Practical - I	U16CH2C2P	3	4	3	25	75	100
	Core Course – III	General Chemistry - II	U16CH2C3	6	5	3	25	75	100
	First Allied Course - II	Allied Physics – II (Practical)	U16PH2A2P	2	4	3	25	75	100
	First Allied Course – III	Allied Physics - III	U16PH2A3	5	3	3	25	75	100
	Environmental Studies	Environmental Studies	U16ES2	2	2	3	25	75	100
				30	24				700
III	Tamil - III	Tamil- III	U16L3T3	6	3	3	25	75	100
	English – III	English -III	U16L3E3	6	3	3	25	75	100
	Core Course – IV	General Chemistry - III	U16CH3C4	6	5	3	25	75	100
	Core Course V	Semi Micro Qualitative Analysis – (Practical II)		3	-	-	-	-	-
	Second Allied Course-I	Allied Mathematics – I/ Allied Zoology	U16MM3A1/ U16ZO3A1	5	3	3	25	75	100
	Second Allied Course-II	Allied Zoology Practical/Allied Maths II		2	-	-	-	-	-
	Non Core Elective I	Energy Physics-I	U16PH3N1	2	2	3	25	75	100
				30	16				500
IV	Tamil – IV	Tamil- IV	U16L4T4	6	3	3	25	75	100
	English – IV	English -IV	U16L4E4	6	3	3	25	75	100
	Core Course – V	Core Course Practical - II	U16CH4C5P	2	4	3	25	75	100
	Core Course VI	General Chemistry - IV	U16CH4C6	5	5	3	25	75	100
	Second Allied Course II	Allied Mathematics II / Allied Zoology –II Practical	U16MM4A2/ U16ZO4A2P	2	4	3	25	75	100
	Second Allied Course III	Allied Mathematics – III / Allied Zoology – III	U16MM4A3/ U16ZO4A3	5	3	3	25	75	100
	Skill Based Elective I	Laboratory Hygiene and Safety	U16CH4S1	2	4	3	25	75	100
	Non Core Elective II	Energy Physics II	U16PH4N2	2	2	3	25	75	100
				30	28				800
V	Core Course – VII	Inorganic Chemistry – I	U16CH5C7	5	5	3	25	75	100
	Core Course – VIII	Organic Chemistry – I	U16CH5C8	5	4	3	25	75	100
	Core Course – IX	Physical Chemistry - I	U16CH5C9	4	3	3	25	75	100
	Core Course - X	Physical Chemistry – (Practical)		3	-	-	-	-	-
	Core Course - XI	Gravimetric and Organic Compound Analysis (Practical)		3	-	-	-	-	-
	Elective Course - I	Industrial Chemistry	U16CH5E1	4	4	3	25	75	100
	Skill Based Elective II	Spectroscopy - I	U16CH5S2	2	4	3	25	75	100
	Skill Based Elective III	Spectroscopy - II	U16CH5S3	2	4	3	25	75	100
	Soft Skill Development	Soft Skill Development	U16SSD3	2	2	3	25	75	100
				30	26				700
VI	Core Course – X	Core Course Practical - III	U16CH6C10P	3	4	3	25	75	100
	Core Course – XI	Core Course Practical - IV	U16CH6C11P	3	5	6	25	75	100
	Core Course – XII	Inorganic Chemistry - II	U16CH6C12	6	5	3	25	75	100
	Core Course - XIII	Organic Chemistry - II	U16CH6C13	6	5	3	25	75	100
	Elective Course - II	Analytical Chemistry	U16CH6E2	5	5	3	25	75	100
	Elective Course - III	Physical Chemistry - II	U16CH6E3	6	4	3	25	75	100
	Extension Activities	Extension Activities		-	1	-	-	-	-
		Gender Education	U16EA4	1	1	3	25	75	100
				30	30				700
	TOTAL			180	140				3900

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BOARD OF STUDIES IN CHEMISTRY   **CONTROLLER OF EXAMINATIONS**

Sl. No.: [ ]   Subject Code: [U16CH1C1]

GOVERNMENT ARTS COLLEGE (AUTONOMOUS):: KARUR-05

B.Sc., CHEMISTRY - I SEMESTER – CORE COURSE - I
(For the candidates admitted from the year 2016-2017 onwards)
GENERAL CHEMISTRY – I

Course outcomes

➢ The basic and general ideas about chemistry will be understood after this General chemistry Paper-I for Ist B.Sc., Students.
➢ Understand the Inorganic components such as the family of boron and carbon, understand the principle of chemical bonding, hydrogen bonding, and VSEPR Theory.
➢ Know the products of petro chemistry and grasp the synthesis of alkenes and alkynes.
➢ The theory of gas kinetics can clearly be understood.

UNIT- I   Inorganic Chemistry   15 hours

1.1 Volumetric Analysis
Standard Solutions – Primary and Secondary Standards – Types of Titrimetric reactions – Redox – Precipitation – EDTA – Titrations. Indicators – Effect of change in pH.
1.2 Boron Family
Comparative study of Boron Family Elements and their Compounds (Hydrides, Oxides and Halides) – Chemistry of Diaborane, Borax and Borazole.
1.3 Carbon Family
Comparative study of Carbon Family Elements and their Compounds (Hydrides, Oxides and Halides) – Chemistry of Cyanogen, Hydrocyanic Acid, Cyanic Acid, Thiocyanic Acid, Ammonium Thirocyanate and Carbon Disulphide. Structure of Graphite, Diamond and Fullerene.

UNIT-II   Inorganic Chemistry   15 hours

2.1 Chemical Bonding Lattice Energy and Born-Haber Cycle
2.2 Polarising power and Polarisability – Partial ionic character from electronegativity – Trasition from ionic to covalent character and vice – versa – Fajan's rule – Concept of hard and soft acids and bases.
2.3 VSEPR Theory shapes of simple inorganic molecules ($BeCl_2$, $SiCl_4$, PCl_5, SF_6, IF_7, H_2O, NH_3, and XeF_6 containing lone pair and bond pairs of electrons – Lewis structures. Hydrogen bonding – Its nature, types, effect on Properties.

UNIT - III   Organic Chemistry   15 hours

3.1 Petroleum Thermal and Catalytic Process of Cracking
Synthetic Petrol – Fischer Tropsch's process and Bergius Process, Flash Point, Fire Point, Smoke Point, Knocking, Octane number and Cetane number, Antiknocking Agents, Power Alcohol, Biodiesel.
3.2 Alkenes
Preparation by Dehydration, dehydrohalogenation methods – Reduction of alkynes, Witting reaction Kolbe's electrolysis – Properties of Alkenes – Electrophilic and free redical addition, addition reactions with hydrogen bromide (peroxide effect) sulphuric acid, water, hydroboration, oznolysis, hydroxylation with $KMnO_4$·

UNIT - IV   Organic Chemistry   15 hours

4.1 Electron displacement effects – Inductive, Inductometric, Electrometric, Mesomeric, resonance, hyperconjugation and steric effects.
Cleavage of Bonds – Homolytic and Heterolytic fission of carbon – Carbon bonds, Reaction intermediates – Free Radicals, Carboctions and Carbanions, Carbenes their stability.
4.2 Alkynes
Preparation of alkeynes – Dehydrohalgenations, dehalogenation, hydration of calcium carbide – Kolbe's electrolysis.
Acidity of alkynes – formation of acetylides – addition of water with $HgSO_4$ catalyst, addition of hydrogen halides and halogens, oxidation, ozonolysis and hydroboration. (An elementary idea).

UNIT - V   Physical Chemistry   15 hours

Gaseous State Critical Phenomena – PV isotherms of real gases, critical temperature, continuity of state – relation between critical constants and van der Waals constants – Determination of critical volume - the law of corresponding states – reduced equation of state.
Molecular velocities – Root mean square, average and most probable velocities – Maxwell Boltzmann distribution of molecular velocities (no derivations) – Collision number and mean free path – Collision diameter.

Books Recommended:
1. J.D.Lee, Concise Inorganic Chemistry, 5th Edition, Blackwell science.
2. B.R. Puri, L.R. Sharma and K.C. Kalia, Principles ofInorganic Chemistry, S.L.N. Chand & Co.
3. B.S. Bahl and Arun Bahl, Advanced Organic Chemistry, S,Chand & Co.
4. I.L. Finar, Organic Chemistry, Vol.I Pearson Education, 6th Edition.
5. B.R. Puri, L.R. Sharma and N.S. Pathania, Principles of Physical Chemistry Vishal Publishing Co. 41st Edition.
6. P.L. Soni & O.P. Dharmarha, Text Book of Physical Chemistry, Sultan Chand & Sons.

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GOVERNMENT ARTS COLLEGE (AUTONOMOUS) KARUR-05

B.SC.,-I SEMESTER – ALLIED COURSE-I
(FOR CHEMISTRY & MATHEMATICS MAJOR)
(For the candidates admitted from the year 2016-2017 onwards)

ALLIED PHYSICS – I

Course outcomes:
1. Analyze and comprehend regarding the strength of the solid materials of different size.
2. Understand specific heat capacity of gas and the different theories on specific heat capacity.
3. Distinguish between magnetic effect of electric current and electromagnetic induction and to apply the related laws in appropriate circumstances.
4. Sound waves deals about amplitude how loud it is and its pitch.

UNIT- I: PROPERTIES OF MATTER
Stress – strain - Hooks law - Elastic constants - Young's modulus by non-uniform bending - Static torsion - Rigidity modulus by torsion pendulum - I form of girder - Surface Tension: Surface tension of the liquid by drop weight method - Explanation of molecular theory - Viscosity: Newton's formula - Poiseuille's formula - stream line motion - Turbulent motion - Critical velocity - Co-efficient of viscosity - Co-efficient of viscosity by Poiseuille's method - Ostwald's viscometer.

UNIT-II: MECHANICS
Force - centripetal and centrifugal forces - Laws of friction - co-efficient of friction - Banking of curved tracks - Newton's law of gravitation – Kepler's laws of Planetary motion - Deduction of Newton's law of gravitation from Keplers law - Centre of gravity - Centre of gravity of solid cone - Floatation laws - Stability of floating bodies.

UNIT-III: HEAT AND THERMODYNAMICS
Celcius – Rankine-Fahrenheit Scale - Entropy and Enthalpy definition - Thermal conductivity of a bad conductor by Lees Disc method - Newton's law of cooling - Specific heat capacity of liquids - Liquification of gases – Linde's process - Isothermal and adiabatic process - zeroth, first, second laws of thermodynamics - solar constant - Angstrom pyroheliometer

UNIT-IV: MAGNETISM AND ELECTROMAGNETISM
Magnetic materials - Properties of dia, para, ferro and anti ferro magnetic materials - Permeability and susceptibility - Laws of electromagnetic Induction - Biot and Savarts law - Force acting on a conductor carrying current in magnetic field – Moving coil galvanometer - Eddy currents – applications.

UNIT-V: SOUND
Laws of stretched strings - determination of frequency of alternating current by Sonometer - characteristics of musical sound - Acoustics of buildings – Decibel - Reverberation time - Sabine's formula for reverberation time - Condition for good acoustics - Ultrasonics: Piezo-electric effect - piezo-electric oscillator - Properties of ultrasonic waves and its applications.

BOOKS FOR STUDY:
Unit-I
1. Brijlal subramaniam, Properties of matter and sound.
2. R. Murugesan Properties of matter and sound.
Unit-II
1. R. Murugesan Allied Physics I & II.
2. A. Sundaravelusamy Allied Physics.
Unit-III
1. Heat and Thermodynamics - Brijlal subramaniam
2. Heat and Thermodynamics - Narayanamurthi and Nagarathinam
Unit-IV
1. Electricity and magnetism — R. Murugesan
2. Electricity and magnetism — Narayanamurthi and Nagarathinam
3. Electricity and magnetism - Brijlal subramaniam
Unit-V
1. Sound -- Brijlal subramaniam
2. Sound – R.L. Seihgal

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Sl. No.: [   ]   Subject Code: | U16CH2C2P |

GOVERNMENT ARTS COLLEGE (AUTONOMOUS):: KARUR-05

B.Sc., CHEMISTRY - II SEMESTER – CORE COURSE - II
(For the candidates admitted from the year 2016-2017 onwards)

CORE COURSE PRACTICAL – I (VOLUMETRIC ANALYSIS)

Course outcomes:
1. The main objective of volumetric analysis is to determine the amount of a substance in a given   sample.
2. To identify the Boiling point and melting point for the given organic compound.

UNIT- I   ACIDMETRY AND ALKALIMETRY
UNIT-II   PERMANGANIMETRY
          1.Estimation of Ferrous I (r) on in Mohr's salt
          2. Estimation of Ferrous and Ferric I (r) ons in a misture
          3. Estimation of Oxalic acid
          4. Estimation of Calcium
UNIT - III   DICHROMETRY
          5. Estimation of Ferrous Iron
          6. Estimation of Ferric Iron by using both internal and external indicators.
UNIT -IV   IODO AND IODIMETRY
          7.Estimation of Copper
          8. Estimation of Potassium Dichromate.
          9. Estimation of Arsenious Oxide.
UNIT – V   ARGENTOMETRY
          10. Estimation of Chloride (in neutral and acid media)
UNIT – VI COMPLEXOMETRIC TITRATIONS
          11. Estimation of Zn, Mg and Ca ions using EDTA.
UNIT – VII   Determination of melting and boiling points of simple organic compounds

Marks:

Int.Asst.   25
Practical   75
                 - - — -
Total   100
                 - - — -

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GOVERNMENT ARTS COLLEGE (AUTONOMOUS): KARUR-05

B.Sc., CHEMISTRY - II SEMESTER – CORE COURSE - III
(For the candidates admitted from the year 2016-2017 onwards)

GENERAL CHEMISTRY- II

Course outcomes

➢ The basic and general ideas about chemistry were to be understood after this General Chemistry Paper-II for Ist B.Sc., Students.

➢ Understand ozone and hydrogen peroxide preparation and properties, diene and cycloalkane properties, understand polymer classification and mechanism and the importance of synthetic rubber, and learn how to measure the average molecular number and weight.

➢ One can know the basic idea about XRD.

UNIT- I   Inorganic Chemistry (18 hours)

      1.1 Nitrogen family

       1.1.1 Chemistry of hydrazine, hydrazonic acid, hydroxyl amine and sodium bismuthate.

      1.1.2 Non aqueous solvents – classification – liquid ammonia as solvent.

      1.2 Ozone – Preparation, Properties, structural elucidation and uses. Green– house effect, ozone hole, causes and protection of ozone layer.

      1.3 Hydrogen peroxide - Preparation, Properties, estimation, structure and uses.

      1.4 Peracids of sulphur – their preparation, properties, uses and structures.

UNIT-II   Organic Chemistry (18 hours)

      2.1 Dienes

        Types of dienes – conjugated, isolated and cumulated

         2.1.1 Stability and chemical reactivity – 1,2 and 1,4 additions, kinetic and thermodynamic controls of reaction. Diels – Alder reaction.

         2.1.2 Synthesis of dienes – 1,3 – Butadiene, isoprene and chloroprene.

      2.2 Cycloalkanes

        2.2.1 Preparation using Wurtz's reaction, Dieckmann's ring closure and reductions of aromatic hydrocarbons.

        2.2.2 Substitution and ring opening reactions.

        2.2.3 Bayer's strain theory and theory of strainless rings.

UNIT - III   Polymer Chemistry (18 hours)

      3.1 Classification of polymers – natural, synthetic, semi synthetic, plastic, elastomers, addition, condensation polymers.

        3.1.1   Mechanism of free radical, radical, anionic cationic – preparation of polyurethane.

        Synthetic rubber – butyl. Buna –S, buna-N, neoprene, SBR, thiocol, silicone rubber, thermocole, nylons 6 and 6,6 and terylene.

UNIT – IV Physical Chemistry (18 hours)

      4.1 Colloidal States: Stability of Colloids, Coagulation and protection, Reverse Osmosis, Desalination of sea water, Donnan membrane- Gels and emulsion.

      4.2 Macro molecules : Number average and weight average molecular weight of macromolecles – determination of molecular weight by Osmetry (number average), ultra centrifuge(weight average), Viscometry and light scattering.

UNIT - V Physical Chemistry (18 hours)

      5.1 Solid State

        5.1.1 Isotropic and anisotropic solids.

        5.1.2 Nature of the solid state – seven crystal systems – Bravais lattice, unit cell, law of rational indices (Weiss indices) Miller indices, symmetry elements in crystals (for cubic system only in detail)

        5.1.3   X-ray diffraction by crystals – derivation of Bragg's – equation – Bragg method – powder method – crystal structure of NaCl,KCl, ZnS and CsCl – radius ratio and packing in Crystals-determination of Avogardro's number.

Books Recommended:

1. J.D.Lee, Concise Inorganic Chemistry, 5th Edition, Blackwell science.
2. B.R. Puri, L.R. Sharma and K.C. Kalia, Principles of Inorganic Chemistry, S.L.N. Chand & Co.
3. B.S. Bahl and Arun Bahl, Advanced Organic Chemistry, S.Chand & Co.
4. I.L. Finar, Organic Chemistry, Vol.I Pearson Education, 6th Edition.
5. B.R. Puri, L.R. Sharma and N.S. Pathania, Principles of Physical Chemistry Vishal Publishing Co. 41st Edition.
6. P.L. Soni & O.P. Dharmarha, Text Book of Physical Chemistry, Sultan Chand & Sons.

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GOVERNMENT ARTS COLLEGE (AUTONOMOUS) KARUR-05
B.Sc., –II - SEMESTER – FIRST ALLIED COURSE –II
(FOR CHEMISTRY & MATHEMATICS MAJOR)
(For the candidates admitted from the year 2016-2017 onwards)

ALLIED PHYSICS – II – LAB
(Any fifteen experiments)

Course outcomes:
1. Conduct experiments on stretching wires and to identify its the strength
2. Analyze the effects of refractive index of a medium using optical instruments
3. Integrated chips are verified by using gate

1. Young's Modulus – Non Uniform Bending – Pin and Microscope.

2. Torsional Pendulum – Rigidity Modulus.

3. Surface tension and Interfacial Surface tension – Drop weight method.

4. Coefficient of Viscosity of liquid using graduated burette.

5. Specific heat capacity of liquid by cooling method.

6. Lee's Disc – Thermal Conductivity of a bad conductor.

7. Focal length of a concave lens.

8. Spectrometer – Grating – Normal incidence method.

9. Spectrometer – refractive index of solid prism (A,D and μ).

10. Newton's Rings – Radius of curvature of a convex lens.

11. Sonometer – Verification of transverse laws.

12. Carey Foster's bridge – specific resistance.

13. Meter bridge – Determination of specific resistance.

14. Potentiometer – Low range voltmeter calibration.

15. Potentiometer – Calibration of ammeter.

16. Table galvanometer – Figure of merit.

17. EMF of thermocouple – Direct deflection method.

18. Characteristics of a junction diode.

19. Construction of full wave rectifiers.

20. AND, OR and NOT Logic gates - Verification of truth table using discrete Components.

BOOKS FOR REFERENCE:
1. M.N. Srinivasan and others, A Text book of Practical Physics - Sultan Chand & Son, New Delhi.
2. A. Dhanalakshmi and K.R.Paramasivam, Practical Physics - Apsara publication,Trichy.

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GOVERNMENT ARTS COLLEGE (AUTONOMOUS) KARUR-05
B.SC.,-II- SEMESTER – FIRST ALLIED COURSE-III
(FOR CHEMISTRY & MATHEMATICS MAJOR)
(For the candidates admitted from the year 2016-2017 onwards)

ALLIED PHYSICS – III

Course outcomes:
1. Predict the curvature of a transparent medium.
2. Understand the laser action phenomena, properties and applications of laser.
3. To discuss the elementary particles.
4. Have a basic knowledge of semiconductor diodes.
5. Conversion between various number systems.

UNIT- I: OPTICS
Laws of Reflection and Refraction - Refractive index of prism using spectrometer - Interference - Newton's rings - Applications - Fresnel's explanation of rectilinear propagation of light - Fiber optics: Numerical aperture, acceptance angle - Fiber optics communication system - Temperature sensor.

UNIT-II: LASER PHYSICS
Einstein's co-efficients - Spontaneous and stimulated emission - Population inversion - Optical pumping - Condition for Laser action - Semiconductor laser - CO_2 laser - Nd-YAG laser - Applications of laser - Holography - Construction and Reconstruction.

UNIT-III: ATOMIC & NUCLEAR PHYSICS
Atomic physics: Photo electric effect - Einstein photoelectric equation - Coupling schemes – LS & JJ couplings - Zeeman effect – Experiment - Stark effect (definition only) - Nuclear Physics: Detection of nuclear radiation - Geiger Muller counter - Particle accelerators: Betatron - Elementary particles: Leptons, Mesons, and Baryons.

UNIT IV: SEMICONDUCTORS AND OPTOELECTRONICS
Volt - Ampere Characteristics of P-N junction Diode - Zener diode - Applications of Zener diodes - Zener voltage regulator - Optoelectronic devices: Photovoltaic cell - Photoconductive cell - Solar cell – Phototransistor - LED and LCD - Construction and working.

UNIT-V: NUMBER SYSTEM AND DIGITAL ELECTRONICS
Binary, Octal, Hexadecimal - Interconversion - AND, OR, NAND, NOR, XOR, XNOR gates - DeMorgan's theorem - Laws of Boolean algebra - Operation Amplifiers: Ideal characteristics – Inverting - Non inverting op-amp - CMRR – Adder – Subtrator.

BOOKS FOR STUDY:

Unit-I
1. R. Murugesan, Modern Physics.
2. R. Murugesan, Optics and Spectroscopy.

Unit-II
1. Gaur and Gupta, Engineering physics.
2. M. Arumugam, Engineering physics.
3. Thiagarajan, LaserPhysics.

Unit-III
1. R.Murugesan, Modern Physics.

Unit-IV
1. V.K. Metha, Principles of Electronics.
2. B.L. Theraja, Basic Electronics.

Unit-V
1. Morris Mano, Digital Logic and Computer Design.
2. Malvino & Leech, Digital principles and Applications.

Books for Referances:
1. R.Murugesan, Allied Physics I&II.
2. Dr.R.Sabesan & Dr.Mrs. Dhanalakshmi Allied Physics.

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GOVERNMENT ARTS COLLEGE (AUTONOMOUS): KARUR-05
B.Sc., CHEMISTRY - III SEMESTER – CORE COURSE - IV
(For the candidates admitted from the year 2016-2017 onwards)
GENERAL CHEMISTRY- III

Course outcomes

➢ After studying this General Chemistry Paper-III for 2nd B.Sc students, the semi micro evaluation, zero group components and metal extraction and purification along with mineral resources in India should be grasped.

➢ In order to understand what aromaticity is? Analysis of conformation, electrophilic and nucleophilic substitution reactions.

➢ To explore the comparison between VBT and MOT and study of Schrodinger wave equation.

UNIT- I   INORGANIC CHEMISTRY (15 hours)

       1.1 Principle of qualitative analysis Solubility Product principle of elimination of interfering radicals, common ion effect, complexation reactions including spot tests in qualitative analysis.

       1.2 Nitrogen family: Comparative study of nitrogen family elements and their compounds (Oxides, Halides, Hydrides and Oxyacids).

       1.3 Zero Group Elements
          Compounds of Xenon – XeF_2, XeF_4, XeF_6, XeO_3 and $XeOF_4$ – preparation, properties, structure and uses.

UNIT-II   Metals and Metallurgy:

       2.1 Occurance of metals – concentration of ores – froath floatation, magnetic separation, Calcination, roasting, Smelting, alumino thermic Process.

       2.2 Purification of metals – electrolysis, Zone refining, vanArkal de Boer methods

       2.3 Mineral Wealth of India – Important minerals found in India (Magnetite, Haematite, Pyrolusite, Bauxite, Magnesite, dolomite, Gypsum, ilmenite, Monazite, pitchblende, Mica, and Common Salt) Minerals exported from and imported to India.

UNIT - III   (Organic Chemistry)   (15 hours)

       3.1 Conformational analysis of ethane and n-butane with energy diagrams. Conformation of cyclohexane (boat, chair and Skew – boat forms) – Axial and equatorial bonds ring flipping.

       3.2 Aromatic hydrocarbons: Structure and Stability of benzene ring – resonance in benzene – delocalized pi – electron cloud in benzene.

       3.3 Aromaticity: Huckel's rule with example like cyclopropenyl cation, benzene, naphthalene, anthracene, furan, thiophene, Pyridine, ferrocene and azulene

UNIT – IV   (Organic Chemistry)   (15 Hrs)

       4.1 Electrophilic, Nucleophilic and free radical Substitution reactions in aromatic compounds.
          General mechanism of electrophilic substitution reaction – nitration, Sulphonation, halogenation, Friedel – Craft's alkylation and acylation reactions – Effect of Substituents – Activating and Deactivating groups Orientation effect.

       4.2 Aromatic nucleophilic substitution reaction – Benzyne mechanism, Intermediate Complex formation mechanism.

UNIT - V   (Physical Chemistry)   (15 Hrs)

       5.1 V.B.Theory postulates –Overlap of atomic orbitals and principles of hybridization.

       5.2 M.O.theory – bonding, antibonding molecular orbitals – MO diagrams of simple homonuclear diatomic molecules (H_2, H^+, He, Li, B, C, O, N and F_2) and hetero nuclear diatomic molecules (HF and CO).

       5.3 Comparision of VB and MO Theories.

       5.4 Heisenberg's uncertainty principle – Schrondinger wave equation – Eigen values and Eigen functions – Significance of ψ and ψ^2 – Concept of orbitals and Shapes of Orbitals.

Books Recommended:

1.   P.L.Soni and Mohan Katyal, "Text Book of Inorganic chemistry" 20th Revised Edition, Shoban Lal Nagin Chand & Co New Delhi.1993.

2.   R.B.Pori and I.R.Sharma, K.C.Kaila, "Principle of Inorganic Chemistry" sultan Chand and Co New Delhi. 1992.

3.   Vogel's "Text Book of qualitative Chemical Analysis" 6th Edition ELBS, Derling Kinderslay (India) Pvt Ltd New Delhi-2006.

4.   R.D.Madan, "Modern Inorganic Che, mistry", S.Chand & Co (Pvt) Ltd. New Delhi.1997.

5.   M.K.Jain, "Organic Chemistry", 12th Edition Shoban Lal Nagin chand and Co. New Delhi 1987.

6.   P.L.Soni and H.M.Chawla, "Text Book of Organic Chemistry", 23rd Edition Sultan Chand Co. New Delhi 1990.

7.   K.S.Tewari S.N.Mehrotra and N.K.Vishnol, "A Text Book of Organic Chemistry", 3rd Edition, Vikas publishing House (Pvt) Ltd. New Delhi 2006.

8.   R.K.Prasad, "Quantum Chemistry" New Age International (P) Ltd. Publishers 1996.

9.   B.R.Puri, L.R.Sharma and Madan S.Pathania, 41 st Edition, "Principle of Physical chemistry" Vishal Publishing. Co, New Delhi, 2004.

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GOVERNMENT ARTS COLLEGE (AUTONOMOUS) KARUR-05

B.Sc., – I & III – SEMESTER - FIRST/SECOND ALLIED COURSE - I
(FOR CHEMISTRY, PHYSICS AND GEOLOGY MAJOR)
(For the candidates admitted from 2015 - 2016 onwards)

ALLIED MATHEMATICS-I

CALCULUS AND FOURIER SERIES

Course Outcomes

On successful completion of the course, the students will be able to

- Understand the nth derivative of second order differential equations by using Leibnitz theorem.
- Solve the problem by using the general properties of definite integrals.
- Acquire knowledge in solving the double and triple integrals on Cartesian Co-ordinates only.
- Understand the concept of Fourier series.

UNIT 1:   Successive Differentiation – n^{th} derivative of standard functions (Derivation not needed) Simple problems only - Leibnitz theorem (proof not needed) and its applications. Curvature and radius of curvature in Cartesian Coordinates only (proof not needed) - Jacobians of two & three variables - Simple problem only.

UNIT 2:   Integrating by parts – Bernoulli's formula - Evaluation of integrals of types 1.

$$\int \frac{dx}{a+b\ \cos\ x} \qquad 2. \int \frac{dx}{a+b\ \sin\ x} \qquad 3. \int \frac{(a\ \cos\ x+b\ \sin\ x+c)}{(p\ \cos\ x+q\ \sin\ x+r)}dx$$

UNIT 3:   General Properties of Definite integrals - Evaluation of Definite integrals of type

$$1. \int_a^b \sqrt{(x-a)(x-b}dx \qquad 2. \int_a^b \frac{dx}{\sqrt{(x-a)(x-b}} \qquad 3. \int_a^b \sqrt{\frac{(x-a)}{(x-b)}}\,dx$$

Reduction formula when n is a positive integer for $1. \int_a^b e^{ax}x^n dx \qquad 2. \int_a^b \sin^n x dx$

$$3. \int_a^b \cos^n x dx \qquad 4. \int_0^{\pi/2} \cos^n x dx \qquad 5. \int_0^{\pi/2} \sin^n x dx \qquad 6. \int_0^{\pi/2} \sin^m x\ \cos^n x dx$$

(Proof not needed for 6 only).

UNIT 4:   Evaluation of Double and Triple integral in simple cases – Changing the order and evaluating the Double integration. (Cartesian Coordinates only)

UNIT 5:   Definition of Fourier series - Finding Fourier Co-efficients for a given periodic function with period 2π - Use of Odd and Even functions in evaluation of Fourier Co-efficients - Half range *sine* and *cosine* series.

TEXT BOOKS:

1. T. K. Manickavasagam Pillai, S. Narayanan, "Calculus Vol. I" S. Viswanathan Private Limited, 2011.
2. S. Arumugam, Issac and Somasundaram, "Trigonometry and Fourier series", New Gamma Publishers, Hosur, 1999.

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Sl. No.: [   ]   Subject Code: [U16ZO3A1]

GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-5
B.Sc,. BOTANY & CHEMISTRY – III SEMESTER – ALLIED COURSE - I
(For the candidates admitted from the year 2016-2017 onwards)

ALLIED ZOOLOGY - I
(INVERTEBRATA AND CHORDATA)

Course outcomes:

On the completion of this course, the students will be able to

1. Become familiar with the world of fauna that surrounds us and their importance.
2. Identify the invertebrates and classify them up to the class level with the basis of systematics
3. Understand the basis of life processes and recognize the economically important invertebrate and chordate fauna.

UNIT- I   General Characters of the Phyla based on the following types
  Phylum Protozoa – Paramoecium
  Phylum Porifera – Ason Sponge
  Phylum Coelenterata – Obelia Sp.

UNIT- II   General Characters of the Phyla based on the following types.
  Phylum Platyhelminthes – Fasciola hepatica
  Phylum Nemathelminthes – Ascaris lumbricoides
  Phylum Annelida – Megascolex Sp.

UNIT-III   General Characters of the Phyla based on the following types
  Phylum Arthropoda – Penaeus Sp.
  Phylum Mollusca – Lamellidens Sp.
  Phylum Echinodermata – Astreas. Sp.

UNIT-IV   General characters of the classes based on the following types
  Class Pisces – Scoliodon; Class Amphibia – Rana; Class Reptilia – Calotes – Morphology, digestive, respiratory, circulatory, nervous system, sense organs, excretory and reproductive system.

UNIT-V   General Characters of the classes based on the following types.
  Class Aves – Columba; Class Mammalia – Oryctolagus – Morphology, digestive, respiratory, circulatory, nervous system, sense organ, excretory and reproductive system.

Text Books:
1. Text Book of Invertebrates, Arumugam, N. Saras Publications, Nagercoil

2. Text book of Chordates, Arumugam, N. Saras Publications, Nagercoil.

Reference Books:

1. Outlines of Zoology – M. Ekambaranatha Ayyar – Viswanathan Publications.
2. A Manual of Zoology, Vol -I & II M. Ekambaranatha Ayyar – Viswanathan Publications.

GOVERNMENT ARTS COLLEGE (AUTONOMOUS) KARUR-05
B.sc., -III SEMESTER – NON CORE ELECTIVE-I
(For the candidates admitted from the year 2015-2016 onwards)
(FOR CHEMISTRY MAJOR)

ENERGY PHYSICS-I

Course Outcomes:
- Classification of conventional and non- conventional energy sources are discussed.
- Solar cells are discussed.
- Knowledge about Water desalination and solar still are explained.
- Need of Bio-mass energy is discussed.

UNIT-I: CONVENTIONAL ENERGY SOURCES
Various forms of energy - Renewable and conventional energy system – Comparisons - Coal, oil and Natural Gas - Availability - Statistical details - Worlds reserve of commercial energy sources and their availability.

UNIT-II: NON- CONVENTIONAL ENERGY SOURCES
Renewable energy sources - Solar energy- Structure of the Sun - Nature of the radiation - Terrestrial radiation - Solar heaters - Domestic and commercial type - Crop driers- Direct and indirect type - Space cooling- Vapour compression system and Absorption air conditioning – Solar cooker – Box type and Multi reflector type solar cooker.

UNIT-III: PHOTO CONVERSION:
Photovoltaic generation - Principle of Solar cell- Current Voltage characteristics - Types of solar cells - p-n Homo junction cell – p-n- Hetro junction cell - Gallium Arsenide solar cell - Indium Phosphide solar cell.

UNIT-IV: WATER DESALINATION- SOLAR STILL:
Water desalination - Principle of solar distiller - Single slope basic solar still - Double slope solar still - Non symmetrical solar still – Symmetrical solar still - Performance of solar distillation - Solar pond - Merits and demerits of solar energy.

UNIT-V: BIO MASS ENERGY:
Bio mass energy - Classification of bio mass energy - Photo synthesis - Bio mass conversion - Direct and indirect method - Gobar gas plants - Ethanol from wood- Merits and demerits.

BOOKS FOR STUDY:
1. G.D. RAI, Non conventional energy sources - Khanna publishers, 2008.

BOOKS FOR REFERENCE:
1. G.D. RAI " Solar energy utilization"- Ed - V(1995).
2. S.P. SAKHATURE, " Solar energy"- TATA MCGRAW Till publication company, Ed., 11, 1997.
3. C.G. Agerwal, Solar energy.
4. KARUPANNAN. K and SUGANTHI, Energy physics- PRIYA publication.

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Sl. No.: [   ]   Subject Code: U16CH4C5P

GOVERNMENT ARTS COLLEGE (AUTONOMOUS):: KARUR-05
B.Sc., CHEMISTRY - IV SEMESTER – CORE COURSE - V
(For the candidates admitted from the year 2016-2017 onwards)

CORE COURSE PRACTICAL –II

Course outcomes :
* After doing the semi-micro analysis practical one can understand the complexation role in cationic identification.
* One can understand how to identify different types of cations and anions systematically by doing semi-micro methods and classification of cations in relevant groups.

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

CATIONS TO BE STUDIED: Lead, Copper, Bismuth, Cadmium, Iron, Aluminum, Zinc
Manganese, Cobalt, Nickel, Barium, Calcium, Strontium, Magnesium and Ammonium.

ANIONS TO BE STUDIED: Carbonate, Sulphide, Sulphate, Nitrate, Chloride, Bromide, Fluoride, Borate, Oxalate and Phosphate.

Marks:

Int.Asst.	25
Practical	75
	- - -
Total	100
	- - -

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Sl. No.:

Subject Code: U16CH4C6

GOVERNMENT ARTS COLLEGE (AUTONOMOUS): KARUR-05
B.Sc., CHEMISTRY - IV SEMESTER – CORE COURSE - VI
(For the candidates admitted from the year 2016-2017 onwards)

GENERAL CHEMISTRY – IV

Course outcomes

➢ The comparative study of alkali and alkaline earth metals and zinc group elements will be understood after reviewing this General Chemistry Paper-IV for 2nd B.Sc., students.
➢ Knowing the essential information of the elements of inner transition.
➢ To review the Elimination and substitution reaction studies.
➢ To learn about ether and alcohol and to consider polarisation and dipole moment.

UNIT- I   INORGANIC CHEMISTRY (15 hours) Alkali and Alkaline earth metals.

1.1 Comparative study of metal and alkaline earth metal compounds (Oxides, Halides, Hydroides, carbonates, and Sulphates).

1.2 Diagonal relationship between lithium and magnesium.

1.3 Preparation, Properties and uses of Lithium aluminium hydride and sodium boro hydride. Coinage metals.

1.4 Comparative study of Zinc group metals, Galvanisation, Evidences for the existence of mercurous ion as Hg_2^{2+}

UNIT-II   Inorganic Chemistry

Inner Transition Elements

2.1 Lanthanides – occurance – general study of lanthanides involving electronic Configuration, Oxidation states, Magnetic properties and Complexation behavior – Lanthanide contraction.

2.2 Extraction of Uranium

2.3 Actinides – Occurance – electronic Configuration, Oxidation states, Magnetic properties and Complexation behaviour.

UNIT - III   (Organic Chemistry)   (15 hours)

3.1 Aliphatic and nucleophillic substitutions – Mechanism of SN_1, SN_2, and SN^i reactions and Effect of Solvents, leaving groups nucleophiles and Structure of substrates.

3.2 Elimination reaction – Hofmann and Saytzeff's eliminations cis and trans eliminations – Mechanism of E_1 and E_2 reactions.

UNIT – IV (Organic Chemistry) (15 Hrs)

4.1 Unsaturared alcohol – Alkyl alcohol – Preparation, Properties and uses.

4.2 Thio alcohols – Preparation, Properties and uses of ethyl mercaptan.

4.3 Ethers: Aliphatic and aromatic ethers – Preparation, properties and uses, 1,4 – dioxane and crown ethers – preparation, properties and uses, Epoxides – preparation reactions and applications.

UNIT - V (Physical Chemistry) (15 Hrs)

5.1 Polarization-Induced polarization- Orientation polarization

5.2 Determination of dipole moment by temperature method. Application of dipole moment measurements – in distinguishing between cis and trans isomers in determining the percent ionic character of bonds – Shapes of simple inorganic and organic molecules (BCl_3, H_2O, CO_2, NH_3, CCl_4) Dipole moment of substituted benzene (o,m and p dicholoro benzene)

Books Recommended:
1.   P.L.Soni and Mohan Katyal, "Text Book of Inorganic chemistry" 20th Revised Edition, Shoban Lal Nagin Chand & Co New Delhi.1993.
2.   R.B.Puri and I.R.Sharma, K.C.Kaila, "Principle of Inorganic Chemistry" sultan Chand and Co New Delhi. 1992.
3.   Vogel's "Text Book of qualitative Chemical Analysis" 6th Edition ELBS, Derling Kinderslay (India) Pvt Ltd New Delhi- 2006.
4.   R.D.Madan, "Modern Inorganic Chemistry", S.Chand & Co (Pvt) Ltd. New Delhi.1997
5.   M.K.Jain, "Organic Chemistry", 12th Edition Shoban Lal Nagin chand and Co. New Delhi 1987.
6.   P.L.Soni and H.M.Chawla, "Text Book of Organic Chemistry", 23rd Edition Sultan Chand Co. New Delhi 1990.
7.   K.S.Tewari S.N.Mehrotra and N.K.Vishnol, "A Text Book of Organic Chemistry",3rd Edition, Vikas publishing House (Pvt) Ltd. New Delhi 2006.
8.   B.R.Puri, L.R.Sharma and Madan S.Pathania, 41st Edition, "Principle of Physical chemistry" Vishal Publishing. Co, New Delhi, 2004.

GOVERNMENT ARTS COLLEGE (AUTONOMOUS) KARUR-05

B.Sc., – II & IV – SEMESTER – FIRST / SECOND ALLIED COURSE - II
(FOR CHEMISTRY AND PHYSICS MAJOR)
(For the candidates admitted from 2015 -16 onwards)

ALLIED MATHEMATICS –II

ALGEBRA, 3D AND TRIGNOMETRY

Course Outcomes

On the completion of this course, the students will be able to

- Demonstrate algebraic facility with algebraic topics including linear, exponential, logarithmic and trigonometric functions.

- Ability to work solving the system of linear equations and compute the eigen values and eigen vectors.
- Ability to work some trigonometric expansions, hyperbolic and inverse hyperbolic functions.

UNIT 1: Binomial, Exponential and Logarithmic series (Formulae only) - Summation and approximation related problems.

UNIT 2: Symmetric, Skew symmetric, Orthogonal, Hermitian, Skew Hermitian and Unitary matrices - Characteristic equation, Eigen values, Eigen vectors - Cayley Hamilton's theorem(proof not needed)
- Simple problems only.

UNIT 3: Equation of a Sphere -Tangent plane - Plane section of a sphere - Finding the center and radius of the circle of intersection (simple problems only).

UNIT 4: Expansion of $\sin n\theta$, $\cos n\theta$, $\tan n\theta$ (n being a positive integer) - Expansion of $\sin^n \theta$, $\cos^n \theta$, $\cos^n \theta \sin^n \theta$ in a series of sines and cosines of multiples of θ (θ - given in radians) - Expansion of $\sin \theta$, $\cos \theta$ and $\tan \theta$ in terms of powers (only problems in all the above)

UNIT 5: Euler's formula for $e^{i\theta}$ - Definition of Hyperbolic functions – Formulae involving Hyperbolic functions - Relation between Hyperbolic and circular functions - Expansion of sinhx, coshx, tanhx in powers of x – Seperation of real and imaginary part of sin(x+iy), cos(x+iy), tan(x+iy), sinh(x+iy), cosh(x+iy), tanh(x+iy), $\sinh^{-1}$(x+iy), $\cosh^{-1}$(x+iy), $\tanh^{-1}$(x+iy).

TEXT BOOKS:
1. T. K. Manickavasagam Pillai, T. Natarajan, K. S. Ganapathy, "Algebra Vol. I" S. Viswanathan Private Limited, Chennai-2010.
2. S. Narayanan, T. K. Manickavasagam Pillai, "Trigonometry" S. Viswanathan Private Limited and Vijay Nicole Imprints Pvt. Ltd.2010.
3. T. K. Manickavasagam Pillai, "Analytical Geometry of 3D and Vector Calculus", New Gamma Publishing House, 2010.

REFERENCE BOOKS:
1. Arumugam & Isaac, "Analytical geometry of 3D and Integral calculus", New Gamma Publications, 2011.
2. Arumugam & Isaac, "Trigonometry and Fourier series", New Gamma Publications.

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GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-5

B.Sc. BOTANY & CHEMISTRY – IV SEMESTER – ALLIED COURSE II
(For the candidates admitted from the year 2016-2017 onwards)

ALLIED ZOOLOGY – II PRACTICAL

Course Outcomes

On the completion of this course, the students will be able to
1. Identify the animals at class level
2. Dissect and display parts of some invertebrate fauna
3. Understand the commercial values of animal products

1. DISSECTIONS:

Earth worm – Nervous System.

Cockroach – Digestive System, Nervous System.

2. MOUNTINGS:

Earthworm – Body setae

Cockroach – Mouth Parts.

Honey Bee – Mouth Parts.

Shark – Placoid Scales

Any Carp – Cycloid & Ctenoid Scales.

3. SPOTTERS:

Amoeba, Paramoecium, Ascon sponge, Obelia colony, Metridium, Fasciola hepatica, Taenia solium, Taenia scolex, Planaria, Ascaris, Earthworm, Earthworm T. S., Nereis, Leech, Leech T.S, Prawn, Scorpion, Grasshopper, Centipede, Peripatus, Freshwater mussel, Pila, Sepia, Sea-star, Sea-urchin, Sea- cucumber, Amphioxous, Ascidian, Balanoglosus, Shark, Anabas, Exocoetus, Echeneis, Frog, Salamander, Calotes, Draco, Turtle, Naja Naja, Vipera russellii, Pigeon, Parrot, Rat, Rabbit, Bat.

4. Species of animals used in Vermiculture, Apiculture, Sericulture, Aquaculture and Poultry farming.

5. Products: Vermicompost, Honey, Bee's wax, Silk, Cod liver oil, Abnormal Eggs of poultry birds.

A record of laboratory work should be submitted at the time of Practical examination. <u>Mark distribution for the Practical Examination:</u>

1.	Dissection	25
2.	Mounting	15
3.	Spotters (5x5)	25
4.	Record	10
	Total	75

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GOVERNMENT ARTS COLLEGE (AUTONOMOUS) KARUR-05

B. Sc.,–II & IV SEMESTER – FIRST/SECOND ALLIED COURSE - III
(FOR CHEMISTRY & PHYSICS MAJOR)
(For the candidates admitted from 2015-2016 onwards)

ALLIED MATHEMATICS – III

DIFFERENTIAL EQUATIONS, LAPLACE TRANSFORMS AND VECTOR CALCULUS

Course outcomes
On successful completion of the course, the students will be able to

- Solving the ODE of first order and higher degree by using various methods
- Forming the PDE by using different approach and also solving the PDE by various methods
- Solving the second order ODE with constant coefficient using Laplace transform
- Knowing the concept of vector differentiation and integration

UNIT 1: Ordinary Differential Equations of first Order but of Higher Degree – Equation solvable for x, solvable for y, solvable for dy/dx, Clairaut's form (Simple case Only) – Linear Equations with constant coefficients – Finding Particular Integral in the case of e^{kx} Sin(kx), Cos(kx) (Where k is constant), X^k Where k is a positive integer, and e^{kx} f(x) Where f(x) is any function of x (only problems in all the above – no proof needed for any formula)

UNIT 2: Formation of Partial Differential Equations by Eliminating arbitrary constants and by Elimination of arbitrary functions – Definition of general, particular and complete solutions – singular integrals (geometrical meaning not required) – Solution of First Order Equations in standard forms: $f(p, q) = 0$, $f(y, p, q) = 0$, $f(z, p, q) = 0$, $f_1(x, p) = f_2(y, q)$, $z = xp + yq + f(p, q)$ – (only problems in all the above – Proof not needed for any formula)

UNIT 3: Laplace Transforms: Definition – L f(t), L (cos (at)), L (sin (at)), L (sin t^n) Where n is a positive integer, Basic theorems in Laplace Transforms (Formula only) – $[e^{at} f(t)]$, $L[e^{at} \cos bt]$, $L[e^{at} \sin bt]$ – Inverse Laplace Transforms related to the above standard forms solving second order ODE with constant co-efficient using Laplace transforms.

UNIT 4: Vector Differentiation –Velocity and Acceleration vectors- Gradient of the vectors – Directional derivatives –Unit normal Vector – Tangent plane –Divergence – Curl – Solenoidal and irrotational vectors –Double operators – Properties connecting grad., div and curl of a vector.

UNIT 5: Vector Integration –Line Integral – Conservative force field - Scalar potential field – Work done by a force – Surface integral – (Statement, Application and verification only) - Gauss Divergence theorem, Stoke's theorem, Green's theorem.

TEXT BOOKS:
1. S. Narayanan, "Differential Equation", S. Viswanathan Publishers,1996.
2. S. Narayanan, T. K. Manickavasagam Pillai, "Calculus Vol. II", S. Viswanathan Pvt. Limited, 2003.
3. M. L. Khanna, " Differential Calculus", Jaiprakashnath and Co., Meerut -2004.

REFERENCE BOOK:
1. Kandasamy, Thilagavathy, Gunavathy, "Allied Mathematics Vol. II", S. Chand & Company Limited, New Delhi 2010.

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GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-5

B.Sc. BOTANY & CHEMISTRY – IV SEMESTER - ALLIED COURSE - III

(For the candidates admitted from the year 2016-2017 onwards)

ALLIED ZOOLOGY – III (COMMERCIAL ZOOLOGY)

Course Outcomes

On the completion of this course, the students will be able to

1. Rear earthworm and make vermicompost
2. Know the nutritional value and medicinal value of honey
3. Understand the lifecycle and economic importance of silkworm
4. Establish and Manage a fish farm
5. Set-up a poultry farm.

UNIT- I   Vermiculture and compositing – Types of earthworm – Significance – Rearing – Rearing technology – Management – Economic importance – Composting.

UNIT- II   Apiculture – Species of Honey bees – Newton's Bee hive – Care and management – Honey extraction – Economic importance – Nutritive and medicinal values of honey.

UNIT-III   Sericulture – Feeding habits of larvae – Life cycle of silk worm (Bombyx mori) – Economic importance of silk worm and silk.

UNIT-IV   Aquaculture – Construction of pond – Management of pond – Freshwater cultivable fishes – Fish feed – Induced breeding – fish diseases (Furunculosis, Epizootic Ulceractive syndrome (EUS) and Vibriosis).

UNIT-V   Poultry farming – types of poultry – Management – Poultry nutrition – diseases and their prevention – Economics of poultry production.

Text Book:
1. G.S. Shukla and V.B. Upadhyay – Economic Zoology, Rastogi Publications.
2. Thiyagarajan, S. 2000 – Commercial Zoology, Tee Jay Publication, Thanjavur (Tamil version)

Reference Books:
1. Ashan, J. and S.P. Sinha – A hand book of Economic zoology – S. Chand & Co
2. Sardar Singh – Bees Keeping in India, ICAR, New Delhi, 1982.
3. Santhanam, et al., 1999, Aquaculture, Oxford & IBH Pub. Co., Pvt. Ltd, New Delhi.
4. Ullal, S.R. and M. N. Narasimhan – Central Silk Board, Government of India, Mumbai
5. Singh – Livestock and Poultry Production
6. Manju Yadav, 2003. Economic zoology, Discovery Publishing House, New Delhi
7. Rose, S.P., Principles of Poultry science, C & B International
8. Ismail. S., 2001, Vermiculture, Orient Longman Ltd., Chennai

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Sl. No.: [   ]   Subject Code: U16CH4S1

GOVERNMENT ARTS COLLEGE (AUTONOMOUS): KARUR-05
B.Sc., CHEMISTRY – IV SEMESTER –SKILL BASED ELECTIVE -I
(For the candidates admitted from the year 2016-2017 onwards)
LABORATORY HYGIENE AND SAFETY

Course outcomes

➢ The safety measures of the laboratory can be understood after reviewing this Laboratory Hygiene and Safety Measures Paper for 2nd B.Sc Students.
➢ To know how to handle chemicals, control of waste disposal, laboratory first aid treatment.
➢ How to obey the rules in the Lab to prevent poisoning chemicals. Precautions for chemical storage.

UNIT- I (6 hours)	1.2 Laboratory safety measures: Lab discipline – Cleanliness and watchfulness. Maintenance of worktable, washing sink, fume hoods, fuel gas systems, instruments and equipments – Requirements for a safe laboratory. Use of apron overcoats, goggles gloves, etc.,
UNIT –II (6 hours)	2.1 Storage and handling of chemicals – carcinogenic chemicals – Handling of ethers – toxic and poisonous chemicals.
UNIT-III (6 hours)	3.1 Safe limits of vapour concentrations – Waste disposal and fume disposal – Precautions for avoiding accidents – cleansing agents – cleaning the apparatus and Instruments.
UNIT – IV (6 hours)	4.1 First – Aid techniques: Burns and Damages due to organic substances, acids, alkalis, burns in the eye- Inhalation of toxic vapours, hazardous chemicals, bromine, phenol and hot objects.
UNIT- V (6 hours)	5.1 Poisons and antidotes – Rules to avoid poisoning – emetics- universal antidote – treatments for specific poisons. Harmful effects of X-rays and lasers.

Books Recommended:

3. V.Gopalan, P.S.Subramaniam and K.Rengarajan, Elements of Analytical Chemistry.

4. Jayashree Ghosh, A Text Book of Pharmacetuical Chemistry.

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GOVERNMENT ARTS COLLEGE (AUTONOMOUS) KARUR-05

B.sc., - IV SEMESTER – NON CORE ELECTIVE - II

(For the candidates admitted from the year 2015-2016 onwards)

(FOR CHEMISTRY MAJOR)

ENERGY PHYSICS-II

Course Outcomes:

1. Working of a wind mill is discussed.
2. A knowledge about geothermal, Ocean thermal energy and nuclear energy are discussed.
3. Methods to store the energy help us for the future use.
4. Impact of Non-conventional energy is explained.

UNIT-I: WIND ENERGY

Wind energy - Calculating the power from the wind – Horizontal - Axis wind mill - Single blade wind mill - bicycle wheel wind mill - Horizontal axis wind mill - Dutch type - sail type - Vertical Axis wind mill- Performance of wind mill- Merits and demerits.

UNIT-II: OTHER ENERGY SOURCES -I

Geothermal energy - Ocean Thermal Energy Conversion (OTEC) - open cycle – closed cycle- Energy from the waves – Principle – High level Reservoir wave machine - Dolphin-type wave power machine - and Tide energy – Principle - Tidal power plants – Single basin system – One way cycle – Two way cycle - Merits and demerits.

UNIT-III: OTHER ENERGY SOURCES -II

Nuclear power - Fusion and Fission - Breeder reactor nuclear fusion - Basic principles of magneto- Hydro - Dynamics - Solar production of Hydrogen - Liquid hydrogen as a Fuel in future - Merits and demerits.

UNIT-IV: ENERGY STORAGE

Solar energy storage- Thermal, Electrical, Chemical, Mechanical – Hydrogen storage – compressed Gas storage – Liquid storage – underground storage – Storage as metal hydrides

UNIT-V: IMPACTS OF NON- CONVENTIONAL ENERGY

Conversions of energy - Patterns of energy consumption in domestic, Industrial, Transportation and Agricultural sectors - Conservation Principles - Energy crisis and possible solutions - Energy option for the developing countries - Impacts due to non - Conventional energy sources - Global warming.

BOOKS FOR STUDY:

1. G.D. RAI, Non conventional energy sources - Khanna publishers, 2008.

BOOKS FOR REFERENCE:

1. H.P.GARG and J.PRAKASH, Solar energy fundamental and application - TATA MCGRAW- HILL publishing company limited, 1997.

2. KARUPANNAN. K and SUGANTHI, Energy physics - PRIYA publication.

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GOVERNMENT ARTS COLLEGE (AUTONOMOUS): KARUR-05
B.Sc., CHEMISTRY - V SEMESTER – CORE COURSE - VII
(For the candidates admitted from the year 2016-2017 onwards)

INORGANIC CHEMISTRY – I

Course outcomes

- The IUPAC nomenclature and basic theory of coordination compounds can be understood after reviewing this Inorganic Chemistry-I paper for 3rd B.Sc students.
- Application of coordination compounds to be identified.
- To understand the Biological significance of organometallic compounds and metal carbonyls in better way.
- To examine the Precipitation analysis and Group Theory applications.

UNIT- I   Coordination compounds
         1.1 Types of ligands. IUPAC nomenclature
            Theories of coordination compounds – Werner, Sidgwick, Valence bond, Crystal field, molecular orbital and ligand field theories.

UNIT –II   2.1.Isomerism – Stability of complexes – factors affecting the stability of complexes.
         2.2 Unimolecular and bimolecular nucleophilic substitution reactions in octahedral and square complexes – Trans effect.
         2.3 Application of coordination compounds – Determination of potassium ions, separation of copper cadmium ions, Estimation of nickel using DMG and aluminium using oxine.

UNIT-III   3.1 Biologically important coordination compounds – Chlorphyll, haemoglobin, Vitamin B12 – Their structure, application (Elucidation is not required)
         3.2 Metal carbonyls – Mono and poly nuclear carbonyls of Ni,Fe and Cr – Synthesis, reactions, structure and uses.
         3.3 Nitrosyl compounds – classification, preparation, properties and structure of nitrosyl chloride and sodium nitroprusside.

UNIT – IV   4.1 Binary compounds – hydrides, borides and carbides– classification, preparation, properties and uses.
         4.2 Organometallic compounds of alkenes alkynes and cyclopentadiene.

UNIT - V   5.1 GRAVIMETRIC ANALYSIS
         Characteristics of precipitating agent – choice of precipitants – specific and selective precipitant.
         Condition of precipitation. Types of precipitations. Purity of precipitant Coprecipitation and post precipitation. Precipitation from homogeneous solution. Digestion and washing of precipitate. Ignition of the precipitate. Use of sequestering agents.
         5.2 GROUP THEORY AND ITS APPLICATIONS
         Symmetry elements – symmetry operation – mathematical group multiplication tables point group of simple molecules (H_2, HCl, CO_2,H_2O,BF_3, NH_3)

Books Recommended:
1. P.L.Soni Text book of Inorganic Chemistry, S.Chand & Co., New Delhi(1999).
2. B.R.Puri and &I.R.Sharma, "Principles of Inorganic Chemistry" shoban Lal, Nagin Chand &Co., New Delhi. 2000.
3. R.D.Madan, G.D.Tuli and S.M.Malik, Selected Topic in Inorganic Chemistry, S.Chand &Co., New Delhi (1988)
4. J.D.Lee., Concise Inorganic Chemistry, E.L.B.S., IV Edn, m(1991)
5. Jeffery et al:"Vogel Text Book of Inorganic Quantitative Analysis", Longman (1984)
6. D.A.Skoog and D.M.West: "Fundamentals of Analytical Chemistry W.B.Saunders, New York (1983).
7. P.K.Bhattacharya: Chemical Application of Group Theory, Himalaya publishing House, Mumbai.(1998)
8. F.A.Cotton, Chemical Application of Group Theory, Third Edition, JohnWiley and Son , New York 2002.
9. M.S.Gopinath and V.Ramakrishnan: Group Theory and Applications (1988)
10. D.F.Shriver and P.W.Atkins, "Inorganic Chemistry " IIIrd Edition, Oxford University Press, 1999.
11. M.C. Day and Selbin, "Theortical Inorganic Chemistry ", Second Edition; Affiliated East – West New Delhi, 1969..

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Sl. No.:   Subject Code: U16CH5C8

GOVERNMENT ARTS COLLEGE (AUTONOMOUS): KARUR-05
B.Sc., CHEMISTRY - V SEMESTER – CORE COURSE - VIII
(For the candidates admitted from the year 2016-2017 onwards)

ORGANIC CHEMISTRY – I

Course outcomes

➢ The optical isomerism and geometrical isomerism for various organic compounds can be comprehended after learning this Organic Chemistry-I paper for 3rd B.Sc students.
➢ To describe the Carbonyl compounds and acid derivatives.
➢ The preparation, properties and uses of heterocyclic compounds should be known.

UNIT- I   STEREOCHEMISTRY - I

1.1 Stereoismerism – Definition – classification into optical and geometrical isomerism.

1.2 Optical isomerism – optical activity – optical specific rotation – conditions for optical activity. Asymmetric centre – chirality – archiral molecule- meaning of + and – and D and L notations – notation for optical isomers – Cahn – Ingold Prelog rules – R.S. notations for optical isomer with one asymmetric carbon. – Element of symmetry – Racemization – Methods of Racemization(by substitution and tautomerism) – symmetry-Resolution – Methods of resolution(Mechanical separation, seeding biochemical and conversion to diastereoisomers) – Walden inversion.

UNIT –II   STEREOCHEMISTRY - II

2.1 Optical activity in compounds containing no asymmetric carbons – Biphenyls, Allenes and Spiranes.

2.2 Geometrical isomerism – Cis – Trans, Syn – Anti and E and Z notations Geometrical isomerism in Maleic and Fumaric acids in unsymmetrical ketoximes – Methods of distinguishing geometrical isomers (dipole moment, dehydration, heat of hydrogenation cyclization, melting points).

UNIT-III   REACTIONS OF CARBONYL COMPOUNDS

3.1 Carbonyl polarization – Reactivity of carbonyl group – Acidity of alpha Hydrogen.

3.2 Mechanism of Perkin, Knoevenagal, Benzoin condensation. Reformatsky, and Wittig reactions.

3.3 Mechanisms of reduction (Sodium borohydride, LiAlH4, Wolff Kishner and MPV reductions) – Mechanisms of haloform reaction and Michael addition and Oppenauer oxidation.

3.4 Photochemistry of carbonyl compounds – Norrish I and II types.

UNIT – IV ACIDS AND ACID DERIVATIVES

4.1 Ionization of carboxylic acids – Acidity constant – comparison of acid strengths of substituted halo acids – Hammett equation.

4.2 Malonic and acetoacetic esters – Characteristics of reactive methylene group - Synthetic uses of Malonic and acetoacetic esters.

4.3 Tautomerism – Definition – Keto Enol tautomerism – identification – acid and bases catalyzed interconversion mechanism.

UNIT - V   HETEROCYCLIC COMPOUNDS

5.1 Aromatic characteristics of heterocyclic compounds.

5.2 Preparation, properties and uses of Furan. Pyrole, Thiophene.

5.3 Synthesis and reactions of pyridine and Piperidine- comparative basic characters of pyrrole, pyridine and piperidine with amines.

5.4 Synthesis and reactions of Quinoline, Isoquinoline and Indole with special reference to Skraup, Bischler Napieralski and indole synthesis.

Note :   Problems where possible (all units). Books

Recommended:

1. B.S.Bahl and Arun Bahl "Advanced Organic Chemistry" , S. Chand & Co, New Delhi. (1998)
2. P.L.Soni and H.M.Chwla: "Text book of Organic Chemistry: - 28th Edition (1999) – Sultan Chand , New Delhi.
3. RaviBhushan: "Stereoisomerism of carbon compounds" – CBS – Publishers, Delhi – Revised ed. (1998)
4. P.S.Kalsi: "Stereochemistry, Conformation and Mechanism" Willey Eastern Limited, New Delhi.
5. O.P.Agarwal : "Chemistry of Natural Products" Volume 1 & 2.
6. D.Nasipuri, "Stereochemistry of organic Compounds " ,Wily Eastern Ltd., New Delhi. (1992)
7. I.L.Finar, "Organic Chemistry" Volume 1, E.L.B.S., London, (1998).
8. Sheyan Egg, "Organic Chemistry Mechanisms,"
9. R.K.Bansal, "Organic Reaction Mechanism," Tata Mc Graw Hill,1975.
10. P.S.Kalsi, "Organic reaction and their Mechanism ," New Age International Publishers.
11. S.H.Pine , J.B.Hendrickson, D.J.Cram and G.S Hammomd , "Organic Chemistry' McGraw Hill fourth Edition, 1980.

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GOVERNMENT ARTS COLLEGE (AUTONOMOUS): KARUR-05
B.Sc., CHEMISTRY - V SEMESTER – CORE COURSE - IX
(For the candidates admitted from the year 2016-2017 onwards)

PHYSICAL CHEMISTRY – I

Course outcomes
➢ After learning this Physical Chemistry-I paper for 3rd B.Sc students, the simple and detailed knowledge of thermodynamic terms can be understood and the meaning and implementation of the first, second and third thermodynamic laws can be understood.
➢ Step rule for learning the equation and uses of Gibbs - Helmholtz.
➢ To learn the phase rule.

UNIT- I   DEFINITION OF THERMODYNAMICS TERMS   15 hours
Systems and surroundings- isolated, closed and open systems – Homogenous & heterogeneous systems, state of the system intensive and extensive variables. Thermodynamics process – cyclic processes, reversible and irreversible, isothermal and adiabatic processes – state and path functions, exact and inexact differentials, concepts of heat and work.

UNIT –II   FIRST LAW OF THERMODYNAMICS AND ITS APPLICATION
2.1 First law if thermodynamics – statements, definitions of internal energy (U), enthalpy(H), heat capacity relation between Cp and Cv- calculation of W,Q, ∂u and ∂H for expansion of ideal and real gases under isothermal and adiabatic condition for reversible and irreversible processes.

2.2 Joule – Thompson effect, Joule – Thompson experiment. Relationship between $\mu_{j,t}$ and other thermodynamic qualities. Calculation of $\mu_{j,t}$ for ideal and gases. Joule – Thompson coefficient and inversion temperature. The zeroth law of thermodynamics – statement - Requirements of thermochemical equation – bond dissociation energy – its calculation from thermochemical data. Temperature dependence of Kirchoff's equation.

UNIT-III   SECOND LAW OF THERMODYNAMICS AND ITS APPLICATIONS
3.1 Heat engine – Carnot's cycle and its efficiency – Carnot's theorem – thermodynamic scale of temperature CONCEPT OF ENTROPY: Entropy as a function of P, V and T. Entropy of mixing– Clausius inequality.

3.2 GIBBS AND HELMHOLTZ FUNCTIONS: ΔA and ΔG criteria for thermodynamics equilibrium and spontaneity –Gibbs – Helmholtz equations and their applications – Maxwell's relations. Equilibrium constants and free energy change. Thermodynamic derivation of law of mass action.

3.3 Equilibrium between different phases - system of variable composition – partial molar quantities – chemical potential of component in ideal mixture – Gibbs Duhem equation. Reaction isotherm – Van't-Hoff's equation Van't - Hoff's isochore. Clapeyron equation and Clausius Clapeyron equation – applications.

UNIT – IV   THIRD LAW OF TRHERMODYNAMICS AND ITS APPLICATIONS
4.1 Need for the law, Nernst heat theorem, III law of thermodynamics – statement and concept of residual entropy. Evaluation of absolute entropy from heat capacity data.

4.2 Solutions – Ideal liquid mixtures –(benzene and toluene)-Raoult's law and Henry's law– Deviation from Raoult's law and Henry's law – Activity and activity Coefficient. Duhem-Margule's equation –its application to fractional distillation of binary miscible liquids.

4.4 Partially miscible liquid pairs – Phenol – Water, Triethanolamine Water and Nicotine-Water systems – Lower and upper CSTs Effect of impurities on CST.

UNIT - V   PHASE RULE
51. Meaning of the terms – phase, component and degree of freedom. Derivation of Gibb's phase rule. Phase equilibria of one component systems-water, CO_2 and sulphur systems.

5.2 Reduced phase rule – phase equilibria of two component of systems – solid –liquid equilibria – simple eutectic systems –Bi-Cd and Pb-Ag Systems – Pattinson's process.

5.3 Compound formation with congruent melting points (Mg-Zn) and incongruent melting points – Efflorescence and Deliquescence.

References:
1. "Principles of physical chemistry ",B.R.Puri & Sharma.
2. "Text book of Physical chemistry", P.L.Soni.
3. "Advanced Physical chemistry", GrudeeRaj.
4. Essentials of Physical chemistry", B.S.Bahl., G.D.Tuli &Arun Bahl, S.chand & Co., N.Delhi (1999).
5. "Thermodynamics for chemistry", Samuel Glasstone.
6. "Simplified course in Physical chemistry", R.LMadan, G.D.Tuli, S.Chand &Co., N.Delhi (1999).
7. "Thermodynamics for students of chemistry", Rajaram and Kuriacose.
8. P.W.Atkins, "Physical Chemistry" , ELBS, Oxford Univ. Press,1998.
9. R.A.Alberty and R.j.Silbay, "Physical Chemistry", John wiley sons. Inc. NewYork,1995.
10. Gordon. M.Barrow, "Physical Chemistry", Tata Mc Graw Hill, New Delhi.
11. I.N.Lerine, "Physical Chemistry"

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GOVERNMENT ARTS COLLEGE (AUTONOMOUS): KARUR-05

B.Sc., CHEMISTRY - V SEMESTER - ELECTIVE COURSE - I

(For the candidates admitted from the year 2016-2017onwards)
INDUSTRIAL CHEMISTRY

Course outcomes

➢ Manufacturing of various types of fuels, cements, glass, sugar and paints can be understood after learning this Industrial Chemistry Paper for 3rd B.Sc students.

➢ To analyze efficiently for the management of Tannery effluent contamination.

➢ To learn the preparation of explosives, caustic soda and sodium chlorate and their applications

➢ for the study of refining of aluminium, solar and fuel cell

UNIT- I
(6 hours)

UNIT –II
(6 hours)

1.1 Cement: Manufacture Wet Process and Dry Process, Types, setting of cement, Reinforced concrete.

1.2 Glass: Types, Composition, manufacture of Optical glass, coloured glasses and lead glass.

2.1 Sugar: Cane Sugar manufacture, Recovery of sugar from molasses, Sugar estimation.

UNIT-III
(6 hours)

2.2 Paints & Varnishes: Primary constituents of paints, dispersion medium (solvent), binder, Pigments, Oil based paints, latex paints baked on paints (alkydresins), formulation of paints and varnishes, Requirements of a good paint.

3.1 Chemical Explosives: Origin of explosive, preparation and chemistry of lead azide, nitrocellulose, TNT, Dynamite, Cordite and gunpowder introduction to rocket propellants.

UNIT – IV
(6 hours)

3.2 Leather Industry: Curing, Preservation and tanning of hides and skins. Treatment of tannery effluents.

4.1 Petroleum: Origin, Refining, Cracking, Reforming knocking and octane number, LPG, synthetic petrol.

UNIT- V
(6 hours)

4.2 Fuel Gases: Large scale production, Storage, Hazards and uses of coal gas, Wages gas, Producer gas, and Oil gas.

5.1 Electrochemical Industries: Production of materials like chlorine, caustic soda and sodium chlorate.

5.2 Electrolytic refining of aluminium, Electro–Oxidation and electro-reduction process with examples, Solar cells and fuel cells.

Books Recommended:

1. B.N.Chakrabarty, Industrial Chemistry, Oxford & IBH Publishing co, New Delhi, 1981.

2. B.K.Sharma, Industrial Chemistry, Goel Publishing House, Meerut.

3. P.P.Singh, T.M.Joseph, R.G.Dhavale, College Industrial Chemistry, Himalaya Publishing House, Bombay, 4th Ed., 1983.

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GOVERNMENT ARTS COLLEGE (AUTONOMOUS): KARUR-05
B.Sc., CHEMISTRY – V SEMESTER – SKILL BASED ELECTIVE -II
(For the candidates admitted from the year 2016-2017 onwards)
SPECTROSCOPY- I

➢ The fundamental knowledge of spectroscopy can be understood after learning this Spectroscopy-I Paper for 3rd B.Sc learners.
➢ To understand the essence and interpretation of UV/Vis, IR and Raman Spectroscopy.

UNIT I
1.1 Definition of spectroscopy – Electromagnetic radiation, Electromagnetic spectrum, atomic and molecular spectroscopy (tranlational, rotational, vibrational and electronic) units.

UNIT II
2.1 UV- Visible spectroscopy- absorptions laws (Lambert's and Beer's Law)- theory of electronic transition- Absorption and intensity shifts- factors influencing $\sum_{max}$ and λ_{max}- Instrumentation and applications.

UNIT III
3.1 IR- Introduction-molecular vibrations-vibrational frequency -number of fundamental vibrations- factors influencing vibrational frequencies – selection rules.

UNIT IV
4.1 IR instrumentation – finger print region- application of IR spectra (Hydro carbon, Aromatic hydro carbons, Halogen compounds, Alcohol, Aldehyde and Ketones, Amine, Amide, Acid, Esters, ϕ-NO_2 compounds) UNIT V
5.1 Raman spectroscopy- Rayleigh and Ramman effect-Scattering-Stokes and Anti stokes lines- Difference between Raman and IR-Vibration – Rotational Spectra –mutual exculsion principle of CO_2 and N_2O.

Books Recommended:
1. G. Herzberg, "Atomic Spectra and Atomic Structure"
2. 1. William Kemp, Organic Spectroscopy, ELBS II Edition, Spectroscopy of organic compounds.
3. . P.S. Kalsi, Organic Spectroscopy, Wiley Eastern Ltd, Madras.
4. 5. C.N.Banwell, Fundamentals of molecular spectroscopy, McGraw Hill, New York,1966.
5. G. Herzberg, "Molecular Spectra and Molecular Structure I. Spectra of Diatomic Molecules"
6. G. Herzberg, "Molecular Spectra and Molecular Structure II. Infrared and Raman Spectra of Polyatomic Molecules"
7. G. Herzberg, "Molecular Spectra and Molecular Structure III. Electronic Spectra and Electronic Structure of Polyatomic Molecules"
8. G. M. Barrow, "Introduction to Molecular Spectroscopy"
9. J. G. Calvert and J. N. Pitts, Jr., "Photochemistry"
10. H. B. Dunford, "Elements of Diatomic Molecular Spectra"
11. R. N. Dixon, "Spectroscopy and Structure"
12. K.V.Raman "Spectroscopy and mathematics of Quantum Chemistry" in Print.
13. R.Chang "Basic Principles of Spectroscopy"

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GOVERNMENT ARTS COLLEGE (AUTONOMOUS): KARUR-05
B.Sc., CHEMISTRY – V SEMESTER – SKILL BASED ELECTIVE -III
(For the candidates admitted from the year 2016-
2017 onwards)

SPECTROSCOPY-II

➤ After reviewing this Spectroscopy-II Paper for 3rd B.Sc., students, one can understand the basic principles, instrumentation and interpretation of proton-NMR, ESR and Mass Spectroscopy.

UNIT I- 1HNMR Spectroscopy

1.1. NMR Spectroscopy-principle of nuclear magnetic resonance – basic instrumentation-number of signals-chemical shift- shielding and deshielding-spin-spin coupling and coupling constants-TMS as NMR standard.

UNIT II
2.1. Interpretation of NMR spectra of simple organic compounds such as Acetone,
Anisole, Benzaldehyde, Ethyl acetate, Ethylamine, Ethyl Bromide, Toluene and ethyl alchol .

UNIT III- ESR spectroscopy
3.1.E.S.R.Spectroscopy-condition-theory of esr spectra-hyperfine splitting-esr spectra of simple radicals CH_3,CD_3,Naphthalene radical ions only.

UNIT IV - Mass spectroscopy
4.1.Mass spectroscopy-Basic principles- instrumentationmolecular ion peak, base peak, metastable peak, isotopic peak- their uses. Nitrogen rule- ring rule- fragmentation – ML rearrangement.

UNIT V
5.1. Interpretation of mass spectra of simple organic compounds such as Acetone,
Anisole, Benzaldehyde, Ethyl acetate, Ethylamine, Ethyl Bromide and Toluene .

Books Recommended:
1. William Kemp, Organic Spectroscopy, ELBS II Edition, Spectroscopy of organic compounds.
2. P.S. Kalsi, Organic Spectroscopy, Wiley Eastern Ltd, Madras.
3. R.M. Silverstein, C.G. Bassler and Monsil, Spectrometric identification of organic
compounds, John Wiley & Sons, New York.
4. William Kemp, NMR in Chemistry, Mac Millan, 1986.
5. A.Carrington, A.D. Melahlam, Introduction to Magnetic Resonance, Harper and Row, New York, 1967.
6.E.A.V.Ebsworth, David, W.H.Ranklin and Stephen Cradock, Structural methods in inorganic chemistry, Black well Scientific Publ., 1987.
7. R. Drago, Physical methods in chemistry, Reinhold, New York, 1968.
8.C.N.Banwell, Fundamentals of molecular spectroscopy, McGraw Hill, New York,1966.
9.G.W.Ewing, Instrumental methods of chemical analysis, McGraw Hill Pub, 1975.
10. Doughlas. A.Skoog, Principles of instrumental analysis, Saunders College Pub.Co, III Edn., 1985
12. K.V.Raman "Spectroscopy and mathematics of Quantum Chemistry" in Print.
13. R.Chang "Basic Principles of Spectroscopy"

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# GOVERNMENT ARTS COLLEGE (AUTONOMOUS):: KARUR-05

B.Sc., CHEMISTRY - VI SEMESTER – CORE COURSE – X
(For the candidates admitted from the year 2016-2017 onwards)

PRACTICAL –III – PHYSICAL CHEMISTRY

- After completion of Physical Chemistry Practical one can know and understand the preparation for each experiment by using Lab manual.
- One can understand how to findout unknown concentration of NaCL in a given sample.
- By doing Ester Hydrolysis experiment one can arrive the rate constant
- By completion of Rast Method one can calculate the molecular weight of the given unknown samples.
- One can determine the transition temperature of unknown compound by conducting Transition temperature experiment.

Distributive Law:
    a) Partition coefficient of Iodine between carbon tetrachloride and water.
    b) Equilibrium constant of the reactions.

$$I_2 + I^- \rightleftharpoons I_3$$
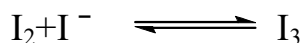
Kinetics:
    Acid catalysed hydrolysis of an ester (Methyl acetate or Ethyl acetate)

Molecular weight:
    Rast's method: Naphthalene, m-dinitrobenzene and diphenyl as solvents.

Heterogeneous equilibrium:
    a) Critical solution temperature of phenol – water system-effect of impurity on C.S.T (2% NaCl or 2% succinic acid solutions).
    b) Simple eutectic system: Naphthalene – Biphenyl, Napthalene Diphernylamine.
    c) Determination of transition temperature: Sodium acetate. Sodium thiosulphate. $SrCl_2.6H_2O$ & $MnCl_2.4H_2O$.

Electro Chemistry:
    a) Conductivity : 1) Cell constant
                         2) Equivalent conductivity
                         3) Conductometric titrations
    b) Potentiometry: Potentiometric titrations.

Marks:

Int.Asst.	25
Practical	75
	- - -
Total	100
	- - -

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GOVERNMENT ARTS COLLEGE (AUTONOMOUS):: KARUR-05
B.Sc., CHEMISTRY - VI SEMESTER – CORE COURSE – XI
(For the candidates admitted from the year 2016-2017 onwards)

PRACTICAL – IV - GRAVIMETRIC ANALYSIS AND ORGANIC COMPOUND ANALYSIS

- After doing gravimetric analysis (quantitative method) one can understand how to accurately determining the amount of the inorganic substances by selective precipitation.
- From organic analysis (qualitative) one can easily find out the function group and its derivatives.
- From organic preparations one can easily prepare the desired organic compound and recrystallize the prepared compound.

ORGANIC COMPOUND ANALYSIS

1. Preparation of involving oxidation, reduction, hydrolysis, nitration, sulphonation, halogenation diazotization.
2. Characterization of organic compounds by their functional groups and confirmation by preparation of derivatives.

GRAVIMETRIC ANALYSIS

1. Estimation of calcium as calcium oxalate
2. Estimation of barium as barium sulphate
3. Estimation of barium as barium chromate
4. Estimation of lead as lead sulphate
5. Estimation of lead as lead chromate
6. Estimation of nickel as nickel dimethylglyoxime complex.

Marks:

Int.Asst.	25
Practical	75

Total	100

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GOVERNMENT ARTS COLLEGE (AUTONOMOUS): KARUR-05
B.Sc., CHEMISTRY - VI SEMESTER – CORE COURSE - XII
(For the candidates admitted from the year 2016-2017 onwards)

INORGANIC CHEMISTRY – II

➢ After learning this Inorganic Chemistry-II Paper for 3rd B.Sc students, the detailed understanding and basic definition of nuclear chemistry can be understood and nuclear reactions and radiolysis can be known.
➢ Understanding the composition of atoms in a cubic lattice.
➢ To think about clathrates, alkyl metals and various forms of silicates.

UNIT- I   NUCLEAR CHEMISTRY
   1.1 Introduction – Composition of nucleus and nuclear forces.
   1.2 Nuclear stability – n/p ratio, mass defect, binding energy, packing fraction and magic numbers, shell and drop models.
   1.2 Isotopes – detection and separation. Isotopic constitution of elements and whole number rule. Isobars, isotones and isomers.

UNIT –II   RADIOACTIVITY AND NUCLEAR TRANSFORMATIONS
   2.1 Radioactivity – discovery, detection and measurements (Wilson cloud chamber). Disintegration theory – modes of decay – Group displacement law – Rate of disintegration – Half life and average life – Radioactive series.
   2.2 Nuclear transformation – use of projectiles – nuclear reaction – fission and fusion. Nuclear reactors. Applications of radio isotopes – Carbon dating – Radio active waste disposal.
   2.3 Radiolysis of water and hydrated electron

UNIT-III   METALLIC STATE
   3.1 Packing of atoms in metal (BCP, CCP, FCC, and HCP).
   3.2 Theories of metallic bonding – electron gas, Pauling and band theories.
   3.3 Structure of alloys – substitutional and interstitial solid solution – Hume Rothery ratios.

UNIT – IV SOME SPECIAL CLASSES OF COMPOUNDS
   4.1 Clathrates – examples and structures. Interstitial compounds and non-stoichiometric compounds.
   4.2 Metal alkyls, Co-ordination polymers and phosphonitrilic polymers.
   4.3 Silicates – classification into discrete anions, one, two and three dimensional structures with typical examples composition, properties and uses of beryl, talc, mica, zeolites and ultramarines.

UNIT- V   Acids and Bases

5.1 Lewis concept – Classification of Lewis acids - Lux Flood concept – Hard-Soft acid base concept and its applications.

5.2 Non- aqueous solvents- Classification of solvents- Neutralization reaction and solvolysis in liquid ammonia- Metal- ammonia solutions.

5.3 Neutralisation, solvolysis and redox reactions in liquid sulphur dioxide – Acid-base, precipitation and solvolysis reactions in acetic acid as solvent.

Books Recommended:

1.   P.L.Soni, Mohan Katyal, " Text book of Inorganic Chemitry", 20th revised edn., Chand, 1992.

2.   Esmarch S.Gilreath, "Fundamental concepts of Inorganic Chemistry", International students edn. McGaw –Hill Kogakusha Ltd., 1958.

3.   Gurdeep Chatwal, "Co-ordination Chemistry", First edn., Himalaya Publishing House, 1992.

4.   B.R.Puri and L.R.Sharma, "Principles of Inorganic Chemistry", Shoban Lal Nagin Chand and Co., 1989.

5.   O.P.Agarwal : "Chemistry of Natural Products" Volume 1 & 2.

6.   R.D.Madan, "Modern Inorganic Chemistry".

7.   S.Glasstone, "Source Book on Atomic Energy", 3rd edn., Affiliated East West Press, 1967.

GOVERNMENT ARTS COLLEGE (AUTONOMOUS): KARUR-05
B.Sc., CHEMISTRY - VI SEMESTER – CORE COURSE - XIII
(For the candidates admitted from the year 2016-2017 onwards)

ORGANIC CHEMISTRY – II

➢ The preparation and properties of phenols, nitro compounds, amino acids, proteins and carbohydrates can be understood after examining this Organic Chemistry-II Paper for 3rd B.Sc students.
➢ Studying the mechanistic approach of molecular rearrangements of organic compounds and to evaluate the structural elucidation of natural products.

UNIT- I   PHENOLS, NITRO COMPOUNDS AND AMINES
   1.1 Cresols di and trihydric phenols, α and β naphthols – Preparation and Properties.
   1.2 Conversion of nitrobenzene to ortho, para, and Meta dintitrobenzene.
   1.3 Relative basic characters of Aliphatic and Aromatic amines.
   1.3 Diazomethane and diazoacetic ester- preparation, structure and their synthetic uses.
   1.4 Sulphanalic acid, Sulphanilamide, Saccharin, Chloramine – T- Preparation and uses.

UNIT –II   AMINO ACIDS AND PROTEINS
   2.1 Classification of amino acids. Essential and non- essential amino acids.
   2.2 Preparation of L- Amino acids properties and reactions. Zwitter ions isoelectric points, peptide synthesis, structure determination of poly peptides. End group analysis.
   2.3 Proteins – classification based on physical and chemical properties and based on physiological function primary and secondary structures of proteins. Helical and sheet structures (elementary treatment only) denaturation of proteins.
   2.4 Type of nucleic acids – DNA and RNA biological functions only.

UNIT-III   CARBOHYDRATES
   3.1 Mutarotation and its mechanism, cyclic structure, pyranose and furanose forms of glucose and fructose.
   Epimerization, chain lengthening and chain shortening of aldoses. Inter conversion of aldoses and ketoses.
   Haworth, Fisher and chair conformations of glucose.
   3.2 Di and polysaccharides – reaction and structure of maltose, lactose, Sucrose, starch and cellulose.

UNIT – IV NATURAL PRODUCTS
   4.1 Structural elucidations of menthol and α Terpinol.
   4.2 Alkaloids – general methods of isolation and structural determination of piperine and nicotine.
   4.3 Vitamins – thiamine, riboflavin, pyridoxine and ascorbic acids occurrence and biological importance only.

UNIT- V   MOLECULAR REARRANGEMENT
   5.1 Pinacol – pinacolone rearrangement – Beckmann, Benzidine, Hoffmann, Curtius, benzylic acid rearrangement. Claisen (sigmatropic rearrangement) and para Claisen rearrangements. Cope and Oxycope rearrangements, Fries rearrangement. (Mechanism only).

Books Recommended:

1. P.L.Soni, and H.M.Chawala, "Text Book of Organic Chemistry", 27th edn. Sultan Chand 1997.

2. V.S.Parmar and H.M.Chawala, "Principles of Reaction Mechanism in Organic Chemistry o", 2nd Edn., Sultan Chand 1978.

3. Subash Chandra Rastogi, Satis kumar Agarwala Ashok Sharma, "Chemistry of Natural Products" Vol.I & Vol.II Edition !974-75. Jai Prakash Nath & Co. Leading Educational Publishers.

4. Ernest L.Eliel "Stereochemistry of Carbon Chemistry", 19th Reprint 1995 Tata McGraw Hill Publishing company Ltd.

5. M.K.Jain "Organic Chemistry", 12th Edn., Shoban Lal Nagin Chand and Co.

Sl. No.: [ ]   Subject Code: | U16CH6E2 |

GOVERNMENT ARTS COLLEGE (AUTONOMOUS): KARUR-05
B.Sc., CHEMISTRY - VI SEMESTER – ELECTIVE COURSE - II
(For the candidates admitted from the year 2016-2017 onwards)

ANALYTICAL CHEMISTRY

➤ The instrumental and personnel errors in the quantitative determination of organic and inorganic compounds can be analysed after reviewing this Analytical Chemistry Paper for 3rd B.Sc students.
➤ To practice the principles of chromatography techniques of varied incarnations.
➤ To grasp the techniques and procedures in the laboratory.
➤ To learn the principle of thermal analysis and electrogravimetric analysis.

UNIT- I   1.1 DATA ANALYSIS

Errors in chemical analysis, Classification of errors, Determine errors, Instrumental errors, Personal errors, constant errors and proportional errors –
Correction of determinate errors Random errors, Precision, Accuracy and rejection of data questioned. Significant figures, Mean deviation and standard deviation. Curve fitting. Method of least squares.

1.2 ORGANIC ESTIMATIONS

Principles and methods to estimate glucose, ascorbic acid, Phenol. Aniline- Iodine value, Saponification value R.M.value and Acetyl value.

UNIT –II   CHROMATOGRAPHY

2.1 Principles involved in adsorption, Partition and ion exchange, paper, Thin Layer, Column, Gas Liquid chromatography. Electro-phoresis- Applications.
2.2 Desiccants, Vacuum drying, Distillation, fractional Distillation, Stem Distillation, Azeotropic Distillation, Crystallisation and Sublimation– Principles and Techniques.

UNIT-III   THERMOANALYTICAL METHODS

3.1 Principles involved in thermo gravimetric analysis and differential thermal analysis – instrumentation.
Characteristics of TGA (CaC_2O_4. H_2O, $CuSO_4$. $5H_2O$ and DTA curves – (CaC_2O_4. H_2O) factors affecting TGA and DTA curves.
3.2 Thermometric Titration of HCI Vs NaOH.
3.3 ANALYTICAL ELECTROCHEMISTRY

Electrolytic Separation. Principles of electrodeposition. Electro-Gravimetry (Estimation of Copper and Silver).

UNIT – IV   COLORIMETRIC ANALYSIS

4.1 Laws of Colorimetry – Nessler's and Photo electric colorimetric method– operation and applications. Estimation of Ni, Cu and Fe.
4.2 Basic principles of flame photometry – Atomic absorption –Spectrophotometry- Estimation of Na, K and Ca.
4.3 TECHNIQUES IN KINETICS

Principles and techniques used to follow the kinetics of ordinary and fast Photo chemical reactions.

UNIT - V   ELECTRO ANALYTICAL METHOD

5.1   Polarography- principle, concentration polarization, dropping mercury electrode (DME) –advantages and disadvantages-migration, residual, limiting and diffusion current- use of supporting electrolytes- Illkovic equation (derivation not required) significance- Half wave potential ($E_{1/2}$) – polarography an analytical tool in qualitative and quantitative analysis.
5.2   Polarimeter – principle - specific rotation – instrumentation- applications.

Books Recommended:

01. R.Gopalan, P.S. Subramaniam and K.R. Rengarajan: "Elements of Analytical Chemistry", "sultan chand & Sons, New Delhi (1995).
02. B.K.Sharma: Instrumental Methods of Chemical Analysis, Goel Publishing House, Meerut(1999)
03. S.M.Khopkar: Basic Concepts of Analytical Chemistry, New Age International(P) Limited, New Delhi(1998)
04. Gurdeep Chatwal, Sham Anand: Instrumental Methods of Chemical Analysis, Himalaya Publishing House, Mumbai(1998)
05. R.A.Day and A.L.Underwood. :Quantitative Analysis", Prentice Hall of India, New Delhi(1998)
06. D.A.Skoog & D.M. West: Fundamentals of Analytical Chemistry W.B.Saunders, New York (1982)
07. K.V. Raman: Computers in Chemistry Tata MC Graw Hill Co., New Delhi(1993)
08. B.G.Gottfried: BASIC Programming Mc Graw Hill International Ltd., (1980)
09. B.R.Gottfried: C Language Programming Mc Graw Hill International Ltd., (1987)
10. E.Balagurusamy: C Language Tata MC Graw Hill Co., New Delhi(1997)
11. A.I.Vogel, Text Book of Quantitative Inorganic Analysis Longman (1984).

CHAIRMAN – BOS   COE

GOVERNMENT ARTS COLLEGE (AUTONOMOUS): KARUR- 05
B.Sc., CHEMISTRY - VI SEMESTER – ELECTIVE COURSE - III
(For the candidates admitted from the year 2016-2017 onwards)

PHYSICAL CHEMISTRY – II

- ➢ The principle of electrical conductance and electrolytic conductance for strong and weak electrolytes can be improved after learning this Physical Chemistry-II Paper for 3rd B.Sc students. Learning and how to measure the transport number.
- ➢ To evaluate a cell's EMF and reversible electrode forms and concentration cells. To determine the rate constant for different types of order of a reaction.
- ➢ To study the derivation and definition of the equation of Arrhenius. Understanding ARRT and Lindemann's Concept.
- ➢ To understand and to learn the kinetics of photochemistry in the photophysical process and quantum yield.

UNIT-I ELECTRICAL CONDUCTANCE

1.1 Elementary treatment of Debye- Huckel Onsager equation for strong electrolytes. Evidence
for ionic atmosphere. The conductance at high field (Wein effect) and high frequencies
(Debye – Falkenhagen effect). Transport number and Hittorf's rule – determination by
Hittorf's method and moving boundary method

1.2 Determination of K_a of acids. Determination of solubility product of a sparingly soluble salt.
Conductometric titrations.

UNIT – II

2.1 Electromotive force of a cell and its measurements. Applications of Gibbs Helmholtz equation, concentration and E.M.F. Nernst equation.

2.2 Types of reversible electrodes – Gas/metal ion, metal/metal ion, metal/insoluble salt/anion
and Redox electrodes. Electro reactions. Standard hydrogen electrode – reference electrodes –
standard electrode potentials – Sign conventions – Electrochemicals series and its significance.

2.3 Concentration cells with and without transport. Liquid junction potential. Application of
concentration cells – Valency of ions, solubility product and activity co-efficient, potentiometric
titrations. Determination of pH using hydrogen, quinhydrone and glass electrodes.

UNIT– III

3.1 Derivation of rate constant of a second order reaction-when the reactants are taken at different initial concentrations-when the reactants are taken at the same initial concentrations-Determination of the rate constant of a II order reaction-Derivation of rate constant of a third order reaction-when the
reactants are taken at the same initial concentrations. Derivation of half-life periods for second and
third order reactions having equal initial concentration of reactants

3.2 Effect of temperature on reaction rates-Derivation of Arrhenius equation-concept of activation energy-determination of Arrhenius frequency factor and energy of activation

UNIT -IV

4.1. Collision theory of reaction rates-Derivation of rate constant of a bimolecular reaction from
collision theory-Failures of CT

4.2. Lindemann theory of Unimolecular reactions.

4.3. Theory of Absolute Reaction Rates-Thermodynamic derivation of rate constant for a bimolecular reaction based
on ARRTcomparison between ARRT and CT. Significance of free energy of activation and entropy of
activation.

4.4. Kinetics of complex reactions of first order opposing, consecutive and parallel reactions- examples.

UNIT – V

5. Photochemistry

5.1. Consequences of light absorption-The Jablonski diagramnon radiative transitions-radiative transitions-
Grotthus-Draper law- The Stark Einstein law of photochemical equivalence-Quantum
efficiency (quantum yield).

5.2. Energy transfer in photochemical reactions photosensitisaiton- Photosynthesis in plants-
Chemiluminescence - fluorescence and phosphorescence-lasers-uses of lasers.

5.3. Photochemical reactions-Kinetics of hydrogen-bromine reaction-decomposition of HI – Photolysis of
aldehydes and ketones(Mechanism only)

Books Recommended:

1. "Principles of physical chemistry ",B.R.Puri & Sharma.
2. R.P.Varma & Pradeep . "Physical Chemistry"
3. Dr. S.Jain & S.P.Jakkar, "Physical Chemistry, principles & problems" , Tata McGraw
   Hill, New Delhi, 1990.
4. Glasstone S., Lewis D.,Elements of Physical Chemistry, London, Mac Millan & Co. Ltd.
5. Atkins P.W., Physical Chemistry, (5th edition) Oxofrd University Press (1994)