



SAIVA BHANU KSHATRIYA COLLEGE

(Aruppukottai Nadargal Uravinmurai Pothu Abiviruthi Trustukku Pathiyapattathu)

(Affiliated to Madurai Kamaraj university)

(Re-accredited with B+ Grade (3rd Cycle) by NAAC)

ARUPPUKOTTAI - 626 101

VIRUDHUNAGAR DISTRICT, TAMIL NADU

DEPARTMENT OF CHEMISTRY

SYLLABUS

B.Sc., Chemistry

ALLIED PAPER II

ORGANIC AND PHYSICAL CHEMISTRY

Credits – 4

Max. Marks 100

Hours/Week: 4

Ext: 75 + Int: 25

UNIT I: NUCLEAR CHEMISTRY

- Composition of the nucleus – nuclear forces – mass defect – binding energy – nuclear stability.
- Soddy's group displacement law – illustration - law of radioactive disintegration.
- Nuclear fission: Definition – theories of fusion – application of fission – the principle of atom bomb.
- Nuclear fusion: Definition – emission of energy – Stellar energy – hydrogen bomb.
- Application of radioactivity – In medicine, agriculture, industry and analytical fields – carbon dating.

UNIT II: CARBOHYDRATES

- : Definition – classification – monosaccharide – properties and uses of glucose and fructose and configuration of glucose – Haworth structure – conversion of glucose to fructose and vice versa.
- Disaccharides:** Sucrose – manufacture – properties and uses – structure- distinction between sucrose, glucose and fructose
- Polysaccharides:** starch and cellulose (structure only) α -amylase - β - amylase- difference between these two.

UNIT III: ISOMERISM

- Classification of organic compounds** – position isomerism-Functional isomerism-Chain isomerism
- Stereo isomerism** - Chiral centre, Optical activity of compounds containing one or two chiral centers- Examples
- Geometrical Isomerism of maleic and fumaric acids.

UNIT IV: CATALYSIS

- Definition– characteristics – different types of catalysis – acid-base catalysis- surface catalytic reactions- definition and example – auto catalysis



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- b. Catalytic poisoning- promoter – enzyme catalysis
- c. Applications of catalysis

UNIT V: AMINO ACIDS, PROTEINS AND DYES

- a. **Amino acids and proteins:** classification – synthesis – properties of amino acids – polypeptides – proteins – classification and biological functions.
- b. **Dyes:** Definition – theory of color and constitution – classification based on structure and application – preparation of methyl orange – bismark brown, malachite green – vat dye – indigo.

REFERENCE BOOKS

1. B.R. Puri, L.R. Sharma and K.C. Kalia, Principles of Inorganic Chemistry, 31st Edition, Milestone Publishers and Distributors, New Delhi, 2013.
2. A. Bahl and B.S. Bahl, Advanced Organic Chemistry, 1st Multicolour Edition, S. Chand & Company, New Delhi, 2010.
3. B.R. Puri, L.R. Sharma and M.S. Pathania, Principles of Physical Chemistry, 46th Edition, Vishal Publishing Company, New Delhi, 2013.

ALLIED PAPER III ORGANIC, INORGANIC AND PHYSICAL CHEMISTRY

Credits – 4
Max. Marks 100

Hours/Week: 4
Ext: 75 + Int: 25

UNIT I: ELECTROCHEMISTRY

- a. Faraday's laws of electrolysis – specific and equivalent conductance – electrochemical cell – Nernst equation – convention regarding the sign of the EMF of the cell
- b. electrodes – reference electrodes – hydrogen and calomel electrodes – types of electrodes – metal – metal ion electrodes, metal – metal insoluble salt electrode – glass and ion selective electrodes
- c. pH measurement using glass electrode- membrane potential – Hydrogen – oxygen fuel cell.

UNIT II: POLYMERS

- a. Definition – classification of polymers – properties of polymers – addition and condensation polymerization reactions with examples
- b. Natural rubber – isoprene unit – vulcanization of rubber – preparation and application of polystyrene, urea-formaldehyde resin, Teflon and buna-S-rubber.



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UNIT III: PHOTOCHEMISTRY

- Comparison of thermal and photochemical reactions - definition of photochemical reactions- laws of photochemistry- Grotthus-draper law- Einstein law - quantum efficiency-reasons for low and high quantum yield with examples – consequences of light absorption by atoms and molecules
- Jabalonski diagram – fluorescence – phosphorescence – photosensitiation – chemiluminescence – bioluminescence –
- Applications of photo chemistry.

UNIT IV: CO-ORDINATION COMPOUNDS

- Definition - nomenclature – definition of various terms involved in co-ordination chemistry
- Werner 's theory – EAN rule – VB theory – Nickel carbonyl – Chelates

UNIT V: POLLUTION

- Air pollution** : Definition , composition of air – chemical reactions occurring in air due to sunlight – sources of air pollution – classification and effects of air pollutants – effect of fluorocarbons – ozone layer – composition – formation – depletion – green house effect.
- Acid rain**: Formation , theory and control of acid rain – methods to control air pollution
- Water pollution**: Types – sources – water sewages – industrial effluents-inorganic pollutants – organic pollutants – water pollution control – water treatment
- Radioactive pollution**: Sources – nuclear traces – wastes – effect of radiation – preventive methods

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ALLIED PAPER IV

ORGANIC AND PHYSICAL CHEMISTRY

Credits –4

Max. Marks 100

Hours/Week: 4

Ext: 75 + Int: 25

UNIT I: VITAMINS AND ANTIBIOTICS:

- Classification and biological function of vitamins A, B₆, B₁₂, C, D, E, K (structural elucidation not necessary)
- Classification and biological function of antibiotics - penicillin, chloroamphenicol, streptomycin, tetracycline.

UNIT II: THERMODYNAMICS

- Importance of thermodynamics – terms used – open and closed system – state function – path function - extensive and intensive properties – reversible and irreversible process – statement and mathematical form of first law of thermodynamics – heat capacity at constant volume and pressure – relation between C_p and C_v.
- Statement of second law of thermodynamics – entropy – physical significance of entropy- Gibb's free energy and its significance

UNIT III: ADSORPTION

- Definition – difference between adsorption and absorption – adsorbate - Adsorbent- physical adsorption – chemical adsorption – difference between these two types – factors influencing adsorption
- Adsorption isotherm - Langmuir isotherm (no derivation, statement only)
- Adsorption of gases on solid surface – Applications of adsorption

UNIT IV: CHROMATOGRAPHY

- Principle and application – partition and gas chromatography - thin layer chromatography – column chromatography
- Paper chromatography – gas -solid and gas- liquid chromatography.

UNIT V: CHEMICAL KINETICS

- Reaction rate – order & molecularity of a reaction – zero order – first order.
- First order rate equation & half life period – derivation. Examples of first order reactions
- Second order reaction – examples.
- Enzyme catalysis – Michaelis and Menten mechanism – Lineweaver Burk plot – significance of k_m



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SEMESTER II/IV PRACTICAL - I VOLUMETRIC ANALYSIS

Credits –1
Max. Marks 100

Hours/Week: 2
Ext: 75 + Int: 25

Objectives

1. To enable the students to acquire the quantitative skills in volumetric analysis.
2. At the end of the course, the students should be able to plan experimental projects and execute them.

I ACIDIMETRY AND ALKALIMETRY

1. Estimation of HCl.
2. Estimation of oxalic acid.
3. Estimation of sodium carbonate
4. Estimation of sodium hydroxide

II REDOX TITRATIONS

PERMANGANOMETRY

1. Estimation of Ferrous ion
2. Estimation of oxalic acid

III IODOMETRY AND IODIMETRY

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

Scheme of evaluation (Max.marks

100) Internal Assessment 40 Marks

| | |
|------------------|----------|
| Regularity | 20 Marks |
| Class Test | 15 Marks |
| Observation Note | 5 Marks |
| Total | 40 Marks |



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External Examination: 60 Marks (3 hours)

| | |
|-------------------------|-----------------|
| Record Note Book | 10 Marks |
| Procedure | 15 Marks |
| Estimation | 35 Marks |
| < 3 % | 35 Marks |
| 3 - 4% | 25 Marks |
| 4- 5% | 20 Marks |
| > 5% | 10 Marks |

SEMESTER IV/VI PRACTICAL - II ORGANIC ANALYSIS

Credits – 1

Max. Marks 100

Objectives

1. To enable the students to develop analytical skills in organic qualitative analysis
2. At the end of the course, the students should be able to plan the experimental projects and execute them.

1. Organic Analysis

- a. Identification of acidic, basic, phenolic, and neutral organic substances.
- b. Detection of N, S and halogens.
- c. Test for aliphatic and aromatic nature of substances.
- d. Test for saturation and unsaturation.
- e. Identification of functional groups:
 - i) Carboxylic acids ii) Phenols iii) Aldehydes iv) Ketones v) Esters vi) Carbohydrates vii) Amines viii) Amides ix) Halogen compounds
- f. Preparation of derivatives for the functional groups.

Scheme of evaluation (Max.marks 100)

Internal Assessment 40 Marks

| | |
|-------------------------|-----------------|
| Regularity | 20 Marks |
| Class Test | 15 Marks |
| Observation Note | 5 Marks |
| Total | 40 Marks |

External Examination: 60 Marks (3 hours)

| | |
|-----------------------------------|-----------------|
| Record Note | 10 Marks |
| Elements present | 18 Marks |
| Aliphatic/aromatic | 6 Marks |
| Saturated/unsaturated | 6 Marks |
| Functional group | 15 Marks |
| Derivative /color reaction | 5 Marks |

