

**BHARATHIAR UNIVERSITY :: COIMBATORE – 641 046**  
**ALLIED CHEMISTRY PAPER- I** (5X15 = 75 hours)

(For The Students Admitted During The Academic Year 2010-2011 Batch & Onwards)

Unit I:

Chemical Bonding

1. Molecular orbital theory, bonding, antibonding and non-bonding orbitals. Molecular orbitals. MO configuration of H<sub>2</sub>, N<sub>2</sub>, O<sub>2</sub>, F<sub>2</sub>. Bond order. Diamagnetism and paramagnetism.
2. Diborane: Preparation and properties, structure, preparation and uses of NaHB<sub>4</sub>, Borazole-Chemistry.
3. Interhalogen compounds: ICl, BrF<sub>3</sub>, IF<sub>5</sub>- Preparation, properties, hybridization and structure, shape. Basic properties of iodine.

Unit II:

1. Industrial Chemistry

Synthesis, properties and uses of silicones. Fuel gases: natural gas, water gas, semi water gas, carburetted water gas, producer gas, oil gas (manufacturing details not required)

2. fertilizers

urea, ammonium sulphate, ammonium nitrate, potassium nitrate NPK fertilizer. Triple superphosphate.

Unit III:

1. covalent bond: orbital overlap, hybridization, geometry of organic molecules- CH<sub>4</sub>, C<sub>2</sub>H<sub>4</sub>, C<sub>2</sub>H<sub>2</sub>, C<sub>6</sub>H<sub>6</sub>. Inductive effect. Electrometric, mesomeric, hyperconjugative and steric effects. Effect in properties of compounds.
2. Stereoisomerism  
Optical isomerism: symmetry, elements of symmetry. Cause of optical activity, tartaric acid, Racemisation, Resolution. Geometric isomerism of maleic and fumaric acids.

Unit IV:

1. Terms: chromophore, auxochrome, bathochromic shift, hypsochromic shift, hyperchromic effect, hypsochromic effect.
2. Dyes: azo and triphenylmethane dyes- Preparation one example.

Unit V:

1. Solutions

types. Liquid in Liquid. Raoult's law. Deviation from ideal behaviour. Binary liquid mixtures. Fractional distillation.

2. Kinetics

Rate, order, molecularity, pseudo first order, determination of order. Measurement of reaction. Effect of temperature on the rate. Energy of activation.

**ALLIED CHEMISTRY PAPER- II** (5X15 = 75 hours)

**Unit I:**

1. Metals

General methods of extraction of metals. Types of ores. Methods of ore dressing.. Reduction methods, electrical methods, types of refining Van Arkel Zone refining.

2. Coordination chemistry

Nomenclature. Theories of Werner, Sidgwick, Pauling, Chelation examples. Haemoglobin, Chlorophyll. Applications in qualitative and quantitative analysis EDTA.

**Unit II:**

1. Aromatic compounds:

Electrophilic substitution in benzene- Mechanism of nitration, halogenation, alkylation, acylation, sulphonation, Preparation and properties of naphthalene.

2. Heterocyclics:

Preparation and properties of furan, thiophene, pyrrole and pyridine.

**Unit III:**

1. Amino Acids: Classification, preparation and properties, preparation of peptides. Classification of proteins by physical properties and by biological functions.

2. Carbohydrates: classification, preparation and properties of glucose and fructose. Discussion of open chain ring structures of glucose and fructose.

**Unit IV:**

Energetics:

Definition of first law thermodynamics. Types of systems. Reversible, irreversible. Isothermal and adiabatic processes. Spontaneous processes, Joule-Thomson effect. Enthalpy, bond energy. Need for the second law. Carnot cycle and Carnot theorem. Entropy and its significance. Free energy change.

**Unit V:**

1. Electrochemistry:

Measurement of conductance. Kohlrausch's law. pH determination. Conductometric titrations. Hydrolysis of salts: pH and buffer in living systems. Galvanic cells, e.m.f. standard electrode potentials, reference electrodes. Electrochemical series, its applications. Principles of electroplating.

2. Phase Equilibria:

Definition of terms in phase rule. Study of a simple eutectic system Pb-Ag.

**ALLIED CHEMISTRY PRACTICALS** (3 HOURS PER WEEK)

**I. VOLUMETRIC ANALYSIS:**

1. Estimation of sodium hydroxide using standard sodium carbonate.
2. Estimation of hydrochloric acid- standard oxalic acid.
3. Estimation of oxalic acid- standard sulphuric acid.
4. Estimation of ferrous sulphate- standard Mohr salt solution.
5. Estimation of oxalic acid- standard ferrous sulphate.
6. Estimation of potassium permanganate- standard sodium hydroxide.

**II. ORGANIC ANALYSIS:**

systematic analysis

1. Detection of Elements (N, S, Halogens).
2. To distinguish between aliphatic and Aromatic.
3. To distinguish between saturated and unsaturated.
4. Functional group tests for phenols, acids (mono and di), aromatic primary amine, amide, diamide, carbohydrate,  
Functional groups characterized by confirmatory test.