# B.Sc (GENERAL) (1+1+1 Pattern) SYLLABUS DISTRIBUTION 2016-17

## CHEMISTRY (General)

**Name of the Teacher: Dr. Pradipta Kumar Basu**
**PART I (PAPER I)**

**Group B**

**Organic Chemistry (Full Marks: 50)**

**1. Functional Nature of Organic Compounds**

Classification of organic compounds in terms functional groups, their IUPAC nomenclature and valence bond structures.

**2. Electron Displacement in Molecules**

Concept of Inductive effect, Electromeric effect, Hyperconjugation, Resonance, Aromaticity and Tautomerism.

**3. Introduction to Organic Reaction Mechanism**

Homolytic and heterolytic bond cleavage; Reaction intermediates: carbocation, carbanion, free radical.

Classification of organic reactions (substitution, elimination, addition and rearrangement) and reagent types (electrophiles, nucleophiles, acids and bases), Ideas of organic reaction mechanism ($S_N1$, $S_N2$, E1 and E2).

**3. Chemistry of Hydrocarbons**

a) Free radical substitutions of alkanes; b) Formation of alkenes, electrophilic addition reactions of alkenes (upto four carbon atoms), Markwonikoff's rule, peroxide effect, ozonolysis, radical addition and catalytic reductions; c) Formation of alkynes, their partial and complete reductions and hydration. Halogen derivatives of alkanes, their nucleophilic substitutions and elimination reactions.

**4. Mono and Bifunctional Compounds**

Preparations and properties of primary, secondary and tertiary monohydric alcohols, ethers, ethylene glycol, pinacol and glycerol; aldehydes and ketones; monocarboxylic acids and their derivatives: acid chlorides, anhydrides, esters, amides; amines; unsaturated alcohol (allyl alcohol), unsaturated aldehyde (acrolein), unsaturated carboxylic acid ( acrylic acid), unsaturated ester (methyl acrylate), di- and tribasic acids (oxalic, malonic, succinic acids; malic and citric acids).

**5. Stereochemistry**

Concept of optical activity, optical properties of lactic acid and tartaric acid, *D,L* and *R,S* nomenclature; Geometrical isomerism with reference to fumaric acid and maleic acid; *cis-trans* and *E, Z* nomenclature.

**6. Chemistry of Aromatic Compounds**

Modern concept of structure of benzene, general mechanism of aromatic electrophilic substitution reactions, preparations and properties of toluene, xylene, halobenzenes, benzyl chloride, benzoyl chloride, benzotrichloride, nitrobenzene, dinitrobenzene, TNT, aniline, methyl and dimethyl aniline, benzyl amine benzene diazonium chloride, phenols, benzyl alcohol, benzaldehyde, acetophenone, benzoic acid, anhydride, amides, esters; phenyl acetic acid, salicylic acid, cinnamic acid, sulphanilic acid, phenyl hydrazine, nitrophenols and picric acid.

**7. Organic Synthesis**

Preparation and synthetic uses of diethyl malonate and ethylacetoacetate. Application of Grignard reagents in synthesis of ketones, secondary and tertiary alcohols and carboxylic acids.

**8. Carbohydrates**

Open-chain and ring structures glucose, fructose and their mutarotation, idea of dissacharides with reference to cane sugar.

Dr. Pradipta Kumar Basu
OFFICER IN CHARGE, W.B.E.S.
Government General Degree College, Mangalkote
Dt. Purba Burdhaman, West Bengal- 713132

**Name of the Teacher: Dr. Debasish Kundu**
**PART I (PAPER I)**

# PART I

**Paper I**

## Group A

## General Principles (Full Marks: 50)

**1. Atomic Structure**

Bohr's theory: energy and radius calculations for H-like atoms, dual nature of matter and light, de Broglie's relationship, Heisenberg's uncertainty principle (qualitative), quantum numbers, Pauli exclusion principle, qualitative introduction of orbitals, shapes of orbitals, electron distribution of elements - Aufbau principle and Hund's rule.

**2. Radioactivity**

Theory of disintegration, rate constant, half life period (their interrelationship – deduction) idea of disintegration series, artificial transmutation and artificial radioactivity, uses and abuses of radioactivity. Stability of atomic nucleus, n/p ratio, mass defect, binding energy.

**3. Periodic Table and Periodic Properties**

Periodic law, Periodic classification of elements on the basis of electron distribution, s-, p- and d-block elements, connection among valencies, electron distribution and positions of the elements in the long form of the periodic table. Periodic properties: atomic radii, ionic radii, covalent radii, ionisation energy, electron affinity, electronegativity and its different scales.

**4. Chemical Forces and Molecular Structure**

Ionic bond, covalent bond (octet rule and expanded octet), dative bond, deformation of ions and Fajan's rules, Born-Haber cycle, hydrogen bond: intra- and intermolecular, bond polarity and dipole moment. Bond lengths, bond angles and qualitative description of shapes of some simple molecules like $CO_2$, $SO_2$, $H_2O$, $BeCl_2$, $BF_3$, $NH_3$, $CH_4$, $C_2H_4$, $C_2H_2$, $C_6H_6$.

**5. Oxidation and Reduction**

Electronic concepts, oxidation number, ion-electron method of balancing equations, application of redox reactions, idea of standard potential and formal potential. Derivation of thermodynamic quantities of cell reactions ($\Delta G$, $\Delta H$ and $\Delta S$).

**6. Acids and Bases, Buffers and Ionic Equilibrium**

Different concept of acids and bases, ionic product of water, salt hydrolysis, pH and its colorimetric determination, Strengths of strong and weak acids and bases, Ostwald dilution law, Henderson equation, neutralization and acid-base indicators, buffers, common ion effect, solubility product (application in analytical chemistry)

(Dr. PRADIPTA KUMAR BASU)
Asst. Professor & Head
Department of Chemistry

Dr. Pradipta Kumar Basu
OFFICER IN CHARGE, W.B.E.S.
Government General Degree College, Mangalkote
Dt. Purba Bardhaman, West Bengal- 713132