SHRI SHIVAJI ARTS COMMERCE & SCIENCE COLLEGE MOTALA DIST-BULDANA

Department of Chemistry
Theory Syllabus
Subject-Chemistry (CBCS)
B.Sc.-Part-I Sem-I

UNIT	SYLLABUS	L
UNIT-I	**Periodicity of Elements** s and p block elements: Pauli's Exclusion Principle, Hund's rule of maximum multiplicity, Aufbau principle. Shapes of s and p orbitals. Electronic configuration for s and p block elements. Detailed discussion of the following properties of the elements, with reference to s and p-block. (a) Nuclear charge and number of shell and its variations (b) Atomic and ionic radii and their variations (d) oxidation states (e) Ionization potential, Successive ionization potential and its variations. (f) Electron affinity and its trends. (g) Electronegativity and its variations. Effect of ionization energy and electronegativity on different properties of elements namely metallic and non-metallic character, relative reactivity, oxidizing and reducing properties. Diagonal relationships: Li with Mg, B with Al. Abnormal behavior of nitrogen.	14
UNIT-II	**A) Acids and Bases**- Arrhenius, Bronsted-Lowry, and Lewis's theory of acids and bases, Theory of solvent systems and Lux-Flood concept of acids and bases. Hard and soft acids and bases. Pearson's HSAB or SHAB principle with important applications.	5
	B) Nonaqueous Solvents-Requirements of a good solvent. Water as a universal solvent. Physical properties of solvents namely liquid range, dielectric constant, dipole moment, heat of vaporization and solubility behavior. Classification of solvents. Acid base, precipitation, redox, solvolysis and complexation reactions in liquid ammonia. Merits and demerits of liquid ammonia as a solvent	9
UNIT-III	**Basics of Organic Chemistry:** **A) Electronic Displacement and Reactive Intermediates:** Inductive, Electromeric, Resonance, Mesomeric effects, Hyperconjugation and their applications, dipole moment, homolytic and heterolytic fission with suitable examples. Electrophiles and nucleophiles. Types, shape and their relative stability of carbocations, carbanions, free radicals and carbenes and nitrene.	14
	B)Aliphatic Hydrocarbons: Formation and reaction of alkanes, Formation of alkenesand alkynes by elimination reactions (with mechanism of E1, E2, E1cb), Saytzeff andHofmann eliminations, Reactions of alkenes and alkynes, Diels-Alder reaction.	
	C)Structural isomers: Definition, classification, and examples	
UNIT-IV	**Aromatic Compounds:** **A)Structural Properties:** Aromaticity and Huckel's rule (Benzenoid and Non-Benzenoid compounds), Kekule and Dewar structures, Molecular orbital diagram ofbenzene, Anti-aromatic and non-aromatic compounds.	14
	B)Orientation effect: Effect of substituent groups, Activating and deactivating group,Theory of reactivity and orientation on the basis of inductive and resonance effects.	
	C)Electrophilic aromatic substitution: Halogenation, nitration, sulphonation andFriedal Craft's alkylation/acylation with their mechanism	

UNIT-V	**Gaseous State:** Postulates of kinetic theory of gases, Maxwell-Boltzmann distribution of velocities (only qualitative treatment), RMS velocity, Average velocity, Most probable velocity, Relationship between RMS velocity and Average velocity, RMS velocity and Most probable velocity, Mean free path, Collision diameter, Collision number or Collision frequency, Deviation of real gases from ideal behaviour, Explanation of deviations, Derivation of van der Waal's equation for real gases. Critical phenomenon, Andrew's experiment (isotherms of carbon dioxide) Critical constant Pc, Tc, Vc in terms of van der Waal's constant (a, b) Derivation of reduced equation of state, Law of corresponding state, Numerical	**14**
UNIT-VI	**A) Liquid State:** Definition of surface tension, Its SI unit and effect of temperature on surface tension,Derivation of expression for relative surface tension by stalagmometer method.Applications of surface tension. Viscosity, definition of coefficient of viscosity, Its SIunit and effect of temperature on viscosity, Derivation of expression for relativeviscosity by Ostwald's hbvc5viscometer method, Applications of viscosity. **B) Physical Properties and Molecular Structure:** **I.Electrical Properties:** (i)Polar and non-polar molecules. Dipole moment. (ii)Induced polarization and orientation polarization. Clausius Mossotti equation (onlyqualitative treatment). (iii)Measurement of dipole moment by temperature and refractitivity methods. (iv)Applications of dipole moment for the determination of molecular structure. i.e.percentage ionic character of covalent bonding, molecular geometry, cis-trans isomers,ortho, meta and para isomers of a disubstituted benzene. **II.Magnetic Properties:** (i)Paramagnetic and diamagnetic substances, origin of paramagnetism, diamagnetism,ferromagnetism and antiferromagnetism. (ii)Volume, specific, mass and molar susceptibility. Relationship between molarmagnetic susceptibility and magnetic moment. (iii)Relationship between magnetic moment and number of unpaired electrons. (iv)Gouy's balance method for determination of magnetic susceptibility. (v)Application of magnetic moment in the determination of molecular structure. (vi)Numerical	**14**
	*SEM: A) Create models for periodic table or periodic properties, or shape of orbitals, categorization ofacids and bases on the basis of various theories, Compare applications of non-aqueous solvents. B) Analyze the role of reaction intermediates in different organic reactions, classification of aromatic and non-aromatic compounds with justification. C) Numerical associated with gaseous and liquid state, Applications of van der Waal's equation for other gaseous constants and parameters, Prediction of molecular structures using physical properties, Data collection and analysis for surface tension and viscosity coefficient of different liquids.	
	Activities: Model creation, Chart preparation, memory maps, Class tests, assignments, project, survey, group discussion, industrial visit, or any other innovative pedagogical method. Any two activities be conducted from above. Class tests are compulsory. Equal weightage for each activity.	

B.SC.- I (SEM -I) CBCS
PRACTICAL SYLLABUS
SUBJECT-CHEMISTRY

* List of Practical/Laboratory Experiments/Activities etc.

1	Preparation of Acetyl derivative of aromatic primary amine (aniline or toluidine).
2	Preparation of Benzanilide (Benzoylation).
3	Preparation of Benzoic acid from Benzamide (Hydrolysis).
4	Preparation of Benzoic acid from benzaldehyde (Oxidation).
5	Preparation of phenyl–azo–β–naphthol dye (Diazotisation)
6	Base catalysed Aldol Condensation (Synthesis of dibanzal propanone).
7	Preparation of p-nitroacetanilide from acetanilide.
8	Determination of surface tension of a given liquid using Stalagmometer
9	Determination of the parachor value of -CH2- group (methylene) using Stalagmometer
10	Determination of coefficient of viscosity of aqueous solution of ethanol or polymer at room temperature
11	Determination of unknown percentage composition of given glycerol solution from standard 2%, 4%,6%,8% and 10% solutions of glycerol
12	Determination of the heat of solution of KNO3 (5% solution)