

**Govt College for Girls, Rania**  
**Lesson Plan Session 2021-22**  
**B.Sc. I Semester II Subject: Physical Chemistry**

Week	Topic
1.	Rate of reaction, Rate equation, factors influencing the rate of reaction. Order of reaction, integrated rate expressions for zero order first order. Order of reaction for second order & third order reaction. Half-life period of a reaction, methods of determination of reaction.
2.	Effect of temperature on rate of reaction-Arrhenius equation, theories of rate of reaction-Simple collision theory for unimolecular reaction. Simple collision theory for bimolecular reaction, Electrolytic conduction, factors affecting electrolytic conduction. Specific conductance, molar conductance, equivalent conductance & relation among them
3.	Variation of Specific conductance, molar conductance, equivalent conductance & conductance with concentration, Arrhenius theory of ionization Ostwald dilution law, Debye-Huckel Onsager's equation for strong electrolytes. Transport no-destination & determination by Hittorf's method, Kohlrausch's law Calculation of molar ionic conductance & effect of temperature & pressure on it, Application of Kohlrausch's law in calculation of conductance of weak electrolytes at infinite dilution.
4.	Application of conductivity measurements; determination of degree of dissociation, determination of $K_a$ of acids. Determination of solubility product of sparingly soluble salts, Conductometric titrations, determination of pH & $pK_a$ . Buffer solution, Buffer action, Henderson-Hasselbalch eqn, buffer mechanism of buffer action.

**B. Sc. I Semester II Subject: Organic Chemistry**

Week	Topic
5.	Alkenes: Nomenclature of alkenes, mechanism of dehydration of alcohols and dehydrohalogenation of alkyl halides, Hofmann elimination and Physical Properties of alkenes, Relative stabilities of alkenes. Mechanism involved in hydrogenation electrophilic and free radical additions, Markownikoff's Rule and other chemical reactions of alkenes.
6.	Arenes and aromaticity: Nomenclature of benzene derivatives, Huckel rule, aromatic, anti-aromatic and non-aromatic compounds. Aromatic electrophilic substitution reactions, Energy profile diagrams, activating and deactivating substituents and orientations.  Questions based upon alkenes and aromaticity
7.	Chemical Properties and Acidic Nature, Comparative acidic strength of alcohols and Phenols, Resonance stabilization of Phenoxide ion. 1-2, 1-4 addition reactions, Diels Alder reaction, Nomenclature, structure and bonding in alkynes. Chemical reactions of
8.	Alkyl halide and aryl halide: Nomenclature, Methods of formation, Physical properties and chemical reactions of alkyl halides. Nomenclature, Methods of formation, Physical properties and chemical reactions of aryl halides.

B. Sc. I Semester II Subject: Inorganic Chemistry

Week	Topic
9.	Hydrogen Bonding, Types, Effects of hydrogen bonding & it's application Vander waals forces, Metallic Bond, Idea of valence bond & bond theories of metallic bond Semiconductors-Introduction, Types & Applications, S-block elements-Comparative study of elements including diagonal relationship
10.	Anomalous behavior of lithium, Anomalous behavior of beryllium, compared other elements. Salient features of hydrides. Solvation & Complexation tendencies including their function in bio systems Chemical properties of noble gases, Chemistry of Xenon, Structure & bonding of fluorides
11.	Oxides & oxyfluorides of xenon, Comparative study of properties of p-block elements including diagonal relationship Diborane-properties & structure, Borazene-Chemical properties & structure Trihalides of Boron-Trends in Lewis acid character, Structure of $AlCl_3$ , Catenation, Carbides, Silicates Silicones-general methods of preparation, properties & uses
12.	Oxides-structure of oxides of N,P, oxyacids Structure of white, yellow & red phosphorous, Oxyacids of sulphur-structure & acidic strengths. Hydrogen peroxide-structure, properties & uses, Basic properties of halogen, interhalogens type properties.

**Govt College for Girls, Rania**  
**Lesson Plan Session 2021-22**  
**B. Sc. II Semester IV Subject: Inorganic Chemistry**

Week	Topic
1.	Electronic structure of lanthanides, oxidation state. Ionic radii and lanthanide contraction, complex formation. Occurrence and isolation, lanthanide compounds.
2.	General features of and chemistry of actinides. Chemistry of separation of Np, Pu and Am from U.
3.	Chemistry of analysis of various groups of basic and acidic radicals. Chemistry of identification of acids radicals in typical combinations. Chemistry of identification of acids radicals in typical combinations.
4.	Chemistry of interference of acid radicals including their removal in the analysis of basic radicals Chemistry of interference of acid radicals including their removal in the analysis of basic radicals. Theory of precipitation, co-precipitation, post precipitation, purification of precipitates. Problem discussion

**B. Sc. II Semester IV Subject: Physical Chemistry**

Week	Topic
5.	Thermodynamics - Limitations of first law, Statements of second law, Carnot theorem, Thermodynamic scale of temp. Entropy, Variation of entropy with P, V and T, Numericals Entropy change during phase change, Entropy of mixing of ideal gases, Numericals
6.	Third law, Calculation of absolute entropies, Residual entropy. Nernst heat theorem, Gibbs Helmholtz equation. Gibbs and Work function. Variation of A and G with T and P, Electrochemical and electrolytic cells.
7.	Reversible and irreversible electrodes and cells, Electrode potential and its calculation. EMF series and its application, Standard cell, Activity and activity coefficient, Nernst equation for single electrode and cells, Numericals
8.	Calculation of thermodynamic quantities, Concentration cells, Liquid junction potential, Applications of EMF measurement. Applications of EMF measurement contd. Revision.

B.Sc. II Semester IV Subject: Organic Chemistry

Sr. No.	Topic
9.	Nomenclature of carboxylic acids, structure and bonding, physical properties, Preparation of carboxylic acids. Reactions of carboxylic acids, Hell-Volhard,-Zelinsky reaction. Reduction of carboxylic acids. Mechanism of decarboxylation. Acidity of carboxylic acids, effects of substituents on acid strength, Structure, nomenclature and preparation of acid chlorides.
10.	Structure, nomenclature and preparation of esters, amides and acid anhydrides. Relative stability of acyl derivatives. Physical properties. Interconversion of acid derivatives by nucleophilicacyl substitution. Mechanisms of esterification and hydrolysis (acidic and basic).
11.	Molecular vibrations. Hooke's law, selection rules, intensity and position of IR bands, measurement of IR spectrum, fingerprint region. Characteristic absorptions of various functional groups and interpretation of IR spectra of simple organic compounds. Applications of IR spectroscopy in structure elucidation of simple organic compounds.
12.	Structure and nomenclature of amines, physical properties. Separation of a mixture of primary, secondary and tertiary amines. Structural features affecting basicity of amines. Preparation of alkyl and aryl amines (reduction of nitro compounds, nitriles, reductive amination of aldehydic and ketonic compounds). Gabriel- phthalimide reaction, Hofmann bromamide reaction. electrophilic aromatic substitution in aryl amines, reactions of amines with nitrous acid.
13.	Mechanism of diazotisation, structure of benzene diazonium chloride, Replacement of diazo group by H, OH, F, Cl, Br, I, NO <sub>2</sub> and CN groups. Reduction of diazonium salts to hydrazines, coupling reaction and its synthetic application.

**Govt College for Girls, Raniá**  
**Lesson Plan Session 2021- 22**  
**B. Sc. III Semester VI Subject: Physical Chemistry**

Sr. No.	Topic
1.	Photochemistry, First and Second laws Quantum yield, Jablonski Diagram, Numerical problems Photosensitization, Spectroscopy Spectroscopy Contd.
2.	Phase rule, Phase, Component, Degree of freedom Water system, Sulphur system Lead – Silver system, Desilverisation of lead
3.	Liquid solutions – General introduction, Concentration of solutions, Numericals Raoult's law, Ideal and non ideal solutions, Numericals Azeotropes, Colligative properties, Relative lowering in Vapour pressure
4.	Osmotic pressure, Elevation in boiling point, Depression in freezing point, Abnormal molecular mass Problem discussion

**B. Sc. III Semester VI Subject: Inorganic Chemistry**

Week	Topic
5.	Definition, nomenclature and classification of organometallic compound Preparation properties Bonding and application of alkyl and aryl of Li, Al, Hg, Sn
6.	Metal ethylenic complexes and homogeneous hydrogenation Mononuclear carbonyl and nature of bonding in carbonyl complex
7.	Acid and base concept. HSAB Concept. Silicone. Phosphazene
8.	Essential and trace elements in biological processes., metallophorphyrin. Special reference to haemoglobin and myoglobin. Biological role of alkali and alkaline earth metal. Nitrogen fixation. Problem discussion

B. Sc III Semester VI Subject: Organic Chemistry

Week	Topic
9.	Molecular orbitals Picture and aromatic characteristics of pyrrole Molecular orbitals Picture and aromatic characteristics of Furan, Thiophene and pyridine Methods of synthesis and chemical reactions
10.	Nucleophilic substitution reactions in pyridine derivative, comparison of basicity of heterocyclic compounds Condensed five and six-member heterocyclic compounds: preparation and reactions
11.	Organo-sulphur compounds: structural features, methods of formation and chemical reaction of thiols and thioethers. Organo-sulphur compounds: structural features, methods of formation and chemical reaction of sulphonic acids, sulphonamides and sulphaguanidine Synthetic detergents
12.	Organic synthesis by enolates: alkylation of diethyl malonate and ethyl acetoacetate, acidity of alpha hydrogen Classifications of amino acids, isoelectric point, electrophoresis, preparation of amino acids Structure and nomenclature of peptides and proteins, classification of proteins
13.	Classical peptide synthesis, solid phase peptide synthesis, primary and secondary structure of proteins Addition or chain growth polymerisation (free radical vinyl polymerisation, ionic vinyl polymerisation, Ziegler-Natta polymerisation)

