

**Curriculum Plan of Dr. Kapil Mohan Saini  
(ODD SEMESTER 2022-2023)  
Semester-III**

**Name of Paper & Code: Solutions, Phase Equilibrium, Conductance, Electrochemistry & Functional Group Organic Chemistry- II, UPC: 42174304 (SEM – 3) (4 Periods Per Week)**

Contents	Allocations of Lectures	Month wise Schedule to be followed	Tutorials/ Assignment/ Presentation
<p><b>Conductance:</b> Conductivity, equivalent and molar conductivity and their variation with dilution for weak and strong electrolytes, Kohlrausch Law of independent migration of ions, transference number and its experimental determination using Hittorf and moving boundary methods, Ionic mobility, applications of conductance measurements: determination of degree of ionization of weak electrolytes, solubility and solubility products of sparingly soluble salts, ionic product of water, hydrolysis constant of a salt. Conductometric titrations (only acid-base).</p>	8	4 <sup>th</sup> Week of August – 1 <sup>st</sup> week of September	- Syllabus Overview - Reference Books - Problem Solving
<p><b>A) Carboxylic acids and their derivatives:</b> Preparation: Acidic and alkaline hydrolysis of esters. Reactions: Hell-Volhard Zelinsky reaction, acidity of carboxylic acids, effect of substitution on acid strength. Carboxylic acid derivatives (aliphatic): Preparation: Acid chlorides, anhydrides, esters and amides from acids and their interconversion, Claisen condensation. Reactions: Relative reactivities of acid derivatives towards nucleophiles, Reformatsky reaction, Perkin condensation.</p> <p><b>B) Amines (aliphatic &amp; aromatic) and Diazonium Salts:</b> Amines Preparation: from alkyl halides, Gabriel's Phthalimide synthesis, Hofmann Bromamide reaction. Reactions: Hofmann vs Saytzeff elimination, carbylamine test, Hinsberg test, reaction with HNO<sub>2</sub>, Schotten-Baumann reaction. Electrophilic substitution (case aniline): nitration, bromination, sulphonation, basicity of amines. Diazonium salt Preparation: from aromatic amines, Reactions: conversion to benzene, phenol and dyes.</p>	13	2 <sup>nd</sup> Week of September – 4 <sup>th</sup> week of September	- Student's Difficulties, Related Problems
<p><b>Amino Acids, Peptides and Proteins:</b> Zwitterion, isoelectric point and electrophoresis Preparation of amino acids: Strecker synthesis and using Gabriel's phthalimide synthesis. Reactions of amino acids: ester of – COOH group, acetylation of –NH<sub>2</sub> group, complexation with Cu<sup>2+</sup> ions, ninhydrin test. Overview of Primary, Secondary, Tertiary and Quaternary Structure of proteins. Determination of primary structure of peptides by degradation Edmann degradation (N- terminal) and C- terminal (thiohydantoin and with carboxypeptidase enzyme). Synthesis of simple peptides (upto dipeptides) by N-protection (t-butyloxycarbonyl and phthaloyl) &amp; C- activating groups and Merrifield solidphase synthesis.</p>	9	4 <sup>th</sup> week of September to 1 <sup>st</sup> week of October	Student's Difficulties, Related Problems, Previous Year Qsn Papers discussion
<p><b>Carbohydrates:</b> Classification, and general properties, glucose and fructose (open chain and cyclic structure), determination of configuration of monosaccharides, absolute configuration of glucose and fructose, mutarotation, ascending and descending in monosaccharides. Structure of disaccharides (sucrose, cellobiose, maltose,</p>	8	1 <sup>st</sup> week of October to 3 <sup>rd</sup> week of October	Class Test, Previous Year Qsn Papers discussion, Student's Difficulties

lactose) and polysaccharides (starch and cellulose) excluding their structure elucidation.			
<b>Electrochemistry:</b> Reversible and irreversible cells, concept of EMF of a cell, measurement of EMF of a cell, Nernst equation and its importance, types of electrodes, standard electrode potential, electrochemical series. thermodynamics of a reversible cell, calculation of thermodynamic properties: G, H and S from EMF data. Calculation of equilibrium constant from EMF data, concentration cells with transference and without transference, liquid junction potential and salt bridge, pH determination using hydrogen electrode and quinhydrone electrode, Potentiometric titrations-qualitative treatment (acid-base and oxidation-reduction only).	10	4 <sup>th</sup> Week of October to 2 <sup>nd</sup> Week of November	Home Register Overview, Student' s Difficulties, Related Problems
<b>Phase Equilibrium:</b> Phases, components and degrees of freedom of a system, criteria of phase equilibrium, Gibbs phase rule and its thermodynamic derivation, derivation of Clausius-Clapeyron equation and its importance in phase equilibria, phase diagrams of one component systems (water and sulphur) and two component systems involving eutectics, congruent and incongruent melting points (lead-silver, FeCl <sub>3</sub> -H <sub>2</sub> O and Na-K only).	6	2 <sup>nd</sup> Week of November - 3 <sup>rd</sup> Week of November	Home Register Overview, Class Test, Related Problems, Previous Year Qsn Papers discussion
<b>Solutions:</b> Thermodynamics of ideal solutions: Ideal solutions and Raoult's law, deviations from Raoult's law-nonideal solutions. Vapour pressure, composition and temperature-composition curves of ideal and non-ideal solutions. Distillation of solutions, Lever rule, Azeotropes. Partial miscibility of liquids: Critical solution temperature; effect of impurity on partial miscibility of liquids. Immiscibility of liquids: principle of steam distillation, Nernst distribution law and its applications, solvent extraction.	6	4 <sup>th</sup> Week of November - 1 <sup>st</sup> Week of December	Complete Assignment and Student' s Difficulties, Related Problems