Curriculum Plan (Odd Semester 2025-26)

Teacher Name: **Dr. Shilpika Bali Mehta**

Course: **B.Sc. (H) Chemistry, NEP-UGCF, Semester III/ II year**

Paper Name: **Carbonyls, Carboxylic Acids, Amines, Nitro Compounds, Nitriles, Isonitriles and Diazonium salts**

UPC**: 2172012302**

S. No.	Contents	Allocation of Lectures	Monthwise schedule to be followed	Assignments/ Presentations etc
1.	**UNIT – 1: Carbonyls, Carboxylic acid & their derivatives** Carbonyl Compounds: Reaction of carbonyl compounds with ammonia derivatives, Aldol and Benzoin condensation, Knoevenagel condensation, Claisen-Schmidt, Perkin, Cannizzaro and Wittig reaction, Beckmann and Benzil-Benzilic acid rearrangements, haloform reaction and Baeyer Villiger oxidation, -substitution reactions, oxidations and reductions (Clemmensen, Wolff Kishner, LiAlH4, NaBH4, MPV, PDC), addition reactions of , -unsaturated carbonyl compounds: Michael addition. Carboxylic acids and derivatives: Effect of substituents on acidic strength on carboxylic acids, HVZ reaction, typical reactions of dicarboxylic acids and hydroxy acids. Comparative study of nucleophilic acyl substitution for acid chlorides, anhydrides, esters and amides, Mechanism of acidic and alkaline hydrolysis of esters, Dieckmann and Reformatsky reactions, Hoffmannbromamide degradation and Curtius rearrangement. Active methylene compounds: Keto-enol tautomerism. Preparation and synthetic applications of diethyl malonate and ethyl acetoacetate.	**27**	**First week August – Fourth week September**	Syllabus Overview, Books Suggestions, Topic Related Problems Practice with solutions, Doubts Discussion, Online Quiz/ tests for Revision Topic Related Problems Practice, Assignment Distribution, Doubts Discussion, Online Quiz / tests for Revision
2.	**UNIT – 2: Nitro Compounds, Amines, Diazonium salts, Nitriles and Isonitriles** Nitro compounds: General methods of preparation: from alkyl halides, alkanes, oxidation of amines and oximes. Henry reaction, Nef reaction,	**18**	**First week October – Third week November**	Assignment Distribution Topic Related Numerical Problems Practice, Revision, Doubts

	Reduction-electrolytic reduction, reaction with nitrous acid, reduction in acidic, basic and neutral medium (for aromatic compounds) Amines: Preparation, chirality in amines (pyramidal inversion), Basicity of amines: Effect of substituents, solvent and steric effects, distinction between Primary, secondary and tertiary amines using Hinsberg's method and nitrous acid, Gabriel Phthalimide synthesis, Carbylamine reaction, Mannich reaction, Hoffmann's exhaustive methylation, Hofmann-elimination reaction and Cope elimination. Diazonium Salts: Synthetic applications of diazonium salts including preparation of arenes, haloarenes, phenols, cyano and nitro compounds; Coupling reactions of diazonium salts (preparation of azo dyes). Nitriles: Preparation using following reactions: Dehydration of amides and aldoximes, substitution reaction in alkyl halides and tosylates, from Grignard reagents and from dehydrogenation of primary amines. Properties: Physical properties, discussion on the following reactions with mechanism: Reaction with Grignard reagent, hydrolysis, addition reaction with HX, NH3, reaction with aqueous ROH, Reduction reactions-catalytic reduction and Stephen's reaction, Condensation reactions-Thorpe Nitrile Condensation. Isonitriles: Preparation from the following reactions: Carbylamine reaction, substitution in alkyl halides and dehydrogenation of N-substituted formamides. Properties: Physical properties, discussion on the following reactions with mechanism: Hydrolysis, reduction, addition of– HX, X2 and sulphur, Grignard reaction, oxidation and rearrangement.			Discussion, Class Test Assignment Collection, Topic Related Problems Practice, Revision, Doubts Discussion, Previous Year Question Papers Discussion

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