B.Sc. (NEP) SEMESTER-III
(THEORY)

Programme: Diploma In Chemistry	**Year: II**	**Semester-III**
Course Code: CHE(N)-201		
Course Name: General Chemistry- I		
Credit: 3		
Max. Marks: 70+30 =100		

Course Objective and Outcomes:

This paper provides detailed knowledge of synthesis of various classes of organic compounds and functional groups. After completing this course, the learners will be able to

- It relates and gives an analytical aptitude for synthesizing various industrially important compounds.
- This paper also provides a detailed knowledge on the elements present in our surroundings, their occurrence in nature. Their position in periodic table, their physical and chemical properties. This paper also gives detailed understanding of the d-block elements and their characteristics.
- After successful completion of this course, the students will be able to gather the information regarding Werner's theory and VBT of transition metal complexes.
- Learners will be able to learn the basic concepts of spontaneity, chemical and phase equilibrium and able to apply these concepts in predicting the spontaneous reactions and will be able to solve the numerical problems based on these concepts.

Syllabus Details

Block-1: Transition elements and Co-ordination Chemistry

Unit 1: Chemistry of Transition elements – I

Characteristic properties of d-block elements. Properties of the first transition series, their binary compounds and complexes illustrating relative stability of their oxidation state, coordination number and geometry.

Unit 2: Chemistry of Transition elements – II

General characteristics, comparative study with their 3d-analogues in respect of ionic radii, oxidation state, magnetic behavior, spectrial properties and stereochemistry.

Unit 3: Chemistry of Transition elements – III

General characteristics, comparative study with their 3d-analogues in respect of ionic radii, oxidation state, magnetic behavior, spectrial properties and stereochemistry.

Unit 4: Co-ordination Chemistry –I

Werner's coordination theory and its experimental verification, effective atomic number concept, chelates, nomencleature of coordination compounds.

Block-2: Hydroxyl and carbonyl frunctional group contaning compounds

Unit 5: Alcohols

Classification and nomencleature. Monohydric alcohols- nomenclature, method of formation by reduction of aldehydes, ketones, carboxylic acids and esters. Acidic nature. Physical properties, chemical reactions of alcohols. Dihydric alcohols- Nomencleature, methods of formation, physical properties and chemical reactions of vicinal glycols. rihydric alcohol- nomenclature and methods of formation, chemical reactions of glycerol.

Unit 6: Phenol and ether

Nomencleature, structure and bonding. Preparation of phenols, physical properties and acidic character. Comparatve acidic character of alcohols and phenols, Chemical reactions of phenols- electrophilic aromatic substitution, acylation and carboxylation. Mechanism of Fries rearrangement, Claisen rearrangement, Gatterman synthesis, Houben-Hoesch reaction, lederer- manasse reaction and Reimer-Tiemann reaction. Nomenclature of ethers and methods Nomencleature of ethers and methods of formation, physical properties. Chemical properties. Synthesis of epoxides. Acid and base catalysed ring opeaning of epoxides, orientation of epoxide ring opening.

Unit 7: Aldehyde

Nomenclature and structure of the carbonyl group. Synthesis of aldehydes with particular reference to the synthesis of aldehyde from acid chloride, synthesis of aldehyde using 1, 3-dithianes, Physical properties. Mechanism of nucleophilic addition to carbonyl group with particular emphasis on benzoin, aldol, perkin and Knoevenagel condensation. Condensation with ammonia and its derivatives. Witting reaction. Mannich reaction. Oxidation of aldehydes, Baeyer- Cannizzaro reaction. MPV reaction, Clemmensen reaction.

Unit 8: Ketone

Nomenclature and structure of ketones, synthesis of ketones, synthesis of ketone from nitriles and carboxylic acid. Physical properties. Chemical reactions of ketone. Villiger oxidation of ketone, Wolff-Kishner reaction, halogenation of enolizable ketone.

Block-3: Thermodynemics and phase equilibrium

Unit 9: Thermodynamics –II

Second law of thermodynamics: need for the law, different statement of the law. Carnot cycles and its efficiency, Carnot theorem. Thermodynamic scale of temperature.

Unit 10: Concepts of entropy

Introduction**,** Entropy as a state function**,** Entropy as a function of V and T**,** Entropy as a function of P and T**,** Entropy change in physical change**,,**Entropy change in ideal gases and mixing of gases, Clausius inequality

Unit 11: Phase Equilibrium –I

Statement and meaning of the term- phase, component and degree of freedom, derivation of Gibbs phase rule, phase equilibrium of one component system- water, CO_2 and S system. Phase equilibrium of two component system- solid liquid equilibrium, simple eutectic- Bi- Cd, Pb-Ag system, desilverisation of lead.

Unit 12: Phase Equilibrium -II

Solid solution- compound formation with congruent melting point(Mg-Zn) and incongruent melting point, ($NaCl$-H_2O), ($FeCl_3$- H_2O) and ($CuSo_4$- H_2O) system. Freezing mixtures, acetone-dry ice. Liquid- liquid mixtures- Ideal liquid mixtures, Results and Henry's law. Non- ideal system- azeotropes- HCl-H_{2O} and ethanol- water systems. Partially miscible liquids- Phenol water, trimethylamine-water, nicotine- water systems. Lower and upper consolute temperature. Effect of impurity on consolute temperature. Immiscible liquids, Steam distillation.

B.Sc. (NEP) SEMESTER-III
(LABORATORY WORK/PRACTICAL)

Programme: Diploma In Chemistry	**Year: II**	**Semester-III**
Course Code: CHE(N) 201L		
Course Name: Laboratory Course-III		
Credit: 1		
Max. Marks: 50		

Course Objective and Outcomes:

After completing this course, the learners will be able to test the inorganic mixtures of acidic and basic radicals in given samples, to qualitatively differentiate between alcohols, phenols, aldehydes, ketones and determine the tranrition temperature and partition cofficient of the given compounds.

Block-1: Laboratory hazards and safety

Unit 1: Laboratory hazards and safety precautions

Laboratory hazards and safety precautions

Block-2: Experiment

Unit 2: Inorganic exercise: Inorganic mixture analysis

Complete analysis of inorganic mixture including both acid and basic radicals with a special emphasis on the role of common ion effect and solubility product.

Unit 3: Organic exercise: Chemical, physical and functional group tests

Functional group tests for alcohols, phenols, aldehyde and ketone. Differentiation between alcohols, phenols, aldehyde and ketone using chemical and physical tests.

Unit 4: Physical exercise: Partition cofficient and trantion temperature

Determination of partition cofficient and trantion temperature of the given compounds.

Distribution of marks shall be as given below:

1.	Inorganic exercise	:	12
2.	Organic exercise	:	12
3.	Physical excercise	:	11
4.	Viva	:	05
5.	Home assignment/internal assessment, lab record and attendance	:	10