BACHELOR OF SCIENCE
Industrial Chemistry Vocational – Sardar Patel University
Semester-III
SUBJECT CODE: US03CICV21
TITLE: Chemical Plant Auxiliaries & Manufacturing
(04 Credits, 4 Hours; 70 External Marks & 30 Internal Marks)
(Effective from June 2019)

Unit: 1 Water- Impurities and hardness of natural water, Water for steam making and industrial processes, Boiler water treatments, Calculations on water treatments. Fuels- Classification, Advantages and disadvantages, Analysis of fuels, Heating media. Air- Specification for industrial uses of air. Industrial applications of CO_2, O_2, N_2 and H_2.

Unit: 2 Compression equipments, Reciprocating compressor, Work of single stage reciprocating compressor, Effect of clearance, Volumetric efficiency, Multistage compression, Refrigeration, COP & refrigerating effect, Industrial refrigerants, Carnot and other refrigeration cycles. Internal combustion engines and external combustion engine, Steam power plant, Its working and thermodynamic analysis, Otto engine and Diesel engine. Steam boilers – Their classification, Steam generation, Conditions of steam, Steam table.

Unit: 3 Nitration – Introduction, Nitration agents, Continuous vs batch nitration, Benzene to nitrobenzene and *m*-dimitrobemere, Chlorobenzene to ortho and para nitro chloro benzene, Acetanitide to *p*-nitroacetanilice. Amination - By reduction - Introduction, Methods of reduction, Metal and acid, Catalyst sulfide, electrolytic , Metal and alkali sulfites, Metal hydrides, Sodium metal, concentrated caustic oxidation, Reduction, Reduction commercial manufacturering of aniline, *m*-nitroaniline. Sulphonation – Introduction, sulphonating agents, Kinetics and mechanism of sulphonation reaction, Commercial sulfonation of benzene.

Unit: 4 Oxidation – Introduction, Types of oxidation reactions, Oxiding agents, Liquid phase oxidation, Vapor phase oxidation, Commercial manufacture of benzoic acid, Phthalic anhydride, Acetic acid. Halogenation- Introduction, kinetics of halogenation reactions, Reagents for halogenation, Commercial production process of Chlorobenzene & Monochloro acetic acid. Hydrogenation - Introduction kinetics, Catalysts for hydrogenation reactions, Hydrogenation of vegetable oil. Esterification - Introduction, Esterification of carboxylic acid derivatives, Commercial manufacture of ethyl acetate. Hydrolysis - Introduction, Hydrolysis agents & mechanism of hydrolysis.

REFERENCE BOOKS

1. Chemistry of Engineering Materials by C. V. Agrawal (Tara Publication).
2. Introduction to Chemical Engineering Thermodynamics (IV edition) by J. M. Smith & Vanness, (McGraw-Hill Co.)
3. Chemistry in Engineering and Technology,(volume I & II) JC Kuriacose & J.Rajarah (Tata McGarw Hill).
4. Chemistry of Engineering Materials By Jain & Jain.(Dhanpairai Publishing Co.).
5. Shreve's Chemical Process Industries by George T. Austin (McGrow-Hill Publication, New Delhi).
6. Unit process in Organic synthesis, P. H. Groggins, Mcgraw- Hill Book Co., New York.

BACHELOR OF SCIENCE
Industrial Chemistry Vocational – Sardar Patel University
Semester-III
SUBJECT CODE: US03CICV22
TITLE: Fundamentals Of Organic Chemistry
(04 Credits, 4 Hours; 70 External Marks & 30 Internal Marks)
(Effective from June 2019)

Unit: 1 Fundamental Aspects In Organic Chemistry
Hybridization, Sigma and pi bonds, Hydrogen bond, Inductive effect, Electronic effect, Resonance effect, Hyper-conjugation, Steric effect, Acid and bases, Definition, Structure and stability of free-radical,Carbocation, Cabanion and Benzyne, Energy profiles.

Unit: 2 Phenols, Alcohols, Ethers And Epoxides
Structure, Nomenclature, Preparation, Physical properties, Salts of phenol, Acidity of phenols, Reactions. Alcohols - Structure, Classification, Nomenclature, Preparation, Physical properties, reactions, Alcohols as acids and bases, Synthesis using alcohols, Formation of 1,2-diols, Analysis of 1,2-diols, Oxidation cleavage of poly hydroxy-alcohols. Ethers - Structure, Nomenclature, Preparation, Physical properties, Reactions, Cyclic ethers. Epoxides - Preparation and reactions.

Unit: 3Aldehydes, Ketones, Carboxylic Acids And Their Derivatives
Structure, Classification, Nomenclature, Preparation, Physical properties, Nucleophilic addition reactions, Base promoted halogenation of ketones, Acid catalyzed halogenation of ketones. Structure, Nomenclature, Preparation, Physical properties, Salts of carboxylic acids, Acidity of carboxylic acids, Effect of substituents on acidity, Reactions, reactions of acid chloride, Acid anhydrides, Amides and esters. Preparation of malic acid and tartaric acid from maleic acid, preparation of citric acid from glycerol.

Unit: 4 Amines And Diazonium Salts
Amines- Structure, Nomenclature, Preparation, Hoffman rearrangement, Physical properties, Salts of amines, Basicity of amines, Effect of substituents on basicity, reactions, Hoffman elimination, Analysis of amines, Phase transfer catalyst. Diazonium salts - Synthesis, reaction and characteristics.

REFERENCE BOOKS

1. Organic Chemistry by M. K. Jain and S. C. Jain (Shoban LAl Nagin Chand & Co. Educational Publishers, Jalandhar).
2. Organic Chemistry by Robert T. Morrison and Robert T. Boyd (VIth Edition, Prentice Hall of India Pvt. Ltd. New Delhi).
3. Organic Chemistry by R. K. Bansal (Tata McGraw – Hill Publishing Co. Ltd. New Delhi)

BACHELOR OF SCIENCE
Industrial Chemistry Vocational – Sardar Patel University
Semester-III
SUBJECT CODE: US03CICV23(LABORATORY)
(04 Credits, 4 Hours; 50 External Marks)
(Effective from June 2019)

Water analysis – suspended solids, total dissolved solids, carbonate and bicarbonates, sulfate as BaSO4, chlorine content, Ca & Mg, Acidity and total hardness, etc. Preparation and estimation of organic compounds based on various unit process.

BACHELOR OF SCIENCE
Industrial Chemistry Vocational – Sardar Patel University
Semester-III
SUBJECT CODE: [illegible] (Laboratory)
(04 Credits, 4 Hours; 50 External Marks)
(Effective from June 2019)

Organic Spotting a binary mixture, separation, identification and derivatives preparation. Experimental based on lab skill enhancement for preparation of laboratory (Preparation and Standardization of laboratory solution).