Vidyasagar University

Curriculum for Industrial Chemistry (Major)

[Choice Based Credit System]

Semester-I

Course	Course Code	Name of the Subjects	Course Type/ Nature	Teaching Scheme in hour per week			Credit	Marks
				L	T	P		
CC1		**C1T:** Unit Process for Organic Synthesis and Industrial Applications	Core Course-1	5	1	0	6	75
CC2		**C2T:** Inorganic Materials for Chemical Industries and Industrial Waste Management	Core Course-2	5	1	0	6	75
GE1		**TBD**	Generic Elective-1				4/5	75
							2/1	
AECC		English	AECC (Elective)	1	1	0	2	50
Semester Total							**20**	**275**

L=Lecture, **T=**Tutorial, **P=**Practical, **CC-** Core Course, **TBD -** To be decided, **AECC-** Ability Enhancement Compulsory Course

Generic Elective (GE) (Interdisciplinary) from other Department [Paper will be of 6 credits]. Papers are to be taken from following discipline: **Computer Science/Mathematics/Physics/Chemistry/Economics**

Modalities of selection of Generic Electives (GE): A student shall have to choose **04** Generic Elective (**GE1 to GE4**) strictly from **02** subjects / disciplines of choice taking exactly **02** courses from each subjects of disciplines. Such a student shall have to study the curriculum of Generic Elective (GE) of a subject or discipline specified for the relevant semester.

Semester –I
Core Course (CC)

CC-1 : Unit Process for Organic Synthesis and Industrial Applications

Credits 06

C1T : Unit Process for Organic Synthesis and Industrial Applications

Course Contents:

Nomenclature Generic name, trade name. Raw Material Resources:
Cellulose, Starch Properties, Modification, Important Industrial Chemical derived from them, alcohol and alcoholbased chemical, Oxalic acid,

Unit Process in Organic Chemical Manufacture Nitration:
Introduction – Nitrating agents, Kinetic and mechanism of nitration process such as nitration of –

a) Paraffinic hydrocarbons
b) Benzene to Nitrobenzene and m-dinitrobenzene
c) Chlorobenzene to O-& P-nitrobenzene
d) Acetanilide to P-nitroacetanilide
e) Toluene, Continuousvs. batch nitration

Halogenations:
Introduction-kinetics of halogenations reactions.Reagents for halogenations, alogenations of aromatics-side chain and nuclear halogenations, Commercial Manufactures-chlorobenzenes,chloral, monochloractic and chloromethane, dichloroflouromethane.

Sulphonation:
Introduction-sulophonating agents, Chemical and physical factors in sulphonation, Kinetics and mechanism of sulphonation reaction,commercial sulfonation of benzene, naphthalene, alkyl benzene, Batch vs.continuous sulfonation.

Unit Processing in Organic Synthesis

Oxidation:
Introduction-Types of oxidation reactions, Oxidizing agents,Kinetics and mechanism of oxidation of organic compounds, Liquid phaseoxidation, vapour phase oxidation, Commercial manufacture of benzoicacid maleic anhydride, phthalic anhydride, acrolein, acetaldehyde, aceticacid.

Hydrogenation :
Introduction-Kinetics and thermodynamics ofhydrogenation reaction, Catalysts of hydrogenation reaction,Hydrogenation of vegetable oil, Manufacture of methanol from carbon monoxide and hydrogen, hydrogenation of acids to alcohols, catalyticreforming.

Alkylation:
Introduction, Types of alkylation, alklating agents,thermodynamic and mechanism of alkylation reactions, Manufacture ofalkyl benzenes (for detergent manufacture), ethyl benzene, phenyl ethylalcohol, (N-alkyl anilines mono and di-methyl and ethyl anilines).

Esterification: Introduction, Hydrodynamics and kinetics of esterificationreaction, terification by organic acids, by addition of unsaturatedcompounds, esterification of carboxy acid derivatives, commercialmanufacture of ethyl acetate, dioctyl phthalate, vinylacetate, cellulose acetate.

Amination:

a) By Reduction: Introduction, Method of reduction-metal and acid, catalytic, sulfide, lectrolytic, metal and alkali sulfites, metalhydrides, sodium metal and alkali sulfites, metal hydrides, sodiummetal, concentrate caustic oxidation, reduction, commercialmanufacture of aniline, m-nitro aniline, p-amino phenol.
b) By Aminolysis : Introduction, Animating agents, Kinetics,thermodynamics and mechanism of hydrolysis.

CC-2: Inorganic Materials for Chemical Industries and Industrial Waste Management **Credits 06**

C2T: Inorganic Materials for Chemical Industries and Industrial Waste Management

Course Contents:

Material Science:
Mechanical properties of materials and change with respect to temperature. Materials of constructions used in industry.

Metals and alloys:
Important metals and alloys, Iron, Copper, Aluminum, Lead, Nickel, Titanium and their alloys phen diagram Mechanical and chemical properties and their applications.

Cement:
Types of cement, composition, manufacturing process setting of

Ceramics:
Introduction, Types, manufacturing process, applications, refractoriness, concept of bio ceramics.

Polymeric Materials:
Commodity polymers, blends and composites their constitution, chemical and physical properties, industrial applications.

Glass:
Types, composition, manufacture, physical and chemical properties, Industrial pplications.

Corrosion: Various types of corrosion relevant to chemical industry mechanism, reventive methods.

Effluent Treatment and Waste Management

Principles and equipments for aerobic, anaerobic treatment, absorption,filtration, sedimentation.Bag filters, electrostatic precipitator, mist eliminators, wet scrubbers. Absorbers .Solid waste Management.Industrial Safety Laws.

Industrial Aspects of Inorganic Chemistry

Basic Metallurigical Operations:

Pulverization, Calcinations, Roasting, Refining.Physicochemical principles of extraction of Iron, Copper, Lead, Silver,Sodium, Aluminum, Magnesium, Zinc, Chromium.Inorganic Materials of Industrial Importance : Their availability, orms,structure and modification, Alumuna, Silica , Silicates, Clays, Mica,Carbon, Zeolites.