VIDYASAGARUNIVERSITY

Midnapore, West Bengal

PROPOSED CURRICULUM&SYLLABUS (DRAFT) OF

BACHELOR OF SCIENCE (HONOURS)

MAJOR IN INDUSTRIAL CHEMISTRY

4-YEAR UNDERGRADUATE PROGRAMME

(w.e.f. Academic Year 2023-2024)

Based on

Curriculum & Credit Framework for Undergraduate Programmes

(CCFUP), 2023& NEP, 2020

VIDYASAGAR UNIVERSITY
BACHELOR OF SCIENCE (HONOURS) MAJOR IN INDUSTRIAL CHEMISTRY
(under CCFUP, 2023)

Level	YR.	SEM	Course Type	Course Code	Course Title	Credit	L-T-P	Marks		
								CA	ESE	TOTAL
B.Sc. (Hons.)	1st	I	SEMESTER-I							
			Major-1	INCHMJ101	T: Unit Process for Organic Synthesis and Industrial Applications	4	4-0-0	15	60	75
			SEC	INCSEC01	P: Chemistry of Cosmetics & Perfumes.	3	0-0-3	10	40	50
			AEC	AEC01	Communicative English -1 (*common for all programmes*)	2	2-0-0	10	40	50
			MDC	MDC01	Multidisciplinary Course -1 (*to be chosen from the list*)	3	3-0-0	10	40	50
			VAC	VAC01	ENVS (*common for all programmes*)	4	2-0-2	50	50	100
			Minor-1 (Disc.-I)	MI01	*To be decided* *(To be taken from other Discipline)*	4	3-0-1	15	60	75
					Semester-I Total	20				400
		II	SEMESTER-II							
			Major-2	INCHMJ102	T: Inorganic Materials for Chemical Industries and Industrial Waste Management	4	4-0-0	15	60	75
			SEC	INCSEC02	P: Medicinal & Pharmaceutical chemistry.	3	0-0-3	10	40	50
			AEC	AEC02	MIL-1 (*common for all programmes*)	2	2-0-0	10	40	50
			MDC	MDC02	Multi Disciplinary Course-02 (*to be chosen from the list*)	3	3-0-0	10	40	50
			VAC	VAC02	Value Added Course-02 (*to be chosen from the list*)	4	4-0-0	10	40	50
			Minor-2 (Disc.-II)	MI02	*To be decided* *(To be taken from other Discipline)*	4	3-0-1	15	60	75
			Summer Intern.	CS	Community Service	4	0-0-4	-	-	50
					Semester-II Total	24				400
					TOTAL of YEAR-1	44				800

MJ = Major, MI = Minor Course, SEC = Skill Enhancement Course, AEC = Ability Enhancement Course, MDC = Multidisciplinary Course, VAC = Value Added Course; CA= Continuous Assessment, ESE= End Semester Examination, T = Theory, P= Practical, L-T-P = Lecture-Tutorial-Practical, MIL = Modern Indian Language, ENVS = Environmental Studies

MAJOR (MJ)

MJ-1: Unit Process for Organic Synthesis & Industrial Applications **Credits 04**
(Full Marks: 75)

MJ-1T: Unit Process for Organic Synthesis & Industrial Applications **Credits 04**

Course contents:

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

MJ-2: Inorganic Materials for Chemical Industries and Industrial Waste Management

Credits 04 (Full Marks: 75)

MJ-2T: Inorganic Materials for Chemical Industries and Industrial Waste Management

Credits 04

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 applications.

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

MINOR (MI)

TO BE DECIDED (SELECTED FROM OTHER DECIPLINES)

SKILL ENHANCEMENT COURSE (SEC)

SEC 1: Chemistry of Cosmetics & Perfumes **Credits 03**

SEC1P: Chemistry of Cosmetics & Perfumes **Full Marks: 50**

Course Outline:

Part-A:

i. Preparation of talcum powder.
ii. Preparation of shampoo.
iii. Preparation of enamels.
iv. Preparation of hair remover.
v. Preparation of face cream.
vi. Preparation of nail polish and nail polish remover.
vii. Preparation of Lipstick.
Any other preparation as per the instruction of respective College

Part-B: Field visit and submission of the Report

Suggested Readings:

1. Stocchi, E. Industrial Chemistry, Vol, Ellis Horwood Ltd. UK (1990). Jain,
2. P.C. & Jain, M. Engineering Chemistry Dhanpat Rai & Sons, Delhi. Sharma,
3. B.K. & Gaur, H. Industrial Chemistry, Goel Publishing House, Meerut (1996).

SEC 2: Medicinal & Pharmaceutical Chemistry **Credits 03**

SEC 2P: Medicinal & Pharmaceutical Chemistry **Full Marks: 50**

Part-A: Extraction

i) Extraction of eucalyptus leaf ingredient
ii) Extraction of eugenol from clove
iii) Extraction of nicotine from tobacco.
iv) Curumine from turmeric
v) Extraction of caffeine from tea/coffee

Part-B: A project: Collection and brief introduction of at least 10 herbal plants

Suggested Readings:

1. Patrick, G. L. Introduction to Medicinal Chemistry, Oxford University Press, UK, 2013.
2. Singh, H. & Kapoor, V.K. Medicinal and Pharmaceutical Chemistry, Vallabh Prakashan, Pitampura, New Delhi, 2012.
3. Foye, W.O., Lemke, T.L. & William, D.A.: Principles of Medicinal Chemistry, 4th ed., B.I. Waverly Pvt. Ltd. New Delhi.