

Sardar Patel University
Syllabus for B. Sc. (Semester-VI) Industrial Chemistry
Effective from Academic Year 2020-2021

Courses	Course Code	Title Of Paper	Credit
Core courses-I	US06CICV21	Synthetic Dyes and Drugs	04
Core courses-II	US06CICV22	Polymer Science and Technology	04
Core courses-III	US06CICV23	Industrial Management & Economics	04
Core courses-IV	US06CICV24	Separation Techniques, Plant design & Control	04
Practical	US06CICV25	Laboratory (All Core Courses)	06
Discipline Specific Elective	US06DICV26	Specialty Chemicals – II	02
Discipline Specific Elective	US06DICV27	Occupational Health & Industrial Hygiene - II	02

Courses	Course Code	Credit	Marks			
			External	Exam Time	Internal	Total
Core courses – I	US06CICV21	04	70	3 Hrs	30	100
Core courses - II	US06CICV22	04	70	3 Hrs	30	100
Core courses – III	US06CICV23	04	70	3 Hrs	30	100
Core courses – IV	US06CICV24	04	70	3 Hrs	30	100
Practical	US06CICV25	06	105	12 Hrs	45	150
Discipline Specific Elective Any One	US06DICV26 US06DICV27	02	50	2 Hrs	--	50

Note: Nomenclature of Subject of code: U S 05 C ICH 21: U=Undergraduate, S=Science Faculty, 05=Semester three/four, C=Core Course, D=Discipline Specific Elective, ICV=Industrial Chemistry Vocational. 21...22...= Paper number.



BACHELOR OF SCIENCE
Industrial Chemistry Vocational – Sardar Patel University
Semester-VI
PAPER NO.: US06CICV21
TITLE: Synthetic Dyes and Drugs
(04 Credits, 4 Hours; 70 External Marks & 30 Internal Marks)
(Effective from June 2020)

Unit 1: Introduction, Classification of Dyes on the basis of mode of applications to the fibers and chemical constitution of the Dyes. Applications of Dyes to fibers, Color shades and fastness properties.

Unit 2: Chemistry of the following dyes with respect to general structural features and classification: Azo dyes, Acid dyes, Basic dyes and Mordant dyes, Anthraquinone (VAT) dyes, Indigoid dyes. Disperse dye and Reactive dyes.

Unit 3: Historical background and development of pharmaceutical industry in India in brief. Pharmacopeias-I.P. , B.P., U.S.P., Brief idea of Pharmaceutical Legislation, Drugs & Cosmetics Act-1940. Introduction to various types of formulation and routes of Administration. Pharmaceutical Packaging: Introduction, package selection, packaging materials, packaging machinery, quality control of packaging materials. Brief study of sterilizations. Pharmaceutical quality control: Aseptic condition, sterility testing, pyrogenic testing, glass testing.

Unit 4: Drugs, pro-drugs, biotransformation of drugs, routes of drugs administration and dosage forms, drug binding, drug toxicity, drug addiction, some important terms used in chemistry of drugs, biological and medical terms used in the study of drugs, distinctive definition. Classification of drugs, relation of chemical structure and chemical activity. The study of life saving drugs: Introduction, classification, properties and uses of followings. Sulfa drugs, Antipyretics and analgesics, and Anti-inflammatory drugs.

REFERENCE BOOKS:

1. LUBS Chemistry of synthetic dyes and pigments, R. E. Krieger Publishing Company.
2. The chemistry of Synthetic Dyes, K.Venkataraman, Academic Press, Vol. I-III.
3. A Laboratory Course in Dyeing, C.H.Gites, The society of Dyes and Colourists.
4. Dyes and Their Intermediates, H.A. Abrahert, Pergaman Press.
5. An introduction to synthetic Dyes, D.M. Rangnekar and P.P.Singh Himalaya Publication, Bombay.
6. Organic chemistry of Drugs synthesis, Daniel Lednice and L.A. Mitsohar, Wiley Interscience.
7. An introduction to synthetic Drugs, P.P.Singh and D.W.Rangnekar, Himalaya Publication, Bombay.
8. Synthetic Drugs by Gurdeep R. Chatwal (Himalaya Publishing House).
9. Text book of organic medicinal and pharmaceutical chemistry Milson, Gisvold, Derge, Lippinett Toppan.



BACHELOR OF SCIENCE
Industrial Chemistry Vocational – Sardar Patel University
Semester-VI
PAPER NO.: US06CICV22
TITLE: Polymer Science and Technology
(04 Credits, 4 Hours; 70 External Marks & 30 Internal Marks)
(Effective from June 2020)

UNIT: 1

Introduction, General characteristics of polymers in comparison with common organic compounds. Nomenclature and classification of polymers, Different types and method of Polymerizations.

UNIT: 2

Molecular weight and molecular weight distribution number, weight and viscosity average molecular weights of polymers. Methods of determining molecular weight, Practical significance of molecular weight distribution. Glassy state, Glass transition temperature (T_g), Factors affecting T_g, Crystallinity in polymers.

UNIT: 3

Thermosetting Polymers: Introduction, Synthesis, Chemistry, Properties and Applications of Phenol formaldehyde, Melamine formaldehyde resins, Polyurethanes, Epoxy resins, Grades of epoxy resins, Curing process and its importance with mechanism. Elastomers, Polybutadiene and Neoprene.

UNIT: 4

Detailed study of the following thermoplastic polymers with respect to Synthesis, Chemistry, Properties and Application Polyolefine Polyethelenes, LDPE, HDPE, Polypropylene, Polyvinyl chloride, Teflon, polystyrene.

Homopolymers, Copolymers such as SBR, ABS, SAN. Polyvinyl acetate and its modifications. Polyamides: Nylon-6 and Nylon-66.

REFERENCE BOOKS:

1. Textbook of Polymer Science, John Wiley and Sons, D.D. Deshpande.
2. Physical Chemistry of Macromolecules. Vishal Publications, New Delhi 1985
3. Polymer Science V. R. Gowarikar, N.V. Vishwanathan and J. Sreedhan, Wiley Eastern Ltd., 1986.
4. Polymer Science and Technology, Joel R Fried, PHI



BACHELOR OF SCIENCE
Industrial Chemistry Vocational – Sardar Patel University
SEMESTER-VI
PAPER NO.: US06CICV23 - Industrial Management & Economics
(4 CREDITS, 4 Hrs, 70 External Marks & 30 Internal Marks)
(Effective from June 2020)

UNIT-1

Forms of legal ownership, Ideal form of an organization, Features, Advantages and Disadvantages of Sole Proprietorship, Partnership Organization, Co-Operative Organization, Joint stock companies and Joint Hindu family organization.

Entrepreneurial decision: Launching a new enterprise, ownership organization decision, Expansion of existing business.

Scale of operation and size of firm: Measure of size, Factors determining size of business, optimum size of business unit, force determining optimum size. Weakness of large firms.

UNIT-2

Concept of scientific management in industry, Function of Management, Decision making, Planning, organizing, Directing and Control.

Location of industry, Management of human resources selection, Incentives welfare and safety. Introduction to MIS, Functions of MIS, Problems with MIS, Knowledge requirements for MIS in seven areas. (GST, DSS, EIS, ES, 4GL, IT & MIS)

UNIT-3

Basic concept of Economics, Demand and Supply, Elasticity of Demand and Supply, Concept of Profit and Revenue, Concept of Equilibrium and Margin, Introduction to Micro and Macro Economics, Economics in production, Economics in management, Economics in finance.

Depreciation methods of determining depreciation, Taxes, selecting some aspects of marketing, Pricing policy, Profitability, Criteria, Economics of selecting alternatives, Variation of cost with capacity, optimum batch sizes, Production scheduling etc.

UNIT-4

Factors involved in project cost estimation, Methods employed for the estimation of capital investment, Capital information, Elements of cost accounting, interest and investment costs, Time value of money, Equivalence.

Material management, Inventory Management: Meaning, Importance, Techniques and Inventory Controls. Quality Control: Meaning, Importance, Total Quality Control and Total Quality Management Case Study on TQC and TQM

REFERENCE BOOKS

1. Fundamentals of Business organization and management by Y.K. Bhushan, Sultan Chand & Sons New Delhi.
2. Business Administration & management by S.C. Saxena.
3. Finance Management by I.M. Pandey.
4. Marketing Management By Philip Kotler.
5. MIS by T. Lucey 8th Edition BPB Publication.
6. Essentials of Inventory Management, by Max Muller, AMACOM.
7. Total Quality Management – An Introductory Text by Paul James, Prentice Hall.
8. Quality Control and Applications by Housen & Ghose.



BACHELOR OF SCIENCE
Industrial Chemistry Vocational – Sardar Patel University
Semester-VI
PAPER NO.: US06CICV24
TITLE: Separation Techniques, Plant design & Control
(04 Credits, 4 Hours; 70 External Marks & 30 Internal Marks)
(Effective from June 2020)

Unit 1:

Development of project, Evaluation of process, Plant design factors, Process design, Choice of process, engineering flow diagram.
Selection of process Equipment's & Materials, Chemical reactors, Plant Layout.

Unit 2:

Surface chemistry & Interfacial phenomena, Absorption, Sols, Gel, Emulsion, Aerosols, Surfactants, catalysis & catalyst, Industrial important of catalyzed reaction.

Unit 3:

Advance separation Techniques: - Ion exchange resins & its Equipment's, Membrane separation process, Ultra-filtration. Reverse Osmosis, Electro-dialysis.

Unit 4:

Automatic control system Terminology, Manual & automatic control, Feedforward & feedback control system, process times lags, control actions & its types of control actions, final control element.

REFERENCE BOOKS:

1. Chemical engineering plant design, vibrant & Dryden (McGraw hill publication)
2. Chemical engineering (volume II) Coulson & Richardson
3. Mechanical and industrial measurement, R.K. Jain (Khanna Publishers)
4. Plant design and economics for chemical engineering, Piter & Pimmerhours
5. Unit operations of chemical engineering, McCabe & smith



BACHELOR OF SCIENCE
Industrial Chemistry Vocational – Sardar Patel University
Semester-VI
SUBJECT CODE: US06CICV25 - Practical
TITLE: PRACTICAL (All Core Courses)
(06 Credits, 12 Hours; External Marks-105, Internal Marks-45)
(Effective from June 2020)

Part: I (02 Credits, 04 Hours, 35 External 15 Internal marks)

Analysis of intermediates: Nitrite titrations, Diazocoupling, titanous chloride titration, estimation of Cu, Ni, Cr, etc. Dyeing: Dyeing of various dyes on cotton. Evaluation of the fastness properties of dyes with respect to light, washing and sublimation. Preparation of various classes of dyes.

Part: II (02 Credits, 04 Hours, 35 External 15 Internal marks)

Determination of Acid value, Iodine number, Saponification value, Melting point and softening point of epoxy resin and Hydroxyl value. Synthesis of polymers and resins like Novalak Phenolformaldehyde, Resol Phenolformaldehyde, Ureaformaldehyde, Melamine formaldehyde, Glyptal resin, Saturated and Unsaturated polyester. Cellulose Acetate, Cellulose Nitrate, Polysulfone rubber and analysis of the above (viscosity, M.P., Mol.Wt. determination). Identification of polymers by simple physical and chemical tests. Analysis of raw materials phenols, formaldehyde, urea, melamine, epichlorhydrin.

Part: III (02 Credits, 04 Hours, 35 External 15 Internal marks)

Quantitative Organic Analysis: Estimation and Analysis of intermediates and finished Drugs. Identification of raw drugs by TLC and Paper chromatography method for identification. Book review report writing and its submission cum presentation. A case study on selected management area of chemical industry visited.



BACHELOR OF SCIENCE
Industrial Chemistry Vocational – Sardar Patel University
Semester-VI
SUBJECT CODE: US06DICV26
TITLE: Specialty Chemicals – II
(02 Credits, 2 Hours; 50 External Marks)
(Effective from June 2020)

Unit-1

White pigments, White lead, Electric method, Characteristic of pigment, use of pigment, Titanium dioxide, morden chlorine method, Physical property of TiO_2 Ultramarine blue, Cobalt blue, Red lead, Synthetic iron oxide pigment, Green pigment, Chrome green, Yellow pigment, Black pigment, Tonner.

Unit -2

Introduction detergents, principal group of synthetic detergent, Classification of surface-active agent, Anionic detergents, Non-ionic detergents, Additives, sub regulators, Binders, Biodegradability of surfactants, Ecofriendly detergents containing enzymes, Ecofriendly detergents-Zeolites, Detrimental effect of detergent, Manufacturing of Shampoos.

Unit-3

Classification of paint, Distemper, Manufacturing of paint, Setting of paint, Good paint, Important of PVC, Paint failure, Emulsion paint, constituent of emulsion paint, Latex paint, Luminescent paints, paint remover, Application of paint and Varnishes, Raw material, Manufacturing of Varnishes, enamels, Gloss finisher.

Unit-4

Introduction of Explosive and Toxic chemical Industries, Classification of Deflagrating, Characteristics of explosive, Nitrocellulose, Di-nitrobenzene, Tri-Nitrobenzene, Tri-Nitro toluene, Picric acid, Ammonium picrate or explosive, Nitroglycerin and dynamite, Gun powder, RDX.

REFERENCE BOOKS

1. Environmental Chemistry by B.K. Sharma, H.Kaur (GOEL Publishing House, Meerut)
2. Environmental Engineering by Howard S. Peavy, Donald R. Rowe, George Tchobanoglous (McGRAW-HILL INTERNATIONAL EDITOR)
3. Water Pollution by V.P. Kudesia (Pragatiprakashan)
4. Environment pollution control engineering by C S Rao (New Age International (P) Limited)



BACHELOR OF SCIENCE
Industrial Chemistry Vocational – Sardar Patel University
Semester-VI
SUBJECT CODE: US06DICV27
TITLE: Occupational Health & Industrial Hygiene - II
(02 Credits, 2 Hours; 50 External Marks)
(Effective from June 2020)

UNIT-1

Safety in chemical industries

Place of chemical industries in society, statutory provisions, Types of chemical hazard & its control, General safety precautions.

UNIT-2

Process Hazard & its control, Utility Hazard & its control, safety transportation of chemicals, Checklist of Routine inspections chemical factories, Types of tests, certificates & Records. Permits for vessel entry.

UNIT-3

Occupational health

Industrial hygiene & occupational health, occupational health hazard, adverse health effect & its control, Types and limits of radiation, Dangerous properties of chemicals and their health effects, Routes of entry & its toxic effects, Evaluation of health hazards, Sampling analysis in gas.

UNIT-4

Safety management

Concept of management , elements of management & principles, safety management & its responsibilities, safety organizations, department & Programme, safety education & training

REFERENCE BOOKS

Fundamental of industrial safety & Health –volume-1 by Dr. K.U.Mistry

Fundamental of industrial safety & Health –volume-2 by Dr. K.U.Mistry

