Bachelor Of Science - Industrial Chemistry Vocational – Sardar Patel University - Semester-VI - PAPER NO.: US06CICV51 - TITLE: Synthetic Dyes and Drugs - (04 Credits, 4 Hours; 70 External Marks & 30 Internal Marks) - (Effective from June 2023)

COURSE OUTCOMES: This course comprises of detailed study of dyes and pharmaceuticals. The students will understand and learn the basic concepts of coloring agents, their chemistry, synthesis, application and analysis. Additionally, the students will students learn the two aspects of pharmaceutical industries that are formulations, their packaging and active pharmaceuticals ingredients. Also, they will study various diseases and the drugs used to cure it. This will enhance their knowledge in the field ofpharmaceuticals.

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, glasstesting.

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.

Sulpha drugs, Antipyretics and analgesics, and Anti-inflammatory drugs. REFERENCE BOOKS:

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

Bachelor Of Science - Industrial Chemistry Vocational – Sardar Patel University - Semester-VI - PAPER NO.: US06CICV52 - TITLE: Polymer Science and Technology - (04 Credits, 4 Hours; 70 External Marks & 30 Internal Marks) - (Effective from June 2023)

COURSE OUTCOMES: This paper will inculcate knowledge of polymer industry. The students will study the concepts of polymerization, types of polymers and the chemistry of polymerization process. Also, they will learn about types of polymers, their characteristics and synthesis at laboratory level and industrial level as well. Additionally, students will learn the manufacturing of various synthetic polymers and their application in day to daylife.

UNIT 1 Introduction, General characteristics of polymers in comparison with common organic compounds. Nomenclature and classification of polymers, Different types and method ofPolymerizations.

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 (Tg), Factors affecting Tg, 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 Poly olefine 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 andSons,D.D.Deshpande.
2. Physcial Chemistry of Macromolecules. Vishal Publications, New Delhi1985
3. Polymer Science V. R. GowarikarN.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.: US06CICV53 - Industrial Management & Economics - (4 CREDITS, 4 Hrs, 7O External Marks & 30 Internal Marks) - (Effective from June 2023)

COURSE OUTCOMES: This paper will help students to understand the concepts of management. They will go through the basic concepts of management like types of ownerships, formation of an organization, entrepreneurship and forms of legal organization. Also, they will study the concepts of scientific management in the industry as well as concepts of economics and project development and project cost estimation.

UNIT 1 Forms of legal ownership, Ideal form of an organization, Features, Advantages and Disadvantages of Sole Proprietorship, Partnership Organization, Co-Operative Organization, join stock companies and Join 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 area. (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, Economies in production, Economics in management, Economies 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 schedulingetc.

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 Newdelhi. Business Administration & management byS.C.Saxena.
2. Finanace Management byI.M.Pandey. Marketing Management By PhilipKotler.
3. MIS by T. Lucey 8th Edition BPBPublication. Essentials of Inventory Management, by Max Muller,AMACOM.
4. Total Quality Management – An Introductory Text by Paul James, PrenticeHall.
5. Quality Control and Applications byHousen&Ghose.

Bachelor Of Science - Industrial Chemistry Vocational – Sardar Patel University - Semester-VI - PAPER NO.: US06CICV54 - TITLE: Separation Techniques, Plant design & Control - (04 Credits, 4 Hours; 70 External Marks & 30 Internal Marks) - (Effective from June 2023)

COURSE OUTCOMES: This paper will help students understand the engineering concepts of Development of project, Evaluation of process, Plant design factors, Process design. Also it will help students to understand the advance level separation techniques and control technology utilized inindustry.

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 hillpublication)
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&Pimmmerhours
5. Unit operations of chemical engineering, McCabe & smith

Bachelor Of Science - Industrial Chemistry Vocational – Sardar Patel University - Semester-VI - SUBJECT CODE: US06CICV55 – Practical - TITLE: PRACTICAL(All Core Courses) - (08 Credits, 16 Hours; External Marks-140, Internal Marks-60) - (Effective from June 2023)

COURSE OUTCOMES: This paper of practical will provide hands on exposure to students towards preparation and estimation of dye intermediates and various dyes. Also, it will help students to learn synthesis and analysis of various types of polymers and its monomers. Also, it will help students to understand about quality control tests of some materials and analysis of Active ingredient from few types of formulations representing different methods of analysis.

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

Analysis of intermediates: Nitrite titrations, Diazo coupling, 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 Hydroxy lvalue. Synthesis of polymers and resin slike Novalak Phenol formaldehyde, Resol Phenol formaldehyde, Urea formaldehyde, Melamine formaldehyde, Glyptalresin, 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)

Book review report writing and its submission and presentation. A case study on selected management area of chemical industry visited. Project on various subjects of curriculum like Forms of legal ownership, financial management, Marketing management, Project cost estimation, Plant location, Inventory management…etc

Part: IV (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. Experiment for sorption isotherm. Preparation of various industrial metal supported catalyst.