

LIST OF INDUSTRIES FOR COLLABORATION

1. Ballarpur Industries Limited.	Yamunanagar (Haryana)
2. Century Pulp & Paper Mills.	Lalkuan (Uttaranchal)
3. Star Paper Mills Ltd.	Saharanpur (U.P)
4. Shiva Paper Mills Ltd.	Kashipur (U.P)
5. Panipat Refinery	Panipat (Haryana)
6. National Fertilizers Ltd.	Panipat (Haryana)
7. Bharat Starch & Chemicals Ltd.	Yamunanagar (Haryana)
8. Ruchi Paper Mills Ltd.	Kala amb (Himachal)
9. Amrit Banaspati Paper Ltd	Hoshiarpur (Punjab)
10. Maghan Paper Mills Ltd.	(Punjab)
11. Khanna Paper Mills Ltd.	(Punjab)
12. Nalco Chemicals Ltd.	(Delhi)
13. Ion Exchange Ltd.	(Hydrabad)
14. Hercules Chemicals Ltd.	(Delhi)
15. Karnal Cooperative Sugar Mills Ltd.	Karnal (Haryana)
16. National Dairy Research Institute	Karnal (Haryana)
17. Shreeyan Paper Mills Ltd.	Ropar (Punjab)
18. Cardinal Chemicals Pvt. Ltd.	(Chandigarh)
19. Chadha Paper Mills Ltd.	Bilaspur, Nantital (Uttaranchal)
20. Cheema Paper Mills	Rampur (U.P)
21. Vapi Paper Mills Ltd.	(Gujarat)
22. Zenith Paper Mills Ltd.	(Punjab)
23. Agarwal Paper Mills Ltd.	Muzaffarnagar (U.P)
24. Varinder Agro Paper Mills Ltd.	Barnala (Punjab)
25. Amrit Banaspati Ltd.	Rajpura (Punjab)
26. National Insecticides & Chemicals Ltd.	Sangrur (Punjab)
27. Indian Agrylic	Bhawanigarh
28. Pepsi Foods	Channo (Bhawanigarh)
29. Rolson Tyres	Ludhiana

30. Mukerian Paper Mills Ltd.	Mukerian (Punjab)
31. Max. India Ltd.	Ropar (Punjab)
32. Pamwi Tissues Ltd.	Solan (H.P)
33. Sethia Paper Mills Ltd.	Muktsar (Punjab)
34. Shiva Paper Mills Ltd.	Muradabad (U.P)
35. Bebani Pigments	Haryana

Steering System:

- State the function of steering system
- Explain the working principle of steering system
- Explain, with a live diagram, Ackerman and Davis steering gear mechanism
- Name different types of steering gears.

Braking System:

- Explain the constructional features of mechanical brake.
- Explain the working of mechanical brake.
- Explain the constructional features of hydraulic brake.
- Explain the working of hydraulic brake.
- Explain the constructional features of vacuum brake.
- Explain the working of vacuum brake.
- Describe the constructional features of master cylinder.
- Describe the constructional features of wheel cylinder.
- State the function of brake drum.
- State the function of brake lining.
- Explain the method of brake adjustment.

Suspension System:

- State the function of suspension system.
- List the types of suspension system.
- Explain the working of coil spring.
- Explain the working of shock absorber.

Battery:

- Explain the constructional details of lead acid cell battery.
- Explain the importance of specific gravity of electrolyte.
- Describe the effect of temperature on specific gravity.
- Explain the chemical reactions during charge and discharge.
- Define capacity of a battery.
- Explain various charging methods of batteries.
- Describe the procedure for maintenance of battery.
- Explain the method of testing a battery for specific gravity and voltage.

Dynamo and Alternator:

- State the functions of a dynamo.
- Explain the working of different types of regulators.
- Describe the constructional features of a cut out.
- Explain the working of a cut out.
- State the function of an alternator.
- Describe the constructional features of an alternator.
- Explain the method of charging of battery from alternator.

Diagram of Typical Wiring System:

- Draw the diagram of the wiring system in an automobile.

Lighting System and Accessories:

- List out electrical lighting accessories.
- Explain the wiring circuit for lighting system.
- State the function of headlight.
- Describe the meaning of aiming of headlights.
- State the function of lighting switches.

- State the function of direction indicators.
- State the function of wind screen wiper.
- State the function of a horn.
- State the function of speedometer.
- Explain how air-conditioning and heating is done in an automobile.

Estimation and Costing:

- Know about the elements of costing.
- Understand the fundamentals of cost accounting.
- Understand the fundamentals of estimation.
- Estimate the material cost.
- Estimate machining time.
- Estimate foundry cost, forging cost and welding cost.

Specific Objectives:

Introduction

- Define estimation.
- Define cost accounting.
- Explain the purpose of estimation and cost accounting.
- Appraise the terms-cost of production, selling price, capital investment and return on investment.

Element of Costing:

- List out elements of costing.
- Appraise the terms-overhead, depreciation, obsolescence, and interest on capital, idleness cost, repair and maintenance cost.
- Calculates depreciation using different methods.
- Explain the methods of distribution of overhead charges.

Cost Accounting:

- List down the objectives of cost accounting.
- Differentiates between financial accounting and cost accounting.
- List down the advantages of cost accounting.
- Describes various methods of costing.

Fundamentals of Estimating:

- List the objectives of cost estimating.
- List the functions of cost estimating.
- Outline the organization of estimating department.
- Identify the factors involved in estimating.
- Describe the procedures for estimating.

Estimation of Material Cost:

- Estimate the volumes and weight of material required.
- Estimate the cost of material.
- Solve simple problems related to estimation of material cost.

Estimation of Machine Shop:

- Appraise various terms such as set uptime, handling time, machining time, teardown time.

- Estimates the time required for machining like turning, milling, drilling, boring, and tapping, shaping, grinding and planning.

Estimation of Other Shops:

- Estimate the foundry cost.
- Estimate the forging cost.
- Estimate the welding cost.
- Solve problems related to estimation of foundry cost, forging cost and welding cost.

Mechanical Operation: Jaw, crusher, Gyratory pettetizer, Ball-mill, Gyrating screens, Electrically Vibrated screws, Grizzlies.

Conveying: Belt Conveyors, Screw Cpnveyor,

Fluid solid separator: Settling tank. Wet scrubber, crystallizer rotary filter, cyclone separator, electrostatic precipitator, bag filter, thick ever classifieds 20

D. Mass Transfer: Absorption tower, stripper, Disttilation tower, and Continuous fractionater

Fluid -Solid Contacting:

Fluid bed, Moving bed, Fixed bed.

Books

Text Book: Unit operations of Chemical Engg. by Mccabe & Smith Mc Graw Hill.

Ref. Books:

1. Outlives of chem.. Technology by Dryden, East-West Press.
2. Introduction to chem. Engg. by Badger, Banchero Mc Graw Hill.
3. Perry's Handbook.

3.6 INDUSTRIAL PROCESS EQUIPMENT

DETAILED CONTENTS

Schematic representation, uses, types, introduction to the constructional details of following equipments:-

A. Fluid Moving Machinery

Pumps; Reciprocating Pumps, Rotary Pumps, Centrifugal Pumps, Vacuum Pump, Fans; Centrifugal fans, Blowers of Compressors; Positive displacement centrifugal blowers, Positive displacement compressors. Jet, ejectors (10 hrs)

B. HEAT TRANSFER EQUIPMENT

Double pipe heat exchanger, shell & tube heat exchanger, fired-heater, Reboiler, Condenser, Jacketed kettle, Evaporators, open pan, single effect multiple effect, vertical tube, long-tube, vertical, forced circulation evaporator, tray driver. (12 hrs)

C. Mechanical operation: Jaw crusher, Gyratory, Ball-mill, Gyrating

Screen, electrically vibrated screens, grizzlies. Conveying; belt conveyors, screw & conveyor. Fluid solid separator; Settling tank, wet scrubber, crystallizer, rotary filter, cyclone separator, electrostatic precipitator, bag filter, thickener classifier. (14 hrs)

D. Mass Transfer; Absorption tower, stripper, distillation tower, continuous fractionator. Fluid solid contacting; Fluid bed, moving bed, fixed bed. (14 hrs)

RECOMMENDED BOOKS

1. Unit operation of chemical Engineering by McCabe & Smith Mc Graw Hill, Publication.
2. Outlines of Chemistry Technology by Dryden. East-West Press & Publishing.
3. Introduction to Chemistry Engineering by Badger Banchero, Mc Graw Hill.
4. Handbook for Chemical Engineers by Perry & Chilton, MC Graw Hill Publication.

4.2 CHEMICAL ENGINEERING THERMODYNAMICS

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RATIONALE

It is a core subject of Chemical Engineering and is essential for understanding basic concept, thermodynamic properties of fluids & performance of thermal systems used in industry.

Detailed Contents

1. Introduction & basic concepts:

Systems, processes & surroundings, homogenous & heterogeneous systems, closed, open & isolated systems, intensive & extensive properties, state & path functions. Concept of internal energy, enthalpy, entropy, free energy & equilibrium. Equation of state, ideal gas law, Vander Waal's eqn., Amagat's law, Dalton's law, Henry's law, Raoult's law, Zeroth law of Thermodynamics. (12 hrs)

2. First law of Thermodynamics for open & closed systems.

Calculation of internal energy, enthalpy, heat and work for ideal gas undergoing reversible isometric, isothermal, isobaric, adiabatic and polytropic process. (9 hrs)

3. Second law of thermodynamics-

Entropy change and its calculations for a closed & open system, Carnot's cycle and its efficiency thermodynamic temperature scale, Reversible & irreversible process. (9 hrs)

4. Applications of the laws of thermodynamics:

Refrigeration coefficient of performance, vapour compression refrigeration system, absorption refrigeration, properties & applications of refrigerants, reciprocating air compressors; single stage compressor, isothermal

efficiency, volumetric efficiency, clearance & clearance volume.

(10 hrs)

5. Phase equilibria

Vapour liquid equilibria, dew point and bubble point and their calculations for two phase systems, Gibbs Duhem Equation.

(8 hrs)

RECOMMENDED BOOKS:

1. Introduction to Chemical Engineering Thermodynamics by Smith and Vanness, Mc Graw Hill.
2. Chemical Engineering thermodynamics by K.V. Narayanan, Prentice Hall India.
3. Chemical Engineering Thermodynamics by Dodge, Mc Graw Hill.
4. Chemical Engineering Thermodynamics by YVC Rao.

4.3 REACTION ENGINEERING.

RATIONALE

It is a core subject of Chemical Engineering and is essential for understanding the kinetics of various reactions, types of reaction vessels and the performance of reactive systems used in industry.

Detailed Contents

1. Kinetics of Homogeneous Reactions

Single and multiple reactions, elementary & non-elementary reactions, fundamentals of chemical reactions equilibrium, molecularity, effect of temperature and pressure on equilibrium Constant, representation of reaction rate, variables affecting reaction rate, zero order, first order, second order reactions for reversible and irreversible reactions, residence time, space time and space velocity, non-elementary reactions, temperature dependent term of a rate equation, activation energy and temperature dependency. (16 hrs)

2. **Reactors** - Basic reactor types, construction details and industrial applications, exposure to ideal and non-ideal reactions in different types of reactors and ideal reactors, steady state mixed flow reactors, steady state plug flow reactor, holding time, space time for flow systems (Qualitative treatment only).

(16 hrs)

3. Interpretation of batch reactor data-

Integral and differential method of analysis for constant Volume & variable Volume Batch reactor.

6. Size comparison of single reactors-batch, mixed & plug flow reactors, general graphical comparison, mixed versus plug flow reactors- first & second order reactions, plug flow reactors in series and parallel, equal size mixed reactors in series. (16 hrs)

LIST Of Practicals:

1. To study the batch reactor for a given system of reactant.
 - (a) Variation of composition with time
 - (b) Measure the temperature Variation.
2. To study the CSTR
 - (a) Time to achieve the steady state
 - (b) Residence time
3. To Study the Plug flow Reactor
 - (a) Time to achieve the steady state
 - (b) Residence time
4. Study of different reactions for determination of
 - (a) Rate of reaction
 - (b) Rate constant
 - (c) Order of reaction

RECOMMENDED BOOKS:

1. Introduction to Chemistry Engineering- Ghoshal and Sanyal.
2. Chemical Reaction Engineering-Levenspeil, John Wiley Publication.
3. Elements of Chemical Reaction Engineering-Fogler, PHI.

5.1 CHEMICAL PROCESS INDUSTRIES

RATIONALE

A chemical engineer, during his/her professional career, is primarily working in plants engaged in the manufacture of various chemical products. It is therefore necessary to provide adequate information to the chemical engineering student about the view materials, the chemistry involved and the outline of manufacturing process of some important chemical product.

Detailed Contents

1. Cement

Definition of cement & portland cement, major cement industries in India, composition of portland cement, process description, raw material, flow sheet & major engineering problems associated with the dry processes for manufacturing of portland cement. (9 hrs)

2. Chlor-Alkali Industry

Definition of electrochemistry , manufacture of soda ash by solvay process, manufacture of chlorine & caustic soda by diaphragm cell, advantages & disadvantages of diaphragm & comparison with mercury cell. (9 hrs)

3. Glass Industry

Definition of glass, general composition of glass, raw material, methods of manufacture of glass, manufacture of special glasses- fused silica and high silica glass. (7 hrs)

4. Inorganic Acids & Allied Industry

Detailed flow sheet, raw material requirement, industrial applications, and major engineering problems associated for the following processes:

Sulfuric acid, hydrochloric acid & citric acid. (12 hrs)

5. Fuel gases

Manufacture of producer gas, water gas by continuous process, coke oven gas, natural gas & LPG. (8 hrs)

6. Paints & Varnishes

Brief description of requirements for surface coatings, simple flow sheet of paint coatings, simple flow sheets of paint manufacturing process, types & composition of different types of varnishes & their applications of primary ingredients of surface coating. (9 hrs)

7. Soap & detergent industry

Continuous hydrolysis & saponification process, flow sheet for continuous process, for fatty acids, soap & glycerin; types of surface active agents, different constituents of detergent, manufacturing process of detergent (sulfonation and sulfation and compounding of detergent) . (10 hrs)

LIST OF PRACTICALS

1. To find out Acid value for different oils (any two).
2. To find out Iodine value for different oils (any two).
3. To find out saponification value for different oils (any two).
4. To find out flash point of given oil (any two)
5. To find out fire point of given oil (any two).
6. To find out smoke point of given oil (any two).
7. To find out viscosity by redwood viscometer.
8. Estimation of available chlorine in given sample of bleaching powder.
9. Estimation of percentage moisture of coal.
10. Estimation of percentage Ash of coal.

RECOMMENDED BOOKS

1. Outlines of Chemical Technology by Dryden, East-West Press Publishing.
2. Chemical Process Industries by shreve, Mc Graw Hill Publication.
3. Text book of Chemical Technology Vol.-I & Vol.-II, by G.N. Pandey, Vikas Publication.

5.3 PROCESS EQUIPMENT DRAWING.

RATIONALE:

After undergoing this course the students will be able to understand various diagrammatic representation and drawing of various chemical process equipments, symbols and line diagrams of process instruments used in chemical industries and brief design of process equipments.

Detailed Contents

1. Systematic representation of different equipments, pumps, compressors, dryers, re boilers, heat exchangers. (20 hrs)
2. Symbols & line diagrams. (12 hrs)
3. Plant layout. (12 hrs)
4. Flow sheets, flow sheets for Ammonia, Urea, Chlor-Alkali, Sulphuric acid etc. (12 hrs)
5. Different types of joint (a) rivet (b) Flange joint raised face flanges, tongue & groove flanges. (12 hrs)

Assembly Drawing: (12 hrs)

- (a) Non-Return Valve.
- (b) Blow-Off Valve.
- (c) Feed Check Valve.

Equipment Drawing (16 hrs)

- (a) Double pipe & shell & tube heat exchanger.
- (b) Auto-clave.
- (c) Distillation column.

- (d) Crystallizer
 - (e) Evaporator
 - (f) Pumps (Centrifugal, Rotary, Reciprocating)
- (Three sheet should be on computers).

RECOMMENDED BOOKS

1. Outlines of Chemical Technology by Dryden, East-West Press Publication.
2. Plant Design & Economics for Chemical Engg. by M.S. Peter & Timmerhaus K.D, Mc Graw Hill Publication.
3. Chemical Process Industries by Shreve, MC Graw Hill Publication.
4. Principles of unit operation by Foust, John Wiley Publication.

5.4 INDUSTRIAL MANAGEMENT

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RATONALE

The knowledge of this subject is required of all diploma holders who wish to choose industry/field as this career. This course is designed to develop understanding of various functions of management, role of workers and engineers and providing knowledge about safety and labour, industrial and tax laws.

DETAILED CONTENTS

1. **Principles of Management** (2 hrs)
 - Management, different functions of management: Planning, organizing, coordination and control.
 - Structure of an industrial organization.
 - Functions of different departments. Relationship between individual departments.

2. **Human and Industrial Relations** (4 hrs)
 - Human relations and performance in organization.
 - Understand self and others for effective behaviour.
 - Behaviour modification techniques.
 - Industrial relations and disputes.
 - Relations with subordinates, peers and superiors.
 - Characteristics of group behaviour and trade unionism.
 - Mob psychology
 - Grievance, handling of grievances.
 - Agitations, strikes, lockouts, picketting and gherao
 - Labour welfare.

- Workers, participation in management.

3. **Professional Ethics** (4 hrs)

- Concept of ethics.
- Concept of professionalism.
- Need for professional ethics.
- Code of professional ethics.
- Typical problems of professional engineers.
- Professional bodies and their role.

4. **Motivation** (4 hrs)

- Factors determining motivation
- Characteristics of motivation.
- Methods for improving motivation.
- Incentives, pay, promotion, rewards.
- Job satisfaction and job enrichment.

5. **Leadership** (4 hrs)

- Need for leadership.
- Functions of a leader.
- Factors for accomplishing effective leadership.
- Manager as a leader.

6. **Human Resource Development** (4 hrs)

- Introduction.
- Staff development and career development.
- Training strategies and methods

7. **Wage Payment** (4 hrs)
- Introduction
 - Classification of wage payment scheme.
8. **Labour, Industrial and Tax Laws** (6 hrs)
- Importance and necessity of industrial legislation.
 - Types of labour laws and disputes.
 - Brief description of the following Acts: The Factory Act 1948; Payment of Wages Act 1936; Workmen Compensation Act 1923; Industrial Dispute Act 1947; Employee' State Insurance Act, 1948; Provident Fund Act.
 - Various types of Taxes-Production Tax, Local Tax, Sales Tax, Excise Duty, Income Tax.
 - Labour Welfare schemes.
9. **Accidents and Safety** (4 hrs)
- Classification of accidents; according to nature of injuries i.e. fatal, temporary; according to event and according to place.
 - Causes of accidents-psychological, physiological and other industrial hazards.
 - Effects of accidents.
 - Accidents-prone workers.
 - Action to be taken in case of accident with machines, electric shock, road accident, fires and erection and construction accidents.
 - Safety consciousness & publicity.
 - Safety procedures.
 - Safety measures-Do's and don'ts & good housekeeping (55).
 - Safety measures during executions of Electrical Engineering works.

10. **Environment Engineering** (4 hrs)

- Ecology.
- Factors causing pollution.
- Effects of pollution on human health.
- Air pollution and control act.
- Water pollution & control Act
- Noise pollution.

11. **Materials Management** (4 hrs)

Material in industry, inventory control model, ABC Analysis, Safety stock, Re-order, level, Economic ordering quantity, Stores equipment, Stores records, purchasing procedures, purchase records, Bin card, Cardex, Material handling, Manual lifting, Hoist, Cranes, conveyors, trucks, fork trucks.

12. **Financial Management** (4 hrs)

Important, ledger, Journal, Profit and Loss Account, Balance Sheet, Interpretation of Statements, Ratio Analysis, Project financing, Project appraisal, return on investments.

13. **Marketing and Sales** (4 hrs)

Sellers and Buyers markets, Marketing, Sales, Market conditions, monopoly, oligraphy, perfect competition, Cost Elements of Cost, Contribution, Break even analysis, Budgets, Pricing Policies.

RECOMMENDED BOOKS

1. Industrial Engineering and Management by TR Banga.
2. Industrial Engineering and Management by OP Khanna, Dhanpat Rai Publications, Delhi.
3. Industrial Management by VK Sharma, OP Harkut.
4. Sharma BR, Environmental and Pollution Awareness: Satya Prakashan, New Delhi.
5. Thakur Kailash, Environment Protection Law & Policy in India: Deep & Deep publication, New Delhi.
6. Handbook of Small Scale Industry by P.M. Bhandari.
7. Marketing Management by Philip Kotler, Prentice Hall of India, New Delhi.
8. Principles of Management by Philip Kotler, TEE Publication.

5.5 (a) PAINT TECH.

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DETAILED CONENTS

1. Introduction to Coatings: Purpose, types of coatings (binder, filler, precoat, final coat etc.) (6 hrs)
2. Different components of coatings: resin/binder, solvent, pigments, Antistatic/Antishimming agents, others (fungicides, other protective agents).
 - Function of each component. (12 hrs)
 - Different types of paints based on solvent (Oil based, Latex paints)
3. Various terms used in paints (critical pigment case. (CPC), coverage ratio, thickness etc.) (6 hrs)
4. Study of each component in detail; (24 hrs)
 - a) Resins: Alkyd, Acrylic, Polymethane Epoxy, Urea Formaldehyde, Melamine Formaldehyde.
 - b) Solvents: Active solvents, latent solvents & Dilutents.
 - c) Pigments: Classification.
 - d) Other agents.
5. Application Methods: Spray, Brush, Roller and dip. (8 hrs)
6. Paint Defects.

RECOMMENDED BOOKS

1. Surface coatings by Swaraj Paul.

COMPUTERS

1. Analysis & Design of Information system
V. Rajaraman (PHI).
2. Window 3.1 Made Easy, Tom Sheldon (Tate Mc Graw).
3. A First house in computers by Sanjay Saxena (2000 Edition, Vikas Pub.)
4. Object oriented programming with CTT.
E. Balaguruswamy (2nd Edition, Tata Mc Graw Hill).
5. CTT by Robat Lafore.

5.5 (b) SUGAR TECHNOLOGY

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5.5 (c) FOOD TECHNOLOGY

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1. Food Chemistry and Nutrition
Importance of food, Introduction to different food groups, chemical scope and importance of water, carbohydrates, proteins, fats, minerals, vitamins and enzymes. (10 hrs)
2. Food Microbiology
Classification of micro organisms, Bacteria, Fungi, Microbiology of milk, poultry & egg products, fruits and vegetable products & cereals. (10 hrs)
3. Principles of Food Processing and Preservation
Importance of food processing and preservation. Preservation by sugar & salt, low temperature, high temperature & moisture removal. (12 hrs)
4. Handling, Transportation and Storage of Foods
Importance of handling, transportation & storage of food & food products, post harvest changes in food. Handling, transportation & storage of fruits & vegetables, grains, animal foods, milk & eggs. (12 hrs)
5. Food Evaluation and Quality control
Need of quality. Principles of evaluating food. Principles and functions of quality control. Sampling, food laws & regulations in India. General Hygiene in food Industry. (10 hrs)
6. Food Packaging Technology
Importance of packaging of foods. Packaging materials, types of packaging, packaging requirements and their selection, Package labeling. (10 hrs)

6.3 FERTILIZERS TECHNOLOGY.

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DETAILED CONTENTS

Introduction: (6 hrs)

Demand and Supply in India. Overview of fertilizer industry in India. Important fertilizer plants in India.

Nitrogenous Fertilizers: (20 hrs)

1. Importance of ammonia, its manufacture from different processes, names of important fertilizers made from ammonia.
2. Manufacturing processes of urea- flow sheet and major engineering problems and their solution.
3. Manufacturing processes of Ammonium Nitrate.
 - (a) Prilling Process in description with the help of flow sheet.
 - (b) Crystallization process: Outline of process
 - (c) Stengel process: Outline of process.
4. Major Engineering problems like corrosion, safety, crystallization, conditioned air requirements
5. Manufacturing process of nitro lime: Description with the help of flow sheet.

Phosphatic Fertilizers: (14 hrs)

1. Manufacturing process of Superphosphate and triple super phosphate: Process description only with the help of flow sheet.
2. Ammonium phosphates: Process description with the help of flow sheet of Diammonium phosphate.

Mixed Fertilizers:

(16 hrs)

1. Chemical Fertilizer; (A mixture of ammonium phosphate, ammonium sulfate and potash); Flow sheet and description of process.
2. Meaning and grading of N-P-K fertilizers. Importance and application of N-P-K fertilizers. Names of important grades in vogue and percentage of their constituents.

Micronutrients: Different micronutrients, their effects.

(8 hrs)

RECOMMENDED BOOKS

6.5 (a) POLYMER TECH.

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DETAILED CONTENTS

Introduction (12 hrs)

- Introduction to polymers.
- Classification of polymers.
- Polymer structure: Tacticity, Geometric isomerism, stereo isomerism.
- Concept of molecular wt. (wt. average ,molecular, number average, molecular wt. effect of molecular wt. on properties of polymers.)

POLYMER SYNTHESIS (18 hrs)

- Step Polymerization.
- Chain Polymerization.
- Brief Introduction to Copolymers.

POLYMERIZATION TECHNIQUES (8 hrs)

- Bulk Polymerization
- Solution Polymerization.
- Suspension Polymerization.
- Emulsion Polymerization.

INTRODUCTION OF SOME INDUSTRIAL POLYMERS (18 hrs)

Structure, properties & uses of following polymers.

- Polyester
- Polyethylene
- Polystyrene
- Polypropylene
- Polyvinyl chloride (PVC)
- Nylon (6-6, 6)

POLYMER PROCESSING TECHNIQUES:

(8 hrs)

Introduction to Extrusion, Injection molding, Blow molding, Calendaring.

RECOMMENDED BOOKS

1. Polymer Science by Gwarikar
2. Polymer Sc. & Technology by Joel R. Fried, Prentice Hall of India, Publication
3. Polymer Science by P. Ghosh.

6.5 (b) PAPER TECHNOLOGY

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6.5 (c) ALTERNATE ENERGY SOURCES

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6.6 AGRO BASED INDUSTRIES

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DETAILED CONTENTS

Vegetable Oils & Vanaspati: Extraction methods; Mechanical & Solvent extraction with examples, details of solvent extraction method for, soyabean oil. construction details of extractor used for soyabean oil.

Hydrogenation of Vegetable oil. How sheet of glycerin & Essential description oils. (10 hrs)

Soaps; Laundry soap: -raw materiel & method of production by continuous process.

Toilet soap raw material & manufacturing process. (5 hrs)

Glycerine; Production of glycerine as a by product from soap & fatty acid. Industrial uses & properties. (5 hrs)

Essential oils; Definition, chemical constituents, General methods of production and their industrial uses. (5 hrs)

CARBOHYDRATES & FERMENTATION INDUSTRIES

Sugar:- Raw material and manufacturing process, description with the help of flow sheet, major engineering problems. (7 hrs)

Starch:- Starch production from Maize with the help of flow sheet. (5 hrs)

Starch derivatives:- Dextrine by starch hydrolysis in a fludized bed; process description with flow sheet. (5 hrs)

Fermentation:-General characteristics of fermentation process, manufacture of ethyl alcohol by fermentation- process description with flow sheet. (6 hrs)

Paper; Definition types of paper products, raw materials like bamboo, agricultural waste residue, bagasse. General method of paper production by Fourdrinier machine. (8 hrs)

Food Industry: - food storage & transport, Engineering aspects of cold storages, Choice of refrigerants, Cold transport of foodstuffs, Food processing- freeze-drying, Food additives. (8 hrs)

RECOMMENDED BOOKS

6.7 PETROCHEMICALS

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DETAILED CONTENTS

1. Names and capacities and location of refineries and petrochemical complexes in India. (6 hrs)
2. Petroleum refinery product classification (List only) (4 hrs)
3. Important petrochemical feed stocks and precursors. (6 hrs)
4. Technology of cracking, reforming, alkylation and sulfonation. (Reaction, conditions and products only). (10 hrs)
5. Definition and practical utility of Flash point, fire point, octane No. Smoke point, aniline point. (10 hrs)
6. Names and uses of important chemicals from (12 hrs)
 - (I) C1 Compounds (methods & synthesis gas)
 - (II) C2 compounds (Ethylene & Acetylene)
 - (III) C3 Compounds (Propylene)
 - (IV) C4 Compounds (Butanes & Butenes)
 - (V) Aromatic Compounds.
7. Manufacturing Process of following petrochemicals (16 hrs)
(Flow sheet & description only). Synthesis Gas, Acetaldehyde, Vinyl acetate, Ethylene Oxide, Vinyl chloride, styrene, Acrylonitrile, propylene oxide, cumene butadiene, isoprene, phenol from cumene only acetone, benzaldehyde, separation of BTX.

RECOMMENDED BOOKS

1. Petroleum Refinery Engineering by W.L. Nelson.
2. Petroleum Processing by RJ Hengsbeck.

Mr. Bodh Raj Verma
Principal
Govt. Women Polytechnic
Bemina, Srinagarr-190 001

Fax. 0194 - 2493808

Dear Sir,

As desired by you the postal address of NTTF is given below:

Nettur Technical Training Foundation
23/24, Peenya Industrial Area, II phase
Banglore - 560 058
Ph. No. 080 - 8397218
Fax: 080 - 8397196

Hope you will find this in order.

Thanking you

Yours sincerely

(Dr. KM Rastogi)
Professor & Head

