

Unified Syllabus

Class - B.Sc. 1st Year
Subject - Industrial Chemistry
Paper - First Theory : 42^{1/2}

UNIT-1 Petroleum : Introduction, Occurrence, composition of petroleum, Origion, theory of petroleum, classification of petroleum, refining of petroleum.

Fraction distillation of crude oil : Cracking, reforming, Hydroforming, Isomerisation, Purification of petroleum, Flash Point, Knocking, Octane number.

UNIT-2 Coal : Types, Composition, structure, classification and properties of coal, Distillation of coal, Low and high temprature carbonation of coal, calorific value of coal, Analysis of Coal.

UNIT-3 Catalysis : Introduction, Types : Homogeneous and Heterogeneous catalysis, Basic Principles of catalysis, Mechanism of catalysis, Factor affecting the catalysis reaction, Industrial uses of catalysis reaction.
Surface chemistry and interfacial phenomenon : adsorption isotherm, sols, Gels, Emulsions.

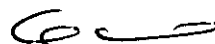
UNIT-4 Inorganic materials of industrial importance, their availability, forms structure and modifications, Alumina, Silica, Silicates, Clays, Mica, Carbon, Zeolites.

Drying : Introduction, Equipments – tray dryer, rotary dryer, drum dryer, spray dryer.

UNIT-5 Distillation : Introduction, Types of distillation : Simple distillation, Fractional distillation, Steam distillation, Distillation under reduced pressure, Batch and continuos distillation, Plate columns and packed columns distillation.

Evaporators : Introduction, Equipment : Short tube evaporator, forced circulation evaporators, climbing film evaporators, wiped film evaporators.


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UNIT-1 Basic Metallurgical Operations : Pulverization, Calcinations, roasting, refining, Physiocochemical Principlal of extraction of Iron, Copper, Aluminium, Magnesium, Zinc and Chromium.

UNIT-2 Enzyme Catalyzed reaction, rate model, industrially important reactions. Dimentions and Units, Basic Chemical Calculations : Atomic weight, molecular weight, equivalent weight, Mole composition of (i) liquid mixture and (ii) gaseous mixtures.

UNIT-3 Material balance without chemical reaction, Flow diagram for material balance, simple material balance with or without recycle of by-pass for chemical engineering operations such as distillation, absorpion, crystallization, evaporation, extraction etc.

UNIT-4 Utilities in Chemical industry; Fuel : Types of fuel, Advantages and disadvantages, combustion of fuels, calorific value, specification for fuel oils, **Biolers :** Types of boilers and their funtioning, Heat transfer, heat exchanges shell and tube, finned tube heat exchangers plate, heat exchanges refrigeration cycles.

UNIT-5 Water : Specification for Industrial use, various water treatments. **Steam :** generation and use, Air: specification for industrial use, processing of air. **Fluid flow :** Fans, blowers, compressors, vacum pumps ejector, **Pump :** Reciprocating pumps, gear pump, centrifugal pumps.

BOOKS :-
1:- Industrial chemistry: - B.K.Sharma.
2:- Environmental chemistry: - B.K.Sharma.
3:- Environmental chemistry: - A.K.Day

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Max. Marks : 50

PRACTICAL

- 1- Determination of M.P. and elevation in B.P. of solids and liquids.
- 2- Analysis of water : Alkalinity, Hardness, pH, Chloride, Sulphate.
- 3- Calibration of thermometers.
- 4- Preparation of standard solution : Primary and secondary standards.
- 5- Determination of Flash Point.
- 6- Chromatography : Paper, thin layer.
- 7- Determination of physical constants : Density, Refractive index, surface tension, viscosity.
- 8- Soil Analysis : Determination of pH , Mg , Silica, Alkalinity.

Division of marks for practical

Two practical	30
Viva	10
Seasonal	10
Total	50 Marks


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Unified Syllabus

Class - B.Sc. IIrd Year

Subject - Industrial Chemistry

Paper - First

Max. Marks : 42^{1/2}

Unit: - 1:- Cement: Types of cement, composition, manufacturing processes, setting of cement. **Ceramic:** Introduction, types, manufacturing processes, applications, refractory materials.

Polymeric materials: Introduction, Mechanism of polymerisation, plastic, Preparation, Properties and uses of polythene, PVC, Bakelite, Nylon 66, industrial applications.

Unit:-2:- Glass: Types, composition, manufacturing- physical and chemical properties, applications. **Corrosion:** Various types of corrosion relevant to chemical industry, mechanism, protection against corrosion.

Unit:-3:- Nitration: Introduction, nitrating agents, kinetics and mechanism of nitration processes such as nitration of :-

1:- Paraffinic hydrocarbon.

2:- Benzene to nitrobenzene and m-dinitrobenzene.

3:- Acetanilide.

Halogenation:- Introduction, kinetics of halogenation reactions, reagents for halogenation reactions, halogenation of sulphatic and aromatic hydrocarbons (Nuclear & side chain halogenation)

Halogenation of aliphatic hydrocarbons with special reference to energy profile diagram. Halogenations of aromatic hydrocarbons- types of reagents & their kinetics. Commercial manufacturing of dichlorobenzene.

Unit:-4 Sulphonation: Introduction .sulphonating agents sulphonation of aliphatic and aromatic hydrocarbons, Mechanism of sulphonation reaction, reversibility of sulphonation concept of reversibility of sulphonation.

Unit:-5 Industrial Pollution : Introduction to industrial pollution with reference to water and air-Statutory limits of air and water pollutants.

- Books :-**
- 1:- Unit process of organic synthesis vol. 1&2 P.H.Gs
 - 2:- Industrial chemistry: - B.K.Sharma.
 - 3:- Environmental chemistry: - B.K.Sharma.
 - 4:- Environmental chemistry: - A.K.Day
 - 5:-Unit operations vol.1&2:- :- K.A.Gauhane
 - 6:- Engineering Chemistry :- P.C. Jain & Monika Jain





Unified Syllabus

Class - B.Sc. IIrd Year
Subject - Industrial Chemistry
Paper - Second

Max. Marks : 42^{1/2}

Unit -I **Concept of measurement and accuracy** principle, construction and working of instruments for the measurement of following parameters.

1. Temperature:- Glass thermometer, vapor filled spring thermometer, radiation pyrometer.
2. Pressure: - Manometer, Barometer, Pressure gauge, Pirani gauges, Diaphragm type.
3. Liquid Level:- Float type liquid level gauge.
4. Density.
5. Viscosity.

Unit -II **Oxidation**– Introduction–Types of oxidising agents, kinetics and mechanism of oxidation, vapour phase oxidation, commercial manufacturing of acetic acid, benzoic acid, maleic anhydride, phthalic anhydride, acrolein and acetaldehyde.

Reduction–Introduction, methods of reduction, commercial manufacturing of aniline, nitroaniline, p-amino phenol.

Unit-III **Hydrogenation**:-Introduction- kinetics and thermodynamics of hydrogenation, reaction catalysis of hydrogenation reaction, hydrogenation of vegetable oil, manufacturing of methanol from carbon monoxide and hydrogen.

Esterification:-Introduction, esterification by organic acids, commercial manufacturing of ethyl acetate, diacetyl phthalate, vinyl acetate and cellulose acetate.

Unit-IV **Solid waste management**, industrial safety, removal of solid contaminants from waste water by coagulation, incineration, fuel palatization, soil conditioning and green house effect, ozone depliction, carbon credits,

Unit-V: Principle and equipments of aerobic, anaerobic treatment such as adsorption, filtration, sedimentation, bag filters, electrostatic precipitators mist eliminators wet scrubbers.

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Unified Syllabus

Class - **B.Sc. IInd. Year**

Subject - **Industrial Chemistry**

Paper - **Practical**

Max. Marks : 50


PRACTICAL

- 1- **Unit process** :- Preparations using nitration, sulphonation, halogenation.
- 2- Instrumental Methods of Analysis related to :- colorimetry, potentiometry, conductivity.
- 3- **Water Analysis** :- Sampling, physical parameters such as – pH conductivity, turbidity, T.D.S, Hardness, COD, BOD.
- 4- Flash point and Ignition points of Oils & Lubricants.

Project Report :- Students are required to visit places of industrial interest.

Division of marks for practical

Two practical	30
Viva	10
Seasonal	10
Total	50 Marks


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Unified Syllabus

Class - **B.Sc. IIIrd Year**

Subject - **Industrial Chemistry**

Paper - **First**

Max. Marks : 42^{1/2}

Unit - I **Factors involved in project cost estimation** Methods employed for the estimation of capital investment. Capital formation, Elements of cost accounting., Interest and investment costs. Time value of money-equivalence. Depreciation, methods of determining depreciation, Taxes, Some aspect of marketing.


Unit - II **Pricing Policy** : Profitability criteria, Economics of selecting alternatives. Variation of cost with capacity, Break even point, optimum batch sizes, production scheduling etc.

Unit - III **Concept of scientific management in industry**, Functions of management decision making and planning organizing, location of industry, directing and control inventory control, management of human resources selection incentives. Concept of welfare and safety in industries.

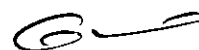
Unit - IV **Modern Instrumental methods of analysis.** Chromatography, paper chromatography, TLC, GLC, HPLC. UV-visible spectroscopy, Beer lamberts law, IR Spectroscopy, rotational vibrational and transitional spectra.

Unit - V **Sampling** procedures, sampling of bulk materials, Techniques of sampling solids liquids and gases, Collecting and processing of data. NMR-Spectroscopy, Atomic Adsorption, Flame Photometry. Neutron diffraction, X-ray fluorescence.

Books : 1- Instrumental Methods of Chemical analysis : B.K. Sharma



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Department of Higher Education Madhyapradesh

Unified Syllabus

Class - B.Sc. IIIrd. Year
 Subject - Industrial Chemistry
 Paper - Second Theory : 42^{1/2}

UNIT- I Physical and Chemical processes used for the recovery of important compounds : - Adsorption, Evaporation, Distillation, Centrifugation, Coagulation, Osmosis, reverse osmosis and electro dialysis.

UNIT- II Need for waste recyles : - limitation of raw material resources, waste elimination, conversion of waste –into useful products. Domestic and agro waste, feasibility of recycle, separation of waste- solid, liquid and gases.

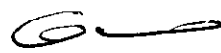
UNIT- III Synthetic Fibers : Introduction, important requirements of a fiber, difference between natural fibers and artificial or synthetic fibers, properties of synthetic fibers, method of spinning, application of synthetic fibers, rayon.

UNIT-IV Characterization of waste management and recovery of important compound from the waste of the following industries. Slaughter houses, rubber, sugar, heavy chemicals, fermentation, thermal power station, electroplating and paper.

UNIT-V Recovery of compound from oil industries, dyestuff industries, fertilizers industries, textile industries. Soap and plant.
Small Scale Units : Agarbaties, wax candelas, shoe polish, chalk crayons, plaster of paris and safety matches.

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Department of Higher Education Madhyapradesh

Unified Syllabus

Class - B.Sc. IIIrd Year
 Subject - Industrial Chemistry
 Paper - Practical Max. Marks : 50


PRACTICAL SYLLABUS

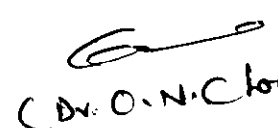
- 1- Determination of iodine value of an oils or fats.
- 2- Determination of saponification value of oils or fats.
- 3- Identification of calorific value of Petroleum based fuel.
- 4- Separation of important metals Fe, Ni, Cr, etc from effluents and their estimation.
- 5- Separation of ions and metals by thin layer chromatography and paper chromatography.
- 6- Study of adsorption of acetic acid on charcoal and prove the validity of freundilich's adsorption isotherm.

Division of marks for practical

Two parctical	30
Viva	10
Seasonal	10
Total	50 Marks

Project report student are requires to visit industries or place of industrial intrest and to collect their product and chemical effluent analysis and submit a brief report. Student's are also allow to participate in seminar's and workshop of related field.


 Dr. P.K. Sharma
 27/4/17


 (Dr. O.N.C. Choubey)