

# INDUSTRIAL CHEMISTRY

## PAPER - I

### INDUSTRIAL ASPECTS, OF ORGANIC & INORGANIC CHEMISTRY

(paper code - 0821)

**UNIT-1** 1.1 Nomenclature Generic names, Trade names.

1.2 Raw Materials for Organic compounds :-

Petroleum, natural gas, Fractionation of Crude oil.

**UNIT-2** 2.1. Petroleum :- Cracking, reforming Hydroforming isomerisation.

2.2. Coal :- Types, Structure, Properties, distillation of coal, chemicals derived there from.

**UNIT-3** 3.1. Renewable natural resources :- Cellulose, starch, properties, modification, important industrial Chemicals derived from them, Alcohol and alcohol based chemicals, Oxalic acid, Furfural.

3.2. Basic metallurgical operations :- Pulverisation, calcination, Roasting, refining.

**UNIT-4** 4.1 Physico chemical principles of extraction of :- Iron, Copper, Lead, Silver, Sodium, Aluminium, Magnesium, Zinc, Chromium.

**UNIT-5** Inorganic materials of Industrial Importance :- Their availability, forms, structure and modification. Alumina, Silica, Silicates, Clays, Mica, Carbon, Zeolites.

#### BOOKS :

1. Coal Conversion, E.J. Hoggman, The Energon Co., Lavamie Wyoming, U.S.A.
2. Introduction of Petroleum Chemicals, H. Steiner, Pergamon Press.
3. From Agrocabon to Petrochemicals, L.F. Hatch & S. Matarm, Gulf Publishing Co., Houston.
4. Cellulose : Its Chemistry & Technology, Hall A.G.
5. Methods in Carbohydrate Chemistry, Vol. 3 - Cellulose, Whistler, R.L.
6. Chemistry of Cellulose, Heuser, E.
7. Chemistry & Industry of Starch, Kerr, R.W.
8. Modified Starches : Properties & Uses, Wurzburg, O.B.
9. Principles of Extractive Metallurgy, Herbashi, Vol. I & II.
10. Theory of Metallurgical Processes, Volsky, A. & Sergievskaya, F.
11. Text book of Metallurgy, Bailey, A.R.
12. Clays, H. Reis, John Wiley & Sons.
13. Unit Processes of Extractive Metallurgy, Perry, Elsevier Publication.
14. Industrial Chemistry, Reigel, Reinhold Publication.

*Abhinav* 24.7.2017    *Abhinav* 24.7.17    *Abhinav* 24.7.17    *Abhinav* 24.7.17    *Abhinav* 24.7.17    *Abhinav*

**PAPER - II**  
**INDUSTRIAL ASPECTS OF PHYSICAL CHEMISTRY**  
**MATERIAL AND ENERGY BALANCE**  
**(paper code - 0822)**

**UNIT-1** Surface. chemistry and Interfacial Phenomena Adsorption Isotherm, Sols, Gels, Emulions, Micoemulsions,,micelles, Aerosols, Effect of surfactants, Hydrotropes.

**UNIT-2** Calalysts :- Introduction, Types, Homog-eneous and Heterogeneous, Basic Principles, Mechanisms factors affecting the performance, Introduction to phase transfer catalysis

**UNIT-3** 3.1. Enzyme catalysed reactions - Rate model, Industrially important reactions.

3.2. Material Balance without chemical Reactions:- flow diagram formaterial balance, simple material with or without recycle or by-pass for chemical engineering opera-tions such as distillation, crystallisation, evaporation, extraction, etc.

**UNIT-4** 4.1. Dimensions and Units :- Basic. chemical calculations -Atomic weight, molecular, weight, equivalent weight, mole composition of (i) liquid mixt<sup>r</sup>ure & (ii) gaseous mixture.

4.2. Material balance involving chemical reaction :- concept of limiting reactant, con-version, yield liquid phase reaction, gas phase reactions with/without recycle or by-pass.

**UNIT-5** Energy Balance :- Heat capacity of p-ure gases and gaseous mixtures at constant pres sures. Sensible heat changes. in liquids, Enthalpy changes.

**BOOKS :**

1. Aersol, Science & Technology, Shephered, H.R.
2. Catalysis :Heterogeneous & Homogeneous, Delmon, Elbevier Scienu Publication.
3. Catalysis, Science & Technology, Anderson, J.
4. Catalysis in Micelller & Macromolecular systems, Fendler & Fendler.
5. Phase Transfer Catalysis, Principle & Techniques, Strles, C.
6. Surgace Chemistry, J.J. Bikermann, Academic Press.
7. Physical Chemistry of Surfaces by A.W. Admson.
8. Storchiometry, B.I. Bhalt & S.M. Vora.
9. Chamilical Process Principle - Part I, B.A. Hougen, K.M. Watson & R.A. Ragats, Asia Publi-cation.

**PAPER - III**  
**UNIT OPERATIONS IN CHEMICAL INDUSTRY AND UTILITIES,**  
**FLUID FLOW AND HEAT TRANSPORT IN INDUSTRY**  
**(paper code - 0823)**

**UNIT-1** 1.1. Distillation - Introduction; Batch and continuous distillation, separation of azeo-tropes, plate columns & packed, columns.

1.2. Absorption - Introduction, Equipments- Packed columns, spray columns, bubble columns, palcked bubble columns, mechanically, agitated contractors.

**UNIT-2** 2.1 Evaporation - Introduction, Equipments - short tube (standard) evaporator, forced circulation evaporators, falling film evaporators, climbing film (Upward flow) evaporations, wiped (agitated) film evaporator.

Filtration - Introduction, filter media and filter aids, Equipments- Plate and frame, filter press, nutch filter, rotatory drum filter, sparkler filter, candle filter, bahgfifter, cen-trifuge.

Drying - Introdunction, free moisture, bound. moisture, drying curve, Equipments tray dryer, rotatory dryer, flash drater, fluid bed dryer, drum dryer, spray dryer.

**UNIT-3** 3.1 Utilities in chemical Industry

Fuel - Types of fuels -advantages and disadvantages, combustion of fuels, calortific value. specification for fuel oil.

Boilers - Types of.-boilers and their functioning.

Water - Specifications fof industrial use, various water treatments.

Steam - Generation and use.

Air - Specifications for Industrial use processing of air.

**UNIT-4** Fluid Flow : Fans, blowers, compressors, vacuum pumps, ejector. Pumps :-  
Reciprocating pumps,, Gear pumps,, centrifugal pumps.

**UNIT-5** Heat Exchangers -: Shall and Tube type; finned tube heat exchangers, plate heat ex-changers, refrigeration cycles.

**BOOKS :**

1. Introduction Chemical Engineering, W.L. Badger, J.J. Banchero, McGraw Hill.
2. Unit Operations in Chemical Engineering, W.L. McCabe & J.C. Smith, McGraw Hill.
3. Chemical Engineer's Hand Book, J.H. Perry, McGraw Hill.
4. Unit Operations - I & II, D.D. Kale, Pune Vidyarthi Griha Prakashan, Pune.
5. Unit Operations of Chemical Engineering, Vol. I, P. Chattopadhyay, Khanna Publishers, Delhi.

  
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### PRACTICAL

<b>Duration of Examination :</b>		<b>04 Hrs.</b>
Discription of marks	Experiment	: 30 marks
	Viva	: 05 marks
	Sessional	: 05 marks
	Project	: 40 marks
	<b>Total</b>	<b>: 80 marks</b>

### EXPERIMENTS TO BE PERFORMED :

1. Simple laboratory techniques crystallisation, Fraction Crystallisation, Distillation, Fractional distillation Boiling Point.Diagram.
2. Extraction Processes- Phase diagram, partition coefficient.
3. Preparation of standard solutions- Primary<sup>2</sup> and<sup>4</sup>secondary standards, Determination of- and  $H_3PO_4$  in a mixture.
4. Calibration of Thermometres.
5. Acquaintance with safety measures in a laboratory Hazards of Chemicals.
6. Depression and elevation in.b.p./m.p. of solids and liquids.
7. Chromatography-column, Paper, Thin layer.
8. Ore analysis dolomite, limestone, -calcite, Analysis of alloys such as cupro-nickel.
9. Determination of Physical Constants  
Refractive -index, surface tension, Effect of surfactants, on surface tension, viscosity- Fluids, Polymer solutions effect of additives on viscosity, optical rotation.
10. Study, experimenfs/demonstration experiments.

**Note :** Any two experiments have to be carried out by the students in the Examination. A Mini mum of 60% of the'experiments have to be conducted by the students.

**INDUSTRIAL CHEMISTRY**  
**PAPER – I**  
**(Paper Code - 0871)**

**M.M. 34**

**UNIT-I** Material Science : Mechanical Properties of materials and change with respect to temperature. **02L**

**Material of constructions used in Industry :**

**Metals and Alloys :** Important metals & alloys; iron, copper, aluminium lead, nikel, titanium and their alloys- Mechanical and chemical properties and their applications. **06L**

**Cement :** Types of cement, composition, manufacturing process, setting of cement. **04L**

**Ceramics :** Introduction, Types, Manufacturing process, Applications. Refractories. **04L**

**UNIT-II** Polymeric Mateials : Industrial polymer and comoposite materials- Their constitution, Chemical and physical properties, Industrial applications. **06L**

**UNIT-III** **Glass :** Types, composition, manufacture, physical and chemical properties, Applications. **04L**

**Corrosion :** Various types of corrosion relevant to chemical Industry-Machanism, Preventive methods. **04L**

**UNIT-IV** Pollution : Air, Oxygen, nitrogen cycle, water, Biosphere, flora and fauna, Energy, soil. **05L**

Pollutants and their statutory limits, pollution evaluation methods. **04L**

**UNIT-V** Air pollution-various pollutants. water pollution-organic/inorganic pollutants, Noise pollution, sewage analysis, pesticide pollution, Radiation pollution, green house effect, future. **10L**

**Books Recommended :**

1. Pollution control in chemical & Allied Industries, S.P. Mahajan.
2. Poolution Control in Industries, A Sories of Books by Jones, H.P.
3. Air Pollution - Vol.1 to 4, Editor, STERN, A.C.; Academic Press.
4. Environmental Engineering, G.N. Pandey, Tata McGraw Hill.
5. Homd Book of Air Pollution, A. Parker, Tata McGraw Hill.
6. Science of Ceromic chemical Processing, Hench, L.L.
7. Science of Ceramics, Stewarts, G.H.
8. Chemistry of Cement.
9. Properties of Glass, Morcy, G.W.
10. Chemistry of Glasses, Paul, A.
11. Corrosion, causes & Prevention, Spellur, F.N.

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24.7.2017    24.7.17    24.7.17    24.7.17    24.7.17    24.7.17

**PAPER - II**  
**(Paper Code - 0872)**

**M.M. 33**

**UNIT-I** Unit processes in organic chemicals manufacture -

**Nitration** : Introduction - Nitrating agents, Kinetics and mechanism of nitration processes such as nitration of :

- i Paraffinic hydrocarbons
- ii. Benzene to nitrobenzene and m-dinitrobenzene
- iii. Chlorobenzene to o and p nitrochloro benzenes.
- iv. Acetanilide to p-nitroacetanilide
- v. Toluene

Continous vs batch nitration.

**12L**

**UNIT-II Helogenation:** Introduction-Kintics of helogenation reactions reagents for elogenation, Helogenation of aromatics-side chain and nuclear helogenations, commercial manufacture of chlorobenzenes, chloral, monochloracetic acid and chloromethanes, dichloro fluormethane.

**09L**

**UNIT-III Sulphonation** : Introduction-sulphonating agents, chemical and physical factors in sulphonation, Kinetics and mechanism of sulphonation reaction, commercial sulfonation of benzene, naphthalene, alkyl benzene, Batch vs continous sultphonation.

**09L**

**UNIT-IV Effluent Treatment and waste Management** : Principles and equipments for aerobic, anaerobic treatment, adsorption, filtration, sedimentation. **09L**

**UNIT-V** Bag fillters, electrostatic precipitator, mist eliminators, wet scrubbers, absorbers, solid waste management, industrial safety. **09L**

**Books Recommended :**

1. Unit process in Organic synthesis P.M. Groggins, McGraw Hill.
2. Effluent Treatment in process Industries - Inst. of Cham. Engg.
3. Effluent Treatment and waste Disposal - Inst. of Chem. Engg.
4. Effluent Treatment and Disposal - Inst. of Chem. Engg.

  
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**PAPER - III**  
**(Paper Code - 0873)**

**M.M. 33**

**UNIT-I Oxidation :** Introduction-Types of oxidation reactions, oxidizing agents, kinetics and mechanism of oxidation of organic compounds liquid phase oxidation, vapor phase oxidation, commercial manufacture of benzoic acid, maleic anhydride, phthalic anhydride, acrolein, acetaldehyde, acetic acid. **07L**

**UNIT-II Hydrogenation :** Introduction-Kinetics and thermo-dynamics of hydrogenation reactions, catalysts for hydrogenation reactions, hydrogenation of vegetable oil. manufacture of methanol from carbon monoxide and hydrogen, hydrogenation of acids and esters to alcohols, catalytic reforming. **07L**

Alkylation: Introduction; Types of alkylation, Alkylating agents, Thermodynamics and mechanism of alkylation reactions, manufacture of - alkyl benzenes (for detergent manufacture), ethyl benzene, phenyl ethyl alcohol, N-alkyl anilines (mono and di- methyl anilines) **03L**

**UNIT-III Esterification :** Introduction; Hydrodynamics and kinetics of esterification reactions, Esterification by organic acids, by addition of unsaturated compounds, esterification of carboxy acid derivaives, commercial manufacture of ethyl acetate, dioctyl phthalate, vinyl acetate, cellulose acetate. **04L**

**Amination : (A) By reduction :** Introduction, Methods of reduction-metal and acid, catalytic, sulfide, electrolytic, metal and alkali sulfites, metal hydrides, sodium metal, concentrated caustic oxidation, reduction, commercial manufacture of aniline, m-nitroaniline, p-amino phenol.

**(B) By aminolysis :** Introduction, aminating agents, factors affecting. **09L**

**Hydrolysis :** Introduction; hydrolysing agents, kinetics, thermodynamics and mechanism of hydrolysis. **02L**

**UNIT-IV Procees Instrumentation :** concept of measurement and accuracy Principle, construction and working of following measuring instruments.

Temperature : Glass thermometers, bimetallic thermometer pressure spring thermometer, vapour filled thermometers resistance thermometers. radiation pyrometers.

Pressure : Manometers, barometers, bourdon pressure gauge ; bellow type, diaphragm type pressure gauges, macleod gauges, pirani gauges, etc. **12L**

**UNIT-V Liquid level :** Direct-indirect liquid level measurement, Float type liquid level gauge, ultrasonic level gauges; bubbler system, density measurement, viscosity measurement. **07L**



**Books Recommended :**

1. Unit process in organic synthesis, P.M. Groggins, McGraw Hill.
2. Industrial Instrumentation, Bekmen, D.P., John wrleys.
3. Applied Instrumentation in process Industries, Vol. I, II & III, Andrews, W.G., Gulf Publication.
4. Instrumentation and Control for the process Industries, Borer, S. Elsevier Applied Science Publishers.
5. Chemical Enggineer's Hand book, Perry, J.H. and Green, D. McGraw Hill.

**Time : 4 Hours**  
**50****PRACTICALS****M.M.**

**Unit Process :** One to two examples of each of the following unit processes. Nitration, sulphonation, friedel-crafts reaction, esterification, hydrolysis, oxidation, Halogenation, chloro-sulphonation, reduction, polymerization, reactions of diazonium salts. **Instrumental methods of analysis :** Use of colourimeter pH meter, potentiometer, conductometer, refractometer, polarimeter

**Materialtesting:** Testing of alloys identification of plastics/rubber estimation of yield point, young's modulus, flaredness; Optical, thermal mechanical and electrical properties. **Process Instrumentation :** Transducers of different types. use of Tranducer for measuring flow control. Determinatiaon of flash point and ignition points of liquids.

**Water analysis :** Solid contents, Hardness, COD and other tests as per industrial specifications.

**Flow measuring devices :** Floats Monographs of representative raw materials such as sulphuric acid, toluene, sodium, carbonate, sodium hydroxide, carbon tetrachloride benzoic acid (5-6 compounds). Limit tests for heavy metals Pb, AS, Hg, Fe and ash content.

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## INDUSTRIAL CHEMISTRY

### PAPER - I

(Paper Code-0925)

#### CHEMICAL PROCESS ECONOMICS

M.M. 34

- UNIT-I** 1. Factors involved in project cost estimation, methods employed for the estimation of capital investment. 06L  
2. Capital formation, elements of cost accounting. 05L
- UNIT-II** 1. Interest & investment cost, time value of money equivalence. 03L  
2. Depreciation, method of determining depreciation, taxes. 04L  
3. Some aspects of marketing, pricing policy. 04L
- UNIT-III** 1. Profitability criteria, economics of selecting alternatives. 03L  
2. Variation of costs with capacity, Break-even point, optimum batch sizes, Production, scheduling etc. 05L  
3. Sampling of Bulk materials, techniques of sampling of solids, liquids and gasses.  
4. Collection & Processing data. 02L  
5. Particle size determination. 02L  
6. Rheological properties of liquids, plastics and their analysis. 03L

#### INDUSTRIAL ORGANIZATION

- UNIT-IV** 1. Concept of scientific management in industry. 04L  
2. Functions of management, decision making, planning, organising, directing & control. 09L  
3. Location of industry. 03L
- UNIT-V** 1. Materials management. 05L  
2. Inventory control. 04L  
3. Management of human resources-selection, incentives, welfare & safety. 05L

#### BOOKS :

1. Economics of Chemical industry, Hempel, E.H.
2. Plant Design & Economics for Chemical Engineers, Peter Time Rhaus, McGraw Hill.
3. I.C.M.A. Booklets-9 & 10.
4. Industrial Organization & Management, Bethel, L.L.
5. Industrial Organization & Management, Tarachand, Vol. I & II.
6. Book on Management, O.P. Khandelwal.
7. Rheology theory & application, Vol. 5, Elrich, R.F.

**PAPER - II**  
**(Paper Code-0926)**  
**PHARMACEUTICALS**

**M.M. 33**

- UNIT-I**
1. Historical Background & development of pharmaceutical industry in India in brief. 02L
  2. Pharmacopoeias - Development of Indian pharmacopoeia & introduction of B.P., U.S.P., E.P., N.F. & other Important Pharmacopoeias. 02L
  3. Introduction to various types of formulations & routes of administration. 02L
  4. Aseptic conditions, need for sterilisation, various methods of sterilisation. 02L

- UNIT-II**
1. Various types of pharmaceutical excipients their chemistry, process of manufacture & quality, specifications Glidants, lubricants, diluents, preservatives, antioxidants, emulsifying agents, coating agents, binders, coloring agents, flavouring agents gelatin & other additives, sorbitol, mannitol, viscosity builders etc. 12L
  2. Surgical dressing, sutures, ligatures with respect to the process, equipments used for manufacture, method of sterilization and quality control. 05L

- UNIT-III**
1. Pharmaceutical packaging introduction, package selection, packaging materials, ancillary materials, packaging machinery, quality control of packaging materials. 05L
  2. F.D.A., Important schedules & some legal aspects of drugs. 03L
  3. Pharmaceutical quality control (other than the analytical methods covered under core-subject) - sterility testing, pyrogenic testing, glass testing, bulk density of powders, etc. 06L

- UNIT-IV**
1. Evaluation of crude drugs-Moisture content, extractive value, volatile oil content, foreign organic matter, quantitative microscopic exercises, including starch, leaf content, (palisade ratio, stomatal number & index vein, islet number & vein termination number), crude fiber content, introduction to chromatographic method of identification of crude drugs. 06L
  2. Chromatography, Paper chromatography, TLC, HPLC, GLC. 04L
  3. Ion chromatography. 01L

**INSTRUMENTATION**

- UNIT-V**
1. UV-Visible spectroscopy. 03L
  2. IR-Spectroscopy non-dispersive IR. 03L
  3. NMR Spectroscopy. 03L
  4. Atomic Absorption & Flame photometry. 03L
  5. Neutron diffraction. 01L
  6. X-Ray Fluorescence. 01L
  7. Ion Selective Electrodes. 01L

## BOOKS :

1. Instrumental methods of analysis, Willard, Merit, Dean.
2. Introduction to instrumental methods of analysis, Braun, R.D., McGraw Hill.
3. Analytical chemistry, J.B. Dick, McGraw Hill.
4. Quantitative Inorganic analysis, A. Vogel.
5. Instrumental methods of Analysis, Skoog & West.
6. Instrumental Methods of Analysis, B.K. Sharma.

## PAPER -III

(Paper Code-0927)

## DRUGS

M.M. 33

**UNIT-I** 1. Phyto-chemicals-Introduction to plant classification & crude drugs, cultivation, collection, preparations for the market & storage of medicinal plants.

2. Classification of various types of drugs with examples.
3. Raw materials, process of manufacture, effluent handling, etc. of the following bulk drugs :-
  - (i) Sulpha drugs-sulphaguanidine, sulphamethoxazole.

**UNIT-II** 1. Chemical constitution of plants including carbohydrates, amino acids, proteins, fats, waxes, volatile oils, terpenoids, steroids, saponins flavonoids, tanins, glycosides, alkaloids.

2. Various isolation procedures for active ingredients with examples for alkaloids, reserpine one for steroids sapogenin, diosgenin, diogron.

**UNIT-III** 1. Antimicrobial :- Chloramphenicol, Furazolidne, Mercurochrome, Isoniazid, NAPS.

2. Analgesic-AntiInflammatory :- Salicylic acid and its derivatives, Ibuprofen, Mefenamic acid.
3. Steroidal Harmones :- Progesterone, Testosterone, Methyl testosterone.

**UNIT-IV** 1. Vitamins :- Vit.-A, Vit.-B6, Vit.-C.

2. Barbiturates :- Pentobarbital.
3. Blockers :- Propranolol, Atenolol.
4. Cardiovascular Agent :- Methyl dopa.
5. Antihistamins :- Chloropheneramine Maleate.

**UNIT-V** 1. Products based of fermentation processes :- Brief idea of micro-organisma, their structure, growth & usefulness. Enzyme systems useful for transformation, microbial products.

2. General principles of fermentation processes & product processing.
3. Manufacture of antibiotics - Pencillin-G & semi synthetic pencillines, Rifamycin, Vitamin-B12.
4. Bio-transformation process for prednisolone, 11-hydroxylation in steroids.
5. Enzyme catalysed transformation, manufacture of ephidrine.

  
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## BOOKS :-

1. Practical Pharmacognosy, T.B. Willis.
2. Practical Pharmacognosy, T.N. Vasudevan.
3. Modern Pharmacognosy, Remstad, McGraw Hill.
4. Indian Pharmacopoea, 1985.
5. British Pharmacopoea, 1990.
6. Hand Book of Drugs & Cosmetic Act, Mehrotra.
7. Pharmaceutical excipients.
8. Pharmaceutical Dosage forms.
9. Principles of Medicinal Chemistry, W.O. Foye, Lea & Febigen, Publication Philadelphia.
10. Text Book of Organic Medicinal & Pharmaceutical Chemistry, Willson, Gisvold, Derge; Lippinett-Toppan.
11. Essentials of Medicinal Chemistry, Korolkovas & Burkhatler, Wiely Interscience.

## PRACTICAL

**Marks : 50**

The Practical examination will be of 08 Hrs. Duration spread over two days carrying 50 Marks.

Two experiments have to be performed.

1. Synthesis of common industrial compounds involving two step reactions. 4-Bromoaniline, 3-Nitroaniline, Sulphanilamide, 4-Aminobenzoic acid, 4-Nitrobenzoic acid, dihalobenzenes, Nitrohalobenzenes.
2. Industrial analysis of common raw materials as per industrial specification :- Phenol, Aniline, Formaldehyde, Hydrogen peroxide, Acetone, Epoxide, Olefins, Oils etc.
3. Demonstration of various pharmaceutical packaging materials, quality control tests of some materials, -A1 Strips, Cartons, Glass bottles.
4. Limit tests for chlorine, heavy metals, arsenic, etc. of two representative bulk drugs.
5. Demonstration of various pharmaceutical products.
6. Active Ingredient analysis of few types of formulations representing different methods of analysis-acidimetry, alkalimetry, non-aqueous.
7. Determination of sulphate ash, loss of drying & other tests of bulk drugs, complete I.P. monograph of three drugs representing variety of testing methods.
8. Evaluation of crude drugs-macroscopic examination-determination & identification of starch granules, calcium oxalate.
9. Palisade ratio, stomatal index-determination & Identification of few drugs. TLC method for identification.
10. Microbiological testing-determination of MIC of some antibacterial drugs by zone/cup plate method.

## DISTRIBUTION OF MARKS :

1. Experiment No. 1.	20
2. Experiment No. 2.	10
3. Viva	05
4. Sessional	05
5. Project Work	10
<b>Total</b>	<b>50</b>