

SYLLABUS

&

Scheme of Examination, *w.e.f.* 2014-2015

B.Sc. Industrial Chemistry – Ist year (Vocational Course)

First Semester

Theory	Maximum Marks	Time allowed for Exam (Hours)
Paper – 101	40+10*	3 hrs
Paper – 102	40+10*	3 hrs

Second Semester

Theory	Maximum Marks	Time allowed for Exam (Hours)
Paper – 201	40+10*	3 hrs
Paper – 202	40+10*	3 hrs

Practicals

Paper - 203	100	7 hrs (<i>Spreads over two sessions</i>)
-------------	-----	--

**Internal assessment*

SYLLABUS

&

Scheme of Examination, *w.e.f.* 2015-2016

B.Sc. Industrial Chemistry – IInd year (Vocational Course)

Third Semester

Theory	Maximum Marks	Time allowed for Exam (Hours)
Paper – 301	40+10*	3 hrs
Paper – 302	40+10*	3 hrs

Fourth Semester

Theory	Maximum Marks	Time allowed for Exam (Hours)
Paper – 401	40+10*	3 hrs
Paper – 402	40+10*	3 hrs

Practicals

Paper - 403	100	7 hrs (<i>Spreads over two sessions</i>)
-------------	-----	--

**Internal assessment*

SYLLABUS

&

Scheme of Examination, *w.e.f.* 2016-2017

B.Sc. Industrial Chemistry–IIIrd year (Vocational Course)

Fifth Semester

Theory	Maximum Marks	Time allowed for Exam (Hours)
Paper – 501	40+10*	3 hrs
Paper – 502	40+10*	3 hrs

Sixth Semester

Theory	Maximum Marks	Time allowed for Exam (Hours)
Paper – 601	40+10*	3 hrs
Paper – 602	40+10*	3 hrs

Practicals

Paper - 603	100	7 hrs (<i>Spreads over two sessions</i>)
-------------	-----	--

**Internal assessment*

First Semester

Paper – I01 (Theory)

Max. Marks: 40

Time: 3 hours

Note: Eight questions will be set section wise, two questions from each section and the candidate have to attempt five questions in all selecting at least one question from each section. All questions carry equal marks.

Section – I

Metallurgy I: Definition, metallurgical operations- crushing and pulverization, concentration methods- gravity separation, magnetic concentration, froth floatation process, chemical method; calcinations and roasting, reduction-using carbon and carbon mono-oxide, using aluminium (aluminio thermite reduction), auto reduction, reduction using precipitation method; refining by liquation, polling, zone refining, parting and electrolytic refining .

(7½)

Section – II

Metallurgy II: Metallurgical extraction and refining of the following metals from their important ores: Copper from copper pyrite, Lead from galena (lead sulphide), Aluminum from bauxite, Zinc from zinc blende (zinc sulphide).

(7½)

Section – III

Colloidal Chemistry: Colloidal dispersions, definition, types, emulsions and types, detection of the types of an emulsion and their applications. Gels- formation and its types and importance of gels, sols and their types, micelles- critical micellization concentration (CMC), types, preparation and uses.

(7½)

Section – IV

Catalysis: Definition, positive and negative catalyst, types of catalysis-homogeneous and heterogeneous catalysis and their theories- adsorption theory and intermediate complex formation theory, characteristics of catalytic reactions, mode of action of catalytic inhibitors, catalytic promoters/ supporters, catalytic poisoning, auto-catalysis, introduction to enzyme catalysis and its mechanism, characteristics of enzyme catalysis, optimum pH and temperature.

(7½)

First Semester

Paper – I02 (Theory)

Max. Marks: 40

Time : 3 hours

Note: Eight questions will be set section wise, two questions from each section and the candidate have to attempt five questions in all selecting at least one question from each section. All questions carry equal marks.

Section – I

1. **Drying:** Introduction, free moisture, bound moisture, equilibrium moisture content, drying rate and drying curves, constant rate period and falling rate period of drying, purpose of drying, equipments – rotary dryers.

(4)

2. **Evaporation:** Introduction, factors affecting the rate of evaporation and choice of evaporators, application of evaporation in chemical process industries, equipment-climbing film and falling film evaporators.

(3½)

Section – II

1. **Distillation:** Introduction, volatility, relative volatility, general equipment for distillation, comparative study of distillation, evaporation and drying, applications of distillation, concept of batch and continuous distillation, simple batch or differential distillation, simple steam distillation- advantages, disadvantages and applications, fractional distillation or rectification.

(5½)

2. **Boilers:** Introduction, classification and applications of boilers.

(2)

Section – III

1. **Filtration:** Introduction, filter media and filter aids, qualities/ characteristics of ideal filter aids, factors affecting the rate of filtration and choice of filter media,

equipments- bag filters and candle filters- description, components, selection criteria, operational sequence and maintenance of candles.

(6)

2. **Absorption:** Introduction, desorption or gas stripping, equipments- spray columns for absorption.

(1½)

Section – IV

1. **Material balance:** Introduction, classification of material balance problems, steady and unsteady state of flow processes, material balance without chemical reactions, general methods of solving material balance problems for systems without chemical reactions, a brief study of procedure for material balance calculations, flow/block diagrams for various industrially important chemical engineering operations such as – distillation, absorption and crystallization and their overall material balance equations (*Numerical problems excluded*).

(6½)

2. **Bypass operations:** Concept and need of bypass operations and block diagrams (*Numerical problems excluded*) and their practical importance in process industries.

(1)

Second Semester

Paper – 201 (Theory)

Max. Marks: 40

Time: 3 hours

Note: Eight questions will be set section wise, two questions from each section and the candidate have to attempt five questions in all selecting at least one question from each section. All questions carry equal marks.

Section – I

Corrosion: Definition, types of corrosion – oxidation corrosion, nature of the corrosion layer formed, corrosion by hydrogen, concentration cell corrosion, stress corrosion, microbiological corrosion. Factors influencing corrosion – position of the metal in the galvanic series, relative cathodic and anodic area, purity of metal, nature of surface film formed, nature of the medium. Corrosion control – proper designing, cathodic protection, modification of the environment. Use of cathodic and anodic inhibitors.

(7½)

Section – II

Coal: Definition and classification, Analysis of coal – proximate analysis (determination and importance of moisture content, volatile matter, ash content and fixed carbon), Ultimate analysis (determination and importance of carbon, hydrogen, and impurities like sulphur, nitrogen, ash and oxygen in coal).

(7½)

Section – III

Petroleum– fractional distillation of crude oil using fractionating columns, brief introduction of each fraction, cracking- thermal and catalytic cracking of petroleum products, significance of octane and cetane number, Reforming – thermal and catalytic reforming.

(7½)

Section – IV

Historical background of the terms - Nomenclature, generic names and trade names.

Fuels: Definition and classification, calorific value and its units, Higher or gross calorific value, Lower or net calorific value, theoretical calculations of calorific value and Dulong formula for calculation of calorific value, characteristics of good fuel.

(7½)

Second Semester

Paper – 202 (Theory)

Max. Marks: 40

Time: 3 hours

Note: Eight questions will be set section wise, two questions from each section and the candidate have to attempt five questions in all selecting at least one question from each section. All questions carry equal marks.

Section – I

1. **Crystallization:** Introduction, concept of super saturation, modes of generation of super saturation, nucleation, primary nucleation and secondary nucleation, crystal growth, ΔL Law of crystal growth; caking of crystals, factors affecting caking and prevention of caking, equipment – circulating liquid evaporator crystallizers.

(4)

2. **Material balance involving chemical reactions:** Introduction, conceptual study of terms involved- stoichiometric equation, stoichiometric coefficients, limiting reactant, excess reactant, conversion, recycling operations and need for their adoption in process industries.

(3½)

Section – II

1. **Energy balance:** Introduction, law of conservation of energy, brief outline of general procedure for making energy balance calculations, enthalpy changes accompanying a chemical reaction, Hess's law of constant heat summation, heat capacity, heat capacity of pure gases at constant pressure and constant volume, relation between C_p and C_v .

(4½)

3. **Fluids flow:** Introduction, conceptual study of compressible and incompressible fluids, nature of fluid flow– streamline or laminar flow, turbulent flow, Reynolds number, and its applications.

(3)

Section – III

1. **Heat transfer:** Introduction, modes of heat transfer, Fourier's law of heat conduction, equipments: brief study of finned tube/extended surface heat exchanger, corrugation, types of corrugation, scraped surface heat exchanger and air cooled heat exchanger. (6)
2. **Steam:** Basic specification of water used for steam production, various applications of steam. (1½)

Section – IV

1. **Titrimetric Analysis:** Theoretical considerations, primary and secondary standards, neutralization indicators, mixed indicators, universal indicators, neutralization curves, choice of indicator in neutralization reactions, complexation titrations, metal ion indicators, precipitation titrations. (7½)

Books Recommended for Ist paper (Semester I & II):

1. Study Material in Vocational Subject to Industrial Chemistry (B.Sc. I, UGC Sponsored). (**Text Book**)
2. Physical Chemistry by B. R. Puri, L. R. Sharma & M. S. Pathania.
3. Principles of Extractive Metallurgy, Herbashi Vol. 1 & 2

Books Recommended for IInd paper (Semester I & II):

1. Study Material in Vocational Subject of Industrial Chemistry (B.Sc. I, UGC Sponsored) (**Text Book**)
2. Introduction to Chemical Engineering W. L. Badger and J. T. Banchero, McGraw-Hill Book Co., USA.
3. Unit Operations in Chemical Engineering W. L. McCabe and J. C. Smith, McGraw-Hill Books co., New York.

Second Semester

Paper – 203 (Practical)

Max. Marks: 40

Time: 7 hours

Note: In the first session of practical examination, the students are required to perform two experiments out of section-I, whereas, on the second day, they will perform one experiment from section-II.

Section – I

1. Prepare and standardize the solution of sodium hydroxide/ KMnO_4 volumetrically.
2. Analysis of Dolomite ore.
3. Analysis of Calcite ore.
4. Analysis of Brass alloy.
5. Analysis of Lime stone.
6. Analysis of Lunar caustic.
7. Determination of percentage of Fe in Mohr's salt.
8. Determine the Iodine value of a given oil sample.
9. Determine the saponification value of a given oil sample.

Section –II

10. To determine the moisture content in a given coal sample.
11. To purify the given organic solvent by distillation process.
12. To separate the different components of a solid mixture (salt and sand) by the process of filtration and evaporation.
13. To purify CuSO_4 / Potash alum by the process of crystallization.
14. Preparation of an emulsion: Oil-in-water and water-in-oil.

Distribution of Marks

Experience No.1 (From Section – I)	25 Marks
Experience No.2 (From Section – I)	25 Marks
Experiment No.3 (From Section – II)	25 Marks
Lab Record	15 Marks
Viva-voce	10 Marks

THIRD SEMESTER

Paper-30I (Theory)

Max. Marks: 40

Time: 3 Hrs

Note: Eight questions will be set section wise, two questions from each section and the candidate have to attempt five questions in all selecting at least one question from each section. All questions carry equal marks.

Section- I

Ceramics Industry: Introduction, type of clay products, properties of clay, plasticity of clay, manufacturing of white wares and stone wares and their application.

Refractories: Introduction, classification, properties of refractories body, manufacturing of Silica bricks, high alumina bricks, dolomite bricks, magnetite bricks, carbon bricks, graphite bricks and carborundum bricks and their applications.

(7½)

Section-II

Cement Industry: Introduction, types of cement, chemical composition of Portland cement, manufacturing of Portland cement, setting and hardening of cement and special cement.

Glass Industry: Introduction, properties of glasses, manufacturing of different type of glasses.

(7½)

Section – III

Unit process in organic chemistry. Type of reaction and intermediates.

Halogenation: Introduction, type of halogenation reaction, halogenating agents, kinetics and mechanism of halogenation, manufacturing of chloroethane, chlorobenzene and chloral.

(7½)

Section – IV

Sulphonation: Introduction, type of sulphonation reaction, sulphonating agents, mechanism of sulphonation reaction, commercial sulphonation of benzene and alkyl benzene.

(7½)

Books Recommended:

1. Engineering chemistry of Jain and Jain.
2. Industrial chemistry by B.K Sharma.
3. UGC (vocation course) notes.

THIRD SEMESTER

Paper-302 (Theory)

Max. Marks: 40

Time: 3 Hours

Note: Eight questions will be set section wise, two questions from each section and the candidate have to attempt five questions in all selecting at least one question from each section. All questions carry equal marks.

Section-I

Noise Pollution: Definition, noise level - bearable limit, sources of noise pollution, bad effects and prevention of noise pollution.

Pesticide Pollution: Classification of pesticides, sources of pesticide pollution, bad effects and control measure.

(7½)

Section-II

Thermal pollution: Definition, sources of thermal pollution, bad effects of thermal pollution,

Radiation pollution: Sources, hazards of nuclear radiations, protective measures, methods of disposal of radioactive waste.

(7½)

Section-III

Air pollution: Air pollutants: Gases - sulphur di oxide, sulphur tri oxide, oxides of nitrogen, carbon mono oxide. Particulate matter - dust, smoke, smog, their sources and bad effects.

(7½)

Section-IV

Green house effect and its consequences. Deforestation and its consequences, Remedial measures to control air pollution, processing of air by cyclone separator and electrostatic precipitator, industrial specification and uses of air.

(7½)

Fourth Semester

Paper-401 (Theory)

Max. Marks: 40

Time: 3 Hours

Note: Eight questions will be set section wise, two questions from each section and the candidate have to attempt five questions in all selecting at least one question from each section. All questions carry equal marks.

Section – I

Sugar industry: Introduction, manufacturing and refining of sugar from sugar cane and beet root.

Pulp and paper industry: Introduction, study of raw materials for manufacturing of pulp, different methods of pulping, manufacturing of wood pulp by sulphite process, sulphate process and soda process, bleaching of wood pulp, refining of pulp, sizing, colouring and manufacturing of thin paper by fourdrimer machine and cylinder machine.

(7½)

Section – II

Nitration: Introduction, types of nitration reaction, nitrating agents, kinetics and mechanism of nitration, manufacturing of nitro benzene and p-nitro acetanilide.

Oxidation: Introduction, type of oxidation reaction, oxidising agents and mechanism of oxidation, commercial manufacturing of benzoic acid, phthalic anhydride and acetic acid.

(7½)

Section – III

Hydrogenation: Introduction, types of catalysts used for hydrogenation, mechanism of hydrogenation, hydrogenation of vegetable oil.

Alkylation: Introduction, types of alkylation reactions, alkylating agents, mechanism of alkylation, manufacturing of ethyl benzene and alkyl benzene (for detergent).

(7½)

Section – IV

Esterification: Introduction, kinetics and mechanism of esterification, esterification by organic acid and by addition of unsaturated compounds. Commercial manufacturing of ethyl acetate.

Hydrolysis: Introduction, hydrolyzing agents and kinetics and mechanism of hydrolysis, industrial importance of hydrolysis.

(7½)

Fourth Semester

Paper- 402 (Theory)

Max. Marks: 40

Time: 3 Hours

Note: Eight questions will be set section wise, two questions from each section and the candidate have to attempt five questions in all selecting at least one question from each section. All questions carry equal marks.

Section-I

Water: Definition, sources and bad effects of water pollution, specification and industrial uses of water.

Water analysis: Determination of alkalinity, acidity, hardness, dissolved oxygen and chloride content

(7½)

Section-II

Treatment of waste water: Preliminary treatment - removal of gross solid, grit, oil and grease. Primary, Secondary and Tertiary treatment of water.

(7½)

Section-III

Solid Waste Management: Classification of solid waste, Microbiology of solid waste, Disposal processes - composting, Sanitary land filling, Incineration and pyrolysis.

(7½)

Section-IV

Process Instrumentation: Principle, construction and working of the following instruments: Glass thermometer, Bimetallic thermometer, Resistance thermometer, Radiation pyrometers, Pressure-manometers, Barometers..

(7½)

Books Recommended for third and fourth semesters:

1. Study material in Vocational subject of industrial chemistry (BSc-II UGC Sponsored)
2. Science of ceramics-chemical processing: Hench L.L
3. Pollution control of chemical and Allied Industries Mahajan, S.P.

Fourth Semester

Paper-403 (Practical)

Max. marks: 100

Time: 7 Hours

Note: The practical is spread over in two sessions. In the first session the candidate have to perform two experiments from first section and in the second session the candidate have to perform one experiment from the second section.

Section-I

- 1 Determination of percentage of silica in given cement sample.
- 2 Determination of Al_2O_3 content in given cement sample.
- 3 Determination of Fe_2O_3 content in given cement sample.
- 4 Determination of MgO content in given cement sample.
- 5 Determination of alkalinity of water sample.
- 6 Determination of acidity of water sample.
- 7 Determination of total hardness of water sample.
- 8 Determination of temporary and permanent hardness of water sample.
- 9 Determination of dissolved oxygen of water sample.
- 10 Determine pH of given water sample.

Section-II

Nitration: Preparation of *m*-dinitrobenzene

Sulphonation: Preparation of Sulphanilic acid

Reaction of diazonium salt: Preparation of 1-phenyl azo β -naphthol

Reduction: Preparation of *m*-nitroaniline from *m*-dinitrobenzene.

Oxidation: Prepare anthraquinone from anthracene.

Prepare *p*-nitro benzoic acid from *p*-nitro aniline.

Prepare anthranilic acid from phthalic anhydride

Distribution of Marks

Experiment No. 1 (from section-I) 25 Marks

Experiment No. 2 (from section-I) 25 Marks.

Experiment No. 2 (from section-II) 25 Marks.

Lab Record 15 Marks

Viva Voce 10 Marks

Fifth Semester

Paper –501 (Theory)

Max Marks: 40

Time: 3 Hours

Note: Eight questions will be set section wise, two questions from each section and the candidate have to attempt five questions in all selecting at least one question from each section. All questions carry equal marks.

Section-I.

Chemometrics: Accuracy and precision, classification of errors and their minimization. Significant figures and computations. Standard deviation and relative standard deviation

(7½)

Section –II

Chromatography: Principle and classification of chromatographic method, paper chromatography, Thin layer chromatography, HPLC and gas chromatography.

(7½)

Section-III

Atomic Spectroscopy: Principle, interferences in flame photometry, applications of atomic absorption and flame emission spectroscopy.

(7½)

Section-IV

Spectrophotometry: Principle, instrumentation for absorption measurements, qualitative and quantitative applications.

(7½)

Books Recommended

1. Vogel's Text book of Quantitative Chemical Analysis, G.H. Jeffery, J. Basset, J. Mendham and R.C.Denney, English Language Book Society/ Longman
2. Study Material in vocational subject, Industrial Chemistry (UGC Sponsored)
3. Handbook of instrumental techniques for Analytical chemistry, F.A. Settle, Prentice Hall.
4. Quantitative Inorganic Analysis, K. Kodama Interscience Publishers, New York.

Fifth Semester

Paper –502 (Theory)

Max Marks: 40

Time: 3 Hours

Note: Eight questions will be set section wise, two questions from each section and the candidate have to attempt five questions in all selecting at least one question from each section. All questions carry equal marks.

Section- I

Pharmaceutical industry: Historical background and development of Pharmaceutical industry in India.

Pharmacopoeias: Introduction to pharmacopoeias, contents of pharmacopoeias, Introduction to various formulations and routes of administration. Legal aspects of drugs: Important FDA schedules.

Sterilization: Need for sterilization, sterilization by heat process viz sterilization by dry heat using hot air oven, flaming and IR radiations.

(7½)

Section- II

Dosage: Dosage forms and their classification on the basis of physical state with important characteristics, Solid dosages forms including tablets, capsules, powders, cachets, pills and suppositories, Liquid dosages forms including injection, aromatic water inhalations, colloidions, draughts, mixtures, irrigations, lotions, mouthwashes, nasal drops, ophthalmic drops, paints and solution tablets.

(7½)

Section-III

Pharmaceuticals Excipients: Various types of excipients used of tablets, capsules, emulsions, suspensions, ointments, creams, pills, powders and in menophasic liquids (clears products). Need for use of excipients in pharmaceuticals. Pharmaceuticals quality testing: sterility testing, pyrogen testing, glass testing.

(7½)

Section – IV

Phytochemicals: Introduction of crude drugs, cultivation, harvesting, drying, packaging and storage of crude drugs. Chemical constituents of plants and uses including carbohydrate, glycosides, fats, oil, waxes, steroids, terpenoids, alkaloids, enzyme and protein drugs, saponin glycosides and tannins.

(7½)

Book Recommended:

1. A text book of pharmaceuticals – Nirali Prakashan.
2. A text book of pharmaceuticals formulation – Mittal.
3. A text book of pharmacognosy by Dr. C.S. Shah.
4. Pharmacognosy – C.K. Kokate, A.P. Purohit and S.B. Gokhale.
5. Study material in vocational subjects (Pharmaceuticals papers -II)

Sixth Semester

Paper –601 (Theory)

Max Marks: 40

Time: 3 Hours

Note: Eight questions will be set section wise, two questions from each section and the candidate have to attempt five questions in all selecting at least one question from each section. All questions carry equal marks.

Section-I

Solvent Extraction: General discussion, factors favoring solvent extraction, classification of solvent extraction systems, applications of solvent extraction.

(7½)

Section-II

Amperometric titration: Theory, types and applications of amperometric titration.

Polarimetry: Principle, instrumentation and applications of polarimetry.

(7½)

Section-III

Refractometry: Principle, instruments and application of refractometry.

Nephelometry: Principle, instruments, factors affecting intensity of scattered radiations and application of nephelometry.

(7½)

Section-III

Buffer solutions: Types of buffer solutions, buffer action, buffer capacity, importance of pH and its measurement.

Monograph of tablet: Hardness test, Friability test, Dissolution rate, and disintegration test.

(7½)

Books Recommended

1. Vogel's Text book of Quantitative Chemical Analysis, G.H. Jeffery, J. Basset, J. Mendham and R.C.Denney, English Language Book Society/ Longman
2. Study Material in vocational subject, Industrial Chemistry (UGC Sponsored)
3. Indian pharmacopoeia/ British pharmacopoeia

Sixth Semester

Paper –602 (Theory)

Max Marks: 40

Time Allowed: 3 Hrs

Note: Eight questions will be set section wise, two questions from each section and the candidate have to attempt five questions in all selecting at least one question from each section. All questions carry equal marks.

Section- I

Excipients: Quality and specification of some excipients used in Pharmaceutical industry.

Binder	-	Acacia.
Viscosity Builders	-	Carboxymethylcellulose sodium.
Coating Agents	-	Cellulose acetate phthalate
Antioxidants	-	Butylated hydroxy anisole
Diluent	-	Lactose
Sweeteners	-	Mannitol, Sorbitol
Lubricants	-	Magnesium stearate
Antimicrobial preservative	-	Phenylmercuric nitrate
Emulsifying agents	-	Sodium lauryl sulfate
Lubricants glidants	-	Talc
Colouring agents	-	Erythrosine

(7½)

Section-II

Classification and examples of analgesics, anti-psychoactive agents and cardiovascular agents.

Synthesis of the bulk drugs: Antimicrobial agents – Isoniazid, p-amino salicylic acid.

Antiinflammatory and analgesic compounds – Salicylic acid and its derivatives, ibuprofen.

(7½)

Section-III

Vitamins – Vitamin A, Vitamin C and Vitamin B₆ (Pyridoxine)

Sulphur Drugs – Sulfonamides, sulphamethoxazole

Hypnotics and sedatives – barbiturates, pentobarbital.

Cardiovascular agents – Methyl Dopa.

(7½)

Section – IV

Fermentation: General principle, types of fermentation processes, outline of fermentation process unit, preparation of inoculum, fermentation media, recovery of products.

Manufacturing processes of antibiotics. Penicillin G, Rifamycin, Tetracycline and cyanocobalamine.

(7½)

Books Recommend:

1. Medicinal Chemistry – Ashutoskar (Vol – I, Vol – II)
2. Industrial Microbiology – Carey, D.E. Casida
3. A text book of pharmaceuticals formulation – Mittal.
4. Study material in vocational subjects of industrial chemistry (UGC sponsored) Paper – II Pharmaceuticals.

Sixth Semester

Paper-603 Practical

Max Marks: 100

Time: 7 Hours

Note: The practical is spread over in two sessions. In the first session the candidate have to perform two experiments from section-I . In the second session the candidate have to perform one experiment from section-II.

Section-I

1. Study of λ_{\max} of an absorbing sample by spectrophotometer.
2. Determine the refractive index of given liquid by Abbe's refractometer and find the specific and molar refraction.
3. Determine the specific and molar rotation of an optically active substance like sucrose.
4. Determination of Na^+ content in a sample by flame photometry.
5. Identification of cations in the mixture by paper chromatography.
6. Study of number of components in the organic mixture by TLC.
7. To determine the coefficient of viscosity of a given liquid with the help of Ostwald's viscometer.
8. To determine the surface tension of the given liquid by drop-number method.
9. Estimate the amount of aspirin in the given table.

Section-II

Pharmaceutical preparation: chloroform spirit, chloroform water, camphor water, cetrimide cream, zinc sulphate lotion

Monograph of aspirin tablet.

Distribution of marks

Experiment No. 1 (from section-I) 25 Marks

Experiment No. 2 (from section-I) 25 Marks

Experiment No. 3 (from section-II) 25 Marks

Lab Record 15 Marks

Viva Voce 10 Marks