# SCHEME OF INSTRUCTION AND EXAMINATION
## FOR
### B. PHARMACY - III YEAR 1ST SEMESTER

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<tr>
<th>COURSE NO.</th>
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# SCHEME OF INSTRUCTION AND EXAMINATION
## FOR
### B. PHARMACY - III YEAR 2ND SEMESTER

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<tr>
<th>COURSE NO.</th>
<th>SUBJECTS</th>
<th>PERIODS/WEEK (50 Mts.)</th>
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<td>PYT.3.204</td>
<td>Forensic Pharmacy (Pharmaceutical Jurisprudence)</td>
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<td>Biostatistics (Pharmacostatistics)</td>
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<td>PYP.3.206</td>
<td>Pharmaceutical Chemistry (Chem. of Natural Products) Lab</td>
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<td>PYP.3.207</td>
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<td>PYP.3.208</td>
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**MEDICINAL CHEMISTRY – I**

Subject Code : PYT 3.101  
Sessional : 30  
Periods/week : 4  
Examination : 70  
Nature of Exam: Theory  
Exam Duration: 3 Hrs

**Unit – I**

**Basic Considerations of Drug Activity**

Physicochemical properties of drug molecules in relation to biological activity - Solubility, lipophilicity, partition-coefficient, Ionization, hydrogen bonding, Chelation, Redox potential and Surface activity. Bioisosterism and Steric features of drugs, drug distribution and protein binding; Introduction to Pro and Soft drug approach in drug design; Drug metabolism and factors affecting on drug metabolism  
**NOTE:** Introduction, definition, nomenclature, chemical classification (other types of classification wherever relevant), structure, synthesis, general mechanism, mode of action (wherever known), SAR including physicochemical and stereo chemical aspects, metabolism and therapeutic uses of the drugs from each category shall be studied for the following units. An outline of synthetic procedure and metabolism of only the drugs, which are official as per Indian pharmacopoeia and British pharmacopoeia and mentioned in brackets against each category.

**Unit – II**

**Adrenergic agents** - (Isoproterenol and Salbutamol)

**Adrenergic blocking agents** - (Prazocin and Atenatol)

Cholinergic drugs and Acetyl Choline esterase inhibitors - (Carbachol, Physostigmine). Cholinergic blocking agents - (Pyridinium bromide and Dicyclomine HCl)  
Ganglionic blocking agents and neuromuscular blocking agents -(Mecamylamine HCl and Pentolinium Tartarate). Skeletal muscle relaxants -Neuromuscular - (meprobromate)

**Unit – III**

Cardio Vascular Drugs - Anti-hypertensive drugs - (Captopril and Clonidine) Anti-arrhythmic drugs - (Verapamil, Nifedipine and Diltiazem),
Vasodilators - (Isosorbide dinitrate and Dipyridamole)
Anti- hyper lipidemic agents - (Clofibrate and Aterostatin)
Anti-platelet drugs - (Aspirin and Ticlopidine)
Cardio tonic Agents - Synthetic analogs of cardiac glycosides

**Unit – IV**
Diuretics - (Acetazolamide and Furosemide, Hydrochlorothiazide and Amiloride).
Positive Inotropic Agents (Amrinone)
Hypoglycemic agents - (Tolbutamide and Glyclazide).

Thyroid agents, Anti-thyroid gents - (Prophylthiouracil)
Immmuno suppressants - (Azathioprine) and Immunostimulants -(Levamisole)

**Unit – V**
Anti-histaminics (HI & H2)-(Diphenhydramine, Chlorpheniramine, Citrizine, Ranitidine). Proton Pump Initiators (Omeprazole)
Coagulants and Anti-coagulants - (Warfarin)

**Examination** : One question from each unit with internal choice.

**Text Books**


**Reference Books**

Unit – I

Formulations
Excipients
Properties and selection, Antioxidants, Preservatives, Colouring agents, Flavouring agents, Sweetening agents, Diluting agents, Vehicles, Surfactants, Hydrocolloids, Above Adjuvants should be studied with reference to FDA approvals and Drugs & Cosmetics Rules wherever applicable.

Capsules

Unit – II

Suspensions and Emulsions
Suspensions: Formulation Types; Deffloculated and Flocculated suspensions, Formulation parameters; Methods of Manufacture and Evaluation.
Emulsions: Formulation Types, Formulation-parameters, Manufacturing Methods and Selection of equipment, Evaluation methods including the shelf life, Concepts of Multiple emulsions.

Unit – III

Tablets and Tablet Coating
Tablets: Types & Classes, Advantages and Disadvantages, Challenges in formulation and manufacture, Excipients in the formulation, Ideal requirements of Excipients, Granulation methods, Compression Machines, Processing problems in compression - Capping & Lamination, Picking & Sticking, Mottling, Weight variation, Hardness variation etc. Evaluation of Tablets.
Tablet Coating: Coating principles, General equipment, Sugar coating-steps, Compression coating, Film coating-steps, materials used in film coating, enteric coating, Film defects, Specialised coating techniques and Quality Control of Tablets

Unit – IV

Parenterals and Ophthalmic Preparations
Parenterals: Definition, Classification and Types of Parenterals, Advantages and limitations, Preparation, Formulation, Containers, Production procedures & facilities, Environmental and other controls, Filling procedures, Products requiring Sterile Packing, Evaluation tests, Sterile powders, Emulsions, Suspensions.

Ophthalmic Preparations: Requirements of Eye ointments, Eye drops, Formulation, Methods of preparation, containers, Evaluation and quality control.
Unit – V

**Aerosols and Packaging Materials**

Aerosols: Definition, Types, Advantages and Disadvantages; Propellants, General Formulation, Manufacturing and packing methods - Pharmaceutical Applications.

Packaging Materials: Glass, Plastics, Metal and Rubber, their influence on dosage form stability.

**Examination:** One question from each unit with internal choice.

**Text Books**

2. Ansel’s Phramaceutical dosage forms and Drug delivery systems, 8th edn, 2004, Lippincott Williams & Wilkins, USA.

**Reference Books**

PHYSICAL PHARMACY – I

Subject Code : PYT.3.103            Sessional : 30
Periods / Week: 4              Examination : 70
Nature of Exam: Theory       Exam Duration: 3 Hrs

Unit – I
States of Matter and Phase Equilibria
Gaseous state: Ideal Gas law, Molecular Weight determination, Kinetic Molecular Theory and Vander-waals Equation for Real Gases;
Liquid state: Liquefaction of Gase, Methods of Achieving Liquefaction, Vapor pressure of Liquids, Boiling Point and Heat of Vaporization including Clausus – Claypeyron equation;
Phase equilibria: The phase rule; Systems containing one, two and three components, Rules relating to Triangular Diagrams; Solid dispersions;
Thermal Analysis: Differential scanning Calorimetry; Diffrential thermal analysis and Thermogravimetric and Thermochemical Analysis;
Physical properties of drug molecules: Refractive index & Molar refraction

Unit – II
Thermodynamics
First Law of Thermodynamics: Statement, Definition of Internal Energy, Enthalpy and Heat Capacity; Heat Capacities at constant Volume and Pressure and their relationship;
Thermochemistry: Standard State Heats of Formation and Combustion; Standard Enthalpy of Formation – Hess’s Law of Heat summation and its application; Heat of reaction at constant pressure and at constant volume; Enthalpy of neutralization; Bond dissociation energy and its calculations from thermochemical data;
The second and third laws of thermodynamics: Statements, Definiton of Entropy, Free energy and Gibbs Free Energy; Free Energy functions and applications.

Unit – III
Solutions of non-electrolytes: Properties, types of solutions and concentration expressions; Ideal and real solutions; Colligative properties and Mol. Wt. determinations.
Solutions of electrolytes: Arrhenius theory of electrolytic dissociation; Modern theory of strong electrolytes; Debye- Huckel theory; Coefficients for expressing colligativeve properties – L value, Osmotic Coefficient and Osmolality.

Unit – IV
Buffered and Isotonic solutions: The Buffer equation – Common ion effect and the buffer equation for weak acid and its salt and a weak base and its salt; pH indicators; Factors influencing
pH of buffer solutions; Measurement and calculating tonicity and methods of adjusting tonicity and pH; Buffer capacity and its calculations; Van Slyke equation; Influence of concentration on buffer capacity and maximum buffer capacity;
Buffers in Pharmaceutical and biological systems – in vivo biologic buffer systems
**Drugs as buffers:** Pharmaceutical buffers and their preparation, influence of buffer capacity and pH on tissue irritation, stability vs optimum therapeutic response, pH and solubility.

**Unit – V**

**Electro Motive Force and Oxidation-Reduction:** Electrochemical cells, Types of Electrodes, measuring the EMF of cells, reference electrodes and standard potentials, electrometric determination of pH and specific ions; Hydrogen and glass electrodes, operation of pH meter, ion elective electrodes, Applications of Oxdn – Redn Potentials (Redox potentials) in pharmacy.

**Catalysis:** Definition of Catalysis and Catalyst; Types of Catalyst; Promoters and Inhibitors; Mechanism of Simple Catalytic Reactions; Factors affecting the catalyst and Catalysis;

**Examination:** One question from each unit with internal choice.

**Text Books**

2. C.V.S. Subrahmanyam, **Essentials of Physical Pharmacy**, Vallabh Prakashan, Delhi, 2005

**Reference Books**

3. Physical Chemistry by Walter Moore.
4. Remington’s Pharmaceuticals Sciences, ed A.R. Gennaro, Mack Publishing co., PA.
5. Basic principles and calculations in Chemical engineering by D.M Himmelblau, Prentice Hall Publications
PHARMACOGNOSY-II

Subject Code : PYT.3.104           Sessional : 30
Periods / Week: 4              Examination : 70
Nature of Exam: Theory              Exam Duration: 3 Hrs

Systematic Phamacognostic study, which includes sources (Biological and Geographical) diagnostic characters, chemical constituents, chemical tests, uses, substituents and adulterants of the crude drugs mentioned in the following units. MICROSCOPICAL CHARACTERS OF ONLY THE DRUGS UNDERLINED SHALL BE STUDIED.

Unit – I
Alkaloids
Introduction, definition, classification, isolation, tests, chemical nature and uses of Rauwolfia, Vinca, Nuxvomica, opium, ipecac, belladonna, dattura, lobelia, vasaka, kurchi, ephedra, cinchona, colchicum, aconite, punemava, shankhpushpi, tobacco.

Unit – II
Glycosides
Introduction, Definition, Classification, Isolation, tests, chemical nature and uses of Senna, aloes, rhubarb, digitalis, squill, dioscoreia, liquorice, momordica, black mustard, ammi, psoralia, gentian, piccrriza, ashwagandha, gokhru, kalmegh, stropanthus, shatavari, brahmi, quassia, gymnema.

Unit – III
Phytopharmaceuticals

Introduction, definition, classification, isolation, tests, chemical nature and uses of Volatile Oils and Resins from following Plant Sources: Fennel, Clove, Cinamon, Gaultheria oil, Artemisia, Taxus, Capsicum, Turmeric, Podophyllum, Guggul Asafoetida and Pyrethrum.

Unit – IV
Tissue Culture
History, introduction, callus culture, suspension culture, Immobilization of culture, single cell culture, organogenesis and embryo culture.
Production of secondary metabolites, biotransformation and clonal propagation, Significance and application of plant tissue culture.

Unit – V
Herbal Medicines
Herbal medicines in India, practice, regulations, Quality Control and Standardization of Raw Materials. Types of herbal formulations and products.

Some Traditional Plant Medicines as a source of New Drugs
Introduction to dosage form of Ayurveda - Aristavas, Asawas, Chumas, Bhasma, Leyhas, Ghritams, Rasayanam and Kashayams.
Examination: One question from each unit with internal choice.

Text Books

1. **Trease and Evans, Pharmacognosy** by W.C. Evans, Elseview Ltd., London, UK/ Vailliers Tindal Easbourn UK.
2. **Pharmacognosy** by C.K. Kokate, Nirali Publication, Pune.
3. **Pharmacognosy** by T.E. Wallis CBS publishers and Distributors, Delhi.

Reference Books

1. **The Ayurvedic pharmacopoeia of India** I-III Govt. of India, Ministry of Health and Family Welfare Dept. of Indian system of medicine and Homeopathy, New Delhi.
4. **Text Book of Pharmacognosy** by Brady & Taylor.
5. **Tissue culture and plant science** by street
Unit – I

General Principles of Pharmacology

Unit – II

Pharmacology of Drugs Acting On ANS
Introduction, Transmission, Distribution and Functions of Drugs acting on Autonomic Nervous System: Cholinoceptor - Activating and cholinesterase inhibitory drugs, Cholinoceptor blocking drugs, Adrenoceptor - Activating and other sympathomimetic drugs, Adrenoceptor - Antagonist drugs.

Unit - III

Pharmacology of Drugs Acting On CNS
Introduction, Transmission, Distribution and Functions of Drugs acting on Central Nervous System: CNS Neuro transmitters; CNS Stimulants: Hypnotics and Anxiolytics; Antipsychotic Agents; Anti-epileptic Agents; Anti-depressants and Mood Stabilizers; Local Anesthetics; Analgesics and Non-steroidal anti-inflammatory agents; Pharmacological management of Parkinsonism and other movement disorders;

Unit – IV

Drugs Acting on Cardio Vascular & Respiratory System

Unit – V

Drugs Acting on Renal and Gastro Intestinal System

Examination: One question from each unit with internal choice.

Text Books


Reference Books

3. Pharmacological Principles of Medical Practice, by Krantz and Care, Williams and Wilkins co.
PHARMACEUTICAL TECHNOLOGY PRACTICALS
(Pharmaceutics - II)

Subject Code: PYP 3.106  Sessional : 25
Periods/week: 4  Examination : 50
Nature of Exam: Practical  Exam Duration: 4 Hrs

List of experiments

Minimum 12 experiments of the following shall be conducted.

1. Determination of optimum concentration of suspending agent (tragacanth) required for maximum physical stability of calcium carbonate suspension.
2. Preparation, identification and physical stability evaluation of an emulsion.
3. Manufacture of Tablets sodium bicarbonate tablets IP (500 mg).
4. Manufacture of paracetamol tablets IP (500 mg)
5. Manufacture of ascorbic acid tablets IP (50 mg).
6. Manufacture of aspirin tablets IP (300 mg).
7. Manufacture of calcium lactate tablets IP (300 mg).
10. Manufacture of aspirin hard gelatin capsules USP (300 mg).
12. Manufacture of ascorbic acid injection IP.
13. Manufacture of calcium gluconate injection IP.
14. Manufacture of nandrolone deconate injection IP.
15. Manufacture of dextrose intravenous infusion IP.
17. Preparation of emulsion with combination of emulsifying agents using HLB values concept.
18. Preparation of suspension using suitable suspending agent.
20. Preparation of Multiple emulsions.

Reference Books

PHARMACOGNOSY PRACTICALS

Subject Code : PYP.3.107  Sessional : 25
Periods / Week: 4  Examination : 50
Nature of Exam: Practicals  Exam Duration: 4 Hrs

List of Experiments

1. Detailed Microscopical study (Transverse section) of following drugs (Any four)
   (a) Rauwälfa (b) Cinchona (c) Senna (d) Liquolice (e) Fennel (f) Clove (g) Nux-Vomica.
2. Microscopical powder characters of (Any eight)
   (a) Vasaka (b) Clove (c) Ephedra (d) Cinnamon (e) Liquorice (f) Digitalis (g) Quassia
   (h) Nuxvomica (i) Cinchona G) Coriander (k) Senna (l) Kruchi (m) Rauwolfia.
3. Morphological Identification of drugs listed in theory.
4. Determination of swelling factor.
5. Determination of refractive index and optical rotation.
6. Isolation and Identification of starch from potatoes.
7. Isolation and Identification of Caffeine from tea
8. Isolation of Tannic acid from Galls.
10. Distillation of volatile oils (Demo).
11. Qualitative Microscopical powder Analysis (Binary Mixture).
12. Determination of stomatal index, palaside ratio and number
13. Measurement of fibers and grains

Reference Books

MULTIMEDIA AIDED LANGUAGE LAB

Subject Code : PYP.3.108  Sessional : 25
Periods / Week: 4   Examination : 50
Nature of Exam: Practical   Exam Duration: 4 Hrs

Exercise Oriented Practicals

Exercise – 1
Writing Effective Headings; Writing Effective Passages - To describe; To compare and contrast;
To define; To show cause and effect and To show sequence

Exercise – 2
Writing Grammatically Sound Sentence; Using the Right Tense and Voice - Using the active
voice; Pairing the passive; Writing in the third person and Using the imperative voice

Exercise – 3
Punctuating Effectively - Common punctuation marks and how to use them; Using punctuation to
clarify messages and improve readability; Bullets, numbers, white space and Using symbols and
abbreviations

Exercise – 4
Writing Summaries; Description – Event and Product

Exercise – 5
Writing Specific Documents - Letters and Memos; Job Applications, Cover letters and Resume;

Exercise – 6
Writing - Procedures; Proposals and Analytical Reports;

Exercise – 7
Using of Graphs, Tables and Figures for representing a data

Exercise – 8
Writing out a talk; Extra verbal Cues; Handouts, Visuals and demonstration Models;

Exercise – 9
Basics of Web Page Design; Writing and Designing for World Wide Web;

Exercise – 10
Document Authoring and Maintenance; HTML Language and Electronic Publishing;

Exercise – 11
Designing and Writing for Multimedia

Exercise – 12
Personal and Group Communication: E-mail; Mailing Lists, News Groups and Pharmacy –Related
Discussion Forums;

Exercise – 13
Phonetics and Spoken English – Rhythm, Intonation, Reading aloud, Accent difference between
American, British and Indian English; International Varieties of English

Exercise – 14
Formal and Informal types of Speech; Elocution; Debating; Group Discussion; Brain Storming;
Exercise – 15
Collaborations of Health care providers using Network Technologies; Intranets, Software used for remote collaboration and Telemedicine

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PHARMACEUTICAL CHEMISTRY
(Chemistry of Natural Products)

Subject Code: PYT 3.201  Sessional: 30
Periods/week: 4  Examination: 70
Nature of Exam: Theory  Exam Duration: 3 Hrs

Unit – I
Poly Functional Natural Products
Carbohydrates: Introduction, Definition, Classification, Isolation, General Properties (including isomerism) and Pharmaceutical importance of Carbohydrates, Chemistry (Structure, Nomenclature and Reactions) of glucose, fructose, sucrose, maltose, cellulose and starch.
Oils & Fats: Introduction, Definition, Classification, Isolation, General properties and Pharmaceutical importance of oils and fats. Chemistry (Structure, Nomenclature and Reactions) of Oils and Fats and analyse according to Pharmacopoeial methods

Unit - II
Amino Acids and Proteins
Introduction, Definition, Classification, Isolation, General properties and Pharmaceutical importance of amino acids and their relationship to proteins and polypeptides.
Chemistry of Protein Hormones: Insulin, Oxytocins, Thyroxin and anti-thyroid drugs

Unit - III
Flavanoids and Terpenoids
Flavonoids: Sources, Uses, chemistry and General methods of structural determination (chemical & spectral analysis) of Amygdalin, arbutin and quercetin
Terpenoids: Isoprene rule, Special Isoprene Rule for terpenes, General methods of isolation and. Chemistry of citral, menthol and camphor.

Unit - IV
Alkaloids - Purine and Xanthine Derivatives
Introduction, Definition, Occurrence, Classification, Isolation, General properties and Pharmaceutical importance of Alkaloids. General methods of extraction, structure elucidation and Chemistry (Structure, Nomenclature and Reactions) of ephedrine, atropine, papaverine and quinine and also Caffeine and nic acid.

Unit - V
Steroids

Examination: One question from each unit with internal choice.

Text books

London.

**Reference Books**

4. R. M. Acheson, An Introduction to the Chemistry of Heterocyclic Compounds, Interscience NY.

**PHARMACOLOGY – II**

Subject Code: PYT 3.202  Sessional : 30
Periods/week: 04  Examination : 70
Nature of Exam: Theory  Exam Duration: 3 Hrs

**Unit – I**

Chemotherapy of Infections and Cancer
Basic Principles of Chemotherapy; Systemic Pharmacological study of Anti-bacterial, Antiviral, Anti-fungal, Anti/protozoal and Anti-helmenthic drugs; Cancer Chemotherapy

**Unit – II**

Pharmacology of Autocoids: Local Hormones
Anti-histamines: Histamine, Serotonin and ergot alkaloids; Vasoactive principles; Eicosanoids; Prostagladins, Thromboxanes, Leukotrones and related compounds. Nitric oxide, Donors and inhibitors. Para Drugs acting on blood and blood forming agents -Coagulants, Anti-coagulants, Haematinics (iron, vitamin-B12, Folic acid) and Thrombolytic Agents.

**Unit – III**

Pharmacology of Endocrine System
Systemic Pharmacological study of Pituitary Hormones, Sex Hormones, Oral Contraceptives, Oxytocics and Uterine relaxants; Pharmacology of thyroid and Anti-thyroid drugs, Insulin, Oral hypoglycemics, Glucagon and Adrenocortico steroids;

**Unit – IV**

Bioethics and Bioassay Of Some Selective Drugs
Principles of Bioethics, Bioethics of Animals used in Bioassay studies; Principles of Bioassays; Official Bioassays; Biological assay of anti-haemophilic fraction, Heparin sodium, Chorionic gonadotropin, Corticotropin, Insulin, Oxytocin, Vasopressin and Adrenaline; Biological assay of
Unit – V

Toxicology of Drugs and Clinical Pharmacology
Principles of Toxicology; Definition of Poison; General principles of treatment of poisoning with special reference to barbutirates, Opium and Organophosphorus toxicity;
Treatment of Poisoning for the following toxins: Methyl Alcohol, Heavy metals, Paracetamol and Digitalis
Introduction to Clinical pharmacology and Phases of clinical trials;

Examination: One question from each unit with internal choice.

Text Books

3. Text Book of Pharmacology by Rang and Dale

Reference Books

2. Lewis’s Pharmacology by J. Crossland., Churchil Livingstone Publications
4. Clinical pharmacology by Lanzence
PHYSICAL PHARMACY – II

Subject Code : PYT.3.203            Sessional : 30
Periods / Week: 4              Examination : 70
Nature of Exam: Theory       Exam Duration: 3 Hrs

Unit – I
Solubility and Distribution Phenomena

Unit – II
Chemical Kinetics

Unit – III
Interfacial Phenomena

Unit – IV
Colloids and Micromeritics
Dispersed systems, Size and shape of colloidal particles - pharmaceutical application, Types - Lipophilic, Lipophobic and Association colloids, Comparison of properties of colloidal sols; Optical, Kinetic and Electric properties of colloids, Solubilization gels - Structure, Properties and Applications.

Particle size and size distribution - average particle size, particle size distribution, number and weight distributions, Particle number; Methods for determining particle size - optical microscopy,
sieveing, Sedimentation, Particle volume measurement, Particle shape and surface area, Methods for determining surface area - Absorption methods, Air permeability methods; Derived properties of powders - Porosity, Packing arrangements, Densities, bulkiness, Flow properties.

**Unit – V**

**Rheology and Polymers**

Rheology of Pharmaceutical Fluids: Newtonian and Non-Newtonian Systems;
Non newtonian systems - Plastic and Pseudoplastic dilatant flow.
Thixotropy - Measurement of thixotropy, Thixotropy in formulation.
Determination of rheologic properties - choice of viscometer, Capillary, falling sphere, Cup and bob, and cone and plate viscometers. Psychorheology. Applications to pharmacy.
Polymers: Definition, Types of Polymers, Water Soluble and Water Insoluble Polymers; Polymers as Thickening Agents; Pharmaceutical Application of Polymers;

**Examination:** One question from each unit with internal choice.

**Text Books**


**Reference books**

Unit – I
1. Evolution of Pharmaceutical and Drug Legislation in India.
2. The Pharmacy Act 1948.

Unit – II
Drugs and Cosmetics Act 1940 and Drugs & Cosmetic Rules 1945 (also amendments).
1. Administration of the Act – The controlling and licensing regulation at state level and central level (the organisation, function and duties of state and central drug control authorities).
2. Drugs & Cosmetic Act Rules – the provisions related to
   a. The manufacture of drugs (other than homeopathic) including schedule C, C(1), F, F(1) and X drugs and cosmetics.
   b. The sale and distribution of drugs (other than homeopathic) including schedule C, C(1), F, F(1) and X drugs and cosmetics.

Unit – III
Drugs & Cosmetics Act Rules
1. (i.) The import and export of drugs & cosmetics.
   (ii) Labelling and packing requirements for all categories of drugs & cosmetics.
2. (i.) List of schedules to the Drugs & Cosmetics Rules.
   (ii.) Detailed study of schedule M (new), U and Y.

Unit – IV
1. Drugs and magic Remedies (Objectionable Advertisments) Act 1954.
2. Prevention of Food Adulteration Act 1954 (salient features)
3. The Factories Act 1948 and the Amendment (salient features.).

Unit – V
IPR’s and Patent Laws
1. Intellectual Property Rights – a brief introduction to various IPR’s.
2. Indian Patent Act 1970 and the Amendments to the Act (up to date with reference to WTO Agreement)
   a. Introduction & Objectives
   b. Inventions and Not inventions according to the Act.
   c. Procedure of obtaining patent for drugs and pharmaceuticals.
3. Drug Price Control Order (Latest).

**Examination:** One question from each unit with internal choice.

**Text Books**

2. *Forensic Pharmacy* by Dr. B.S. Kuchekar, A.M. Khadatare and Sachin C. Itkar, Nirali Prakashan, Pune.

**Reference Books**

1. *Bare Acts*, published by Govt. of India.
BIOSTATISTICS
(PHARMACOSTATISTICS)

Subject code : PYT 3.205            Sessional           : 30
Periods / week : 4              Examination     : 70
Nature of exam: Theory             Exam Duration: 3 Hrs

Unit – I
Definition and determination of terms Mean, Median, Mode, relation between mean, median, and mode. Standard deviation, histogram, Coefficient of correlation, regression analysis, curve fitting, theory of probability.

Unit – II
Nature and Scope of Statistical methods and their limitations, compilation, classification, tabulation and applications in pharma and life sciences; Graphical representation; Measures of Average Stem and Leaf Plots; Box and Whisker Plots, Co-plots; Introduction to Probability Theory and Distributions (Concepts without Derivations), Binomial, Poisson & Normal Distributions (Only definition and Problems)

Unit – III
Sampling Methods: Simple, Random, stratified, Systematic and Cluster Sampling Procedures; Data Collection, Data Organization and Data Representation; Bar, Pie, 2-D and 3-D Diagrams; Sampling and Non-Sampling Errors; Sampling Distributions; measure of dispertion.

Unit – IV
Interference Concerning Means: Point Estimation - Interval estimation - Bayesians estimation - Tests of Hypothesis; Common Parametric and Non parametric tests employed in testing of significance in biological/pharmaceutical experiments.

Unit – V
Tests of significance - T -test, chi-square test, analysis of variance, elements of Anova (one way and two way). Principles of scientific experiments; concept of CRD, RBD and Latin square diagrams.

Examination: One question from each unit with internal choice.

Text and Reference Books
1. Probability and Statistics by M.R Spiegel Schaum Series
2. Biostatistics: A Foundation for analysis in Health Sciences, by Danial W.W., John Wiley
4. Practical statistics for experimental Biologists, by Wardlaw, A.C., John Wiley and Sons Inc.,
PHARMACEUTICAL CHEMISTRY PRACTICALS
(Chemistry of Natural Products)

Subject Code: PYP 3.206            Sessional : 25
Periods/week: 4                  Examination : 50
Nature of Exam: Practicals       Exam Duration: 4 Hrs

List of experiments

1. Qualitative analysis of carbohydrates
2. Qualitative analysis of proteins
3. Qualitative analysis of amino acids
4. Qualitative analysis of alkaloids
5. Qualitative analysis of triterpenoids & steroids.
6. Determination of acid value
7. Determination of saponification value
8. Determination of peroxide value
9. Determination of iodine value
10. Estimation of Atropine

Reference Books

1. I.L. Finar: Organic chemistry, Vol.2: Stereochemistry and the Chemistry of
3. B.S Furniss, A.J Hannaford, PWG Smith and AR Tatchell, Vogel’s Text book of
   1996.
PHARMACOLOGY PRACTICALS

Subject Code : PYP.3.207          Sessional : 25
Periods / Week: 4             Examination : 50
Nature of Exam: Practicals       Exam Duration: 6 Hrs

List of Experiments

1. An introduction to different equipments used in Pharmacology laboratory
2. Effect of routes of administration on the action of drugs.
3. Dose response curves of Acetyl cholins.
4. Demonstration of different types of antagonism on isolated tissue preparations.
5. Effect of different electrolytes or drugs on isolated frog’s heart.
6. Effect of drugs on isolated frog rectus abdominus (any four drugs).
7. Bioassay of drugs by matching method.
8. Bioassay of drugs by graphical (interpolation) method.
9. Bioassay of drugs by three point and four point methods.
10. Effect of various drugs on isolated rabbit intestine / guinea pig ileum.
11. Hypoglycemic activity of insulin in rabbit.
13. Local anesthetic activity on Rabbit eye / Guinea pig! Frog’s hind limb withdrawal (Demo).
15. To study the analgesic effect of narcotic analgesic by using tail-flic/hot-plate/acetic acid induced writing method. (demo)
17. Antipyretic effect in rabbits.

Reference Books

PHYSICAL PHARMACY PRACTICALS

Subject Code: PYP.3.208            Sessional : 25
Periods / Week: 6              Examination : 50
Nature of Exam: Practical        Exam Duration: 4 Hrs

List of Experiments

Minimum 12 experiments of the following shall be conducted

1. Determination of bulk density and flow properties of powders/ granules.
2. Determination of viscosity of liquids using Ostwald viscometer/ Redwood viscometer.
3. Determination of surface tension by stalagmometer method.
4. Determination of HLB of surfactant- Saponification method.
5. Determination of CMC of a surfactant-Drop count method using stalagmometer.
6. Ternary phase diagram for a three component system comprising of alcohol, water and benzene.
7. Determination of adsorption behavior of acetic acid on charcoal.
8. Determination of CST of Phenol-water system
9. Effect of sodium chloride on CST of phenol water system.
11. Determination of first order reaction rate constant - Acid hydrolysis of ester.
12. Preparation of pharmaceutical buffer and determination of its buffer capacity.
15. Determination of distribution coefficient of benzoic acid in benzene and water.

Reference Books