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PRINCETON COLLEGE OF PHARMACY
(Affiliated to JNTUH, Approved by PCI, New Delhi & Accredited by NAAC)
Chowdariguda (V), Korremula, Ghatkesar (M), Medchal- Malkajgiri (Dist.) - 500 088
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1.3 Curriculum Enrichment

1.3.1 Institution integrates cross- cutting issues relevant to Gender, Environment and Sustainability, Human Values and Professional Ethics into the Curriculum

1.3.1 (1) List and Description of courses addressing cross cutting issues relevant to Professional Ethics, Gender, Human Values, Environment and Sustainability

PRINCIPAL
Princeton College of Pharmacy
Korremula Vill, Vijayapuri Colony,
Ghatkesar Mdl, Medchal Dist, Telangana.

PS510: PHARMACOLOGY - II LAB

B.Pharm. III Year I Sem.

L T/P/ C
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List of Experiments:

1. Introduction to *in-vitro* pharmacology and physiological salt solutions.
2. Effect of drugs on isolated frog heart.
3. Effect of drugs on blood pressure and heart rate of dog.
4. Study of diuretic activity of drugs using rats/mice.
5. DRC of acetylcholine using frog rectus abdominis muscle.
6. Effect of physostigmine and atropine on DRC of acetylcholine using frog rectus abdominis muscle and rat ileum respectively.
7. Bioassay of histamine using guinea pig ileum by matching method.
8. Bioassay of oxytocin using rat uterine horn by interpolation method.
9. Bioassay of serotonin using rat fundus strip by three point bioassay.
10. Bioassay of acetylcholine using rat ileum/colon by four point bioassay.
11. Determination of PA_2 value of prazosin using rat anococcygeus muscle (by Schilds plot method).
12. Determination of PD_2 value using guinea pig ileum.
13. Effect of spasmogens and spasmolytics using rabbit jejunum.
14. Anti-inflammatory activity of drugs using carrageenan induced paw-edema model.
15. Analgesic activity of drug using central and peripheral methods

Note: All laboratory techniques and animal experiments are demonstrated by simulated experiments by softwares and videos

Recommended Books (Latest Editions)

1. Rang H. P., Dale M. M., Ritter J. M., Flower R. J., Rang and Dale's Pharmacology,
2. Churchil Livingstone Elsevier
3. Katzung B. G., Masters S. B., Trevor A. J., Basic and clinical pharmacology, Tata Mc Graw-Hill.
4. Goodman and Gilman's, The Pharmacological Basis of Therapeutics
5. Marry Anne K. K., Lloyd Yee Y., Brian K. A., Robbin L.C., Joseph G. B., Wayne A. K., Bradley R.W., Applied Therapeutics, The Clinical use of Drugs, The Point Lippincott Williams & Wilkins.
6. Mycek M.J, Gelnet S.B and Perper M.M. Lippincott's Illustrated Reviews-Pharmacology.
7. K.D.Tripathi. Essentials of Medical Pharmacology, , JAYPEE Brothers Medical Publishers (P) Ltd, New Delhi.
8. Sharma H. L., Sharma K. K., Principles of Pharmacology, Paras medical publisher
9. Modern Pharmacology with clinical Applications, by Charles R.Craig& Robert.
10. Ghosh MN. Fundamentals of Experimental Pharmacology. Hilton & Company, Kolkata.
11. Kulkarni SK. Handbook of experimental pharmacology. Vallabh Prakashan.

PS511: PHARMACOGNOSY AND PHYTOCHEMISTRY II LAB

B.Pharm. III Year I Sem.

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List of Experiments:

(1) Morphology, histology and powder characteristics & extraction & detection of: Cinchona, Cinnamon, Senna, Clove, Ephedra, Fennel and Coriander

(2) Exercise involving isolation & detection of active principles
   a. Caffeine - from tea dust.
   b. Diosgenin from Dioscorea
   c. Atropine from Belladonna
   d. Sennosides from Senna

(3) Separation of sugars by Paper chromatography

(4) TLC of herbal extract

(5) Distillation of volatile oils and detection of phytoconstitutents by TLC

(6) Analysis of crude drugs by chemical tests: (i) Asafoetida (ii) Benzoin (iii) Colophony (iv) Aloes (v) Myrrh

Recommended Books: (Latest Editions)

1. W. C. Evans, Trease and Evans Pharmacognosy, 16th edition, W.B. Sounders & Co., London, 2009.
2. Mohammad Ali. Pharmacognosy and Phytochemistry, CBS Publishers & Distribution, New Delhi.
3. Text book of Pharmacognosy by C. K. Kokate, Purohit, Gokhlae (2007), 37th Edition, Nirali Prakashan, New Delhi.
4. Herbal drug industry by R.D. Choudhary (1996), Ist Edn, Eastern Publisher, New Delhi.
5. Essentials of Pharmacognosy, Dr. SH. Ansari, IInd edition, Birla publications, New Delhi, 2007
6. Herbal Cosmetics by H. Pande, Asia Pacific Business press, Inc, New Delhi.
7. A. N. Kalia, Textbook of Industrial Pharmacognosy, CBS Publishers, New Delhi, 2005.
8. R Endress, Plant cell Biotechnology, Springer-Verlag, Berlin, 1994.
9. Pharmacognosy & Pharmacobiotechnology. James Bobbers, Marilyn KS, VE Tylor.
10. The formulation and preparation of cosmetic, fragrances and flavours.
11. Remington's Pharmaceutical sciences.
12. Text Book of Biotechnology by Vyas and Dixit.
13. Text Book of Biotechnology by R.C. Dubey.

*MC500: ENVIRONMENTAL SCIENCES

B.Pharm. III Year I Sem.

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Course Objectives: Environmental Sciences is the scientific study of the environmental system and the status of its inherent or induced changes on organisms. It includes not only the study of physical and biological characters of the environment but also the social and cultural factors and the impact of man on environment.

Course Outcomes: Upon completion of the course the student shall be able to:

- Create the awareness about environmental problems among learners.
- Impart basic knowledge about the environment and its allied problems.
- Develop an attitude of concern for the environment.
- Motivate learner to participate in environment protection and environment improvement.
- Acquire skills to help the concerned individuals in identifying and solving environmental problems.
- Strive to attain harmony with Nature.

UNIT – I

The Multidisciplinary nature of environmental studies
Natural Resources
Renewable and non-renewable resources:
Natural resources and associated problems

a) Forest resources; b) Water resources; c) Mineral resources; d) Food resources; e) Energy resources; f) Land resources: Role of an individual in conservation of natural resources.

UNIT – II

Ecosystems
Concept of an ecosystem.
Structure and function of an ecosystem.
introduction, types, characteristic features, structure and function of the ecosystems: Forest ecosystem; Grassland ecosystem; Desert ecosystem; Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

UNIT – III

Biodiversity and Biotic Resources: Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.

Unit – IV

Environmental Pollution: Air pollution; Water pollution; Soil pollution, Noise Pollution

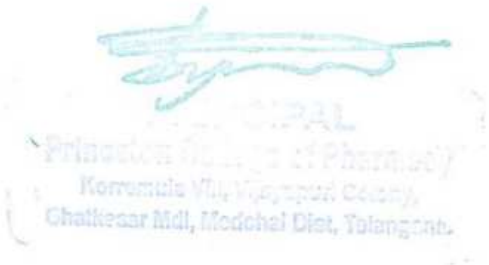
UNIT – V

Environmental Policy, Legislation & EIA: Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act.

Towards Sustainable Future: Concept of Sustainable Development, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA), Low carbon life style.

Recommended Books (Latest edition):

1. Y.K. Sing, Environmental Science, New Age International Pvt, Publishers, Bangalore
2. Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
3. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad – 380 013, India,
4. Text book of environmental science and technology, Dr. M. Anji Reddy.
5. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p
6. Clark R.S., Marine Pollution, Clanderson Press Oxford
7. Cunningham, W.P. Cooper, T. H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p
8. De A.K., Environmental Chemistry, Wiley Eastern Ltd.
9. Down of Earth, Centre for Science and Environment



PS601: MEDICINAL CHEMISTRY – III

B.Pharm. III Year II Sem.

L T/P/ C
3 1/0/ 4

Course Objectives: This subject is designed to impart fundamental knowledge on the structure, chemistry and therapeutic value of drugs. The subject emphasis on modern techniques of rational drug design like quantitative structure activity relationship (QSAR), Prodrug concept, combinatorial chemistry and Computer aided drug design (CADD). The subject also emphasizes on the chemistry, mechanism of action, metabolism, adverse effects, Structure Activity Relationships (SAR), therapeutic uses and synthesis of important drugs.

Course Outcomes: Upon completion of the course student shall be able to

- Understand the importance of drug design and different techniques of drug design.
- Understand the chemistry of drugs with respect to their biological activity.
- Know the metabolism, adverse effects and therapeutic value of drugs.
- Know the importance of SAR of drugs.

Study of the development of the following classes of drugs, Classification, mechanism of action, uses of drugs mentioned in the course, Structure activity relationship of selective class of drugs as specified in the course and synthesis of drugs superscripted by (*)

UNIT – I **10 Hours**

Antibiotics:

Historical background, Nomenclature, Stereochemistry, Structure activity relationship, Chemical degradation classification and important products of the following classes.

Beta-Lactam antibiotics: Penicillin, Cephalosporins, Beta-Lactamase inhibitors, Monobactams

Aminoglycosides: Streptomycin, Neomycin, Kanamycin

Tetracyclines: Tetracycline, Oxytetracycline, Chlortetracycline, Minocycline, Doxycycline

UNIT – II **10 Hours**

Antibiotics:

Historical background, Nomenclature, Stereochemistry, Structure activity relationship, Chemical degradation, classification and important products of the following classes.

Macrolide: Erythromycin Clarithromycin, Azithromycin.

Miscellaneous: Chloramphenicol*, Clindamycin.

Prodrugs: Basic concepts and application of prodrugs design.

Antimalarials: Etiology of malaria.

Quinolines: SAR, Quinine sulphate, Chloroquine*, Amodiaquine, Primaquine phosphate, Pamaquine*, Quinacrine hydrochloride, Mefloquine.

Biguanides and dihydro triazines: Cycloguanil pamoate, Proguanil.

Miscellaneous: Pyrimethamine, Artesunete, Artemether, Atovoquone.

UNIT – III **10 Hours**

Anti-tubercular Agents

Synthetic anti tubercular agents: Isoniazid*, Ethionamide, Ethambutol, Pyrazinamide, Para amino salicylic acid.*

Anti-tubercular antibiotics: Rifampicin, Rifabutin, Cycloserine Streptomycine, Capreomycin sulphate.

Urinary tract anti-infective agents

Quinolones: SAR of quinolones, Nalidixic Acid, Norfloxacin, Enoxacin, Ciprofloxacin*, Ofloxacin, Lomefloxacin, Sparfloxacin, Gatifloxacin, Moxifloxacin

Miscellaneous: Furazolidine, Nitrofurantoin*, Methanamine.

Antiviral agents: Amantadine hydrochloride, Rimantadine hydrochloride, Idoxuridine trifluoride, Acyclovir*, Gancyclovir, Zidovudine, Didanosine, Zalcitabine, Lamivudine, Loviride, Delavirding, Ribavirin, Saquinavir, Indinavir, Ritonavir.

UNIT – IV **08 Hours**

Antifungal agents:

Antifungal antibiotics: Amphotericin-B, Nystatin, Natamycin, Griseofulvin.

Synthetic Antifungal agents: Clotrimazole, Econazole, Butoconazole, Oxiconazole Tioconozole, Miconazole*, Ketoconazole, Terconazole, Itraconazole, Fluconazole, Naftifine hydrochloride, Tolnaftate*.

Anti-protozoal Agents: Metronidazole*, Tinidazole, Ornidazole, Diloxanide, Iodoquinol, Pentamidine Isethionate, Atovaquone, Eflornithine.

Anthelmintics: Diethylcarbamazine citrate*, Thiabendazole, Mebendazole*, Albendazole, Niclosamide, Oxamniquine, Praziquantal, Ivermectin.

Sulphonamides and Sulfones

Historical development, chemistry, classification and SAR of Sulfonamides:
Sulphamethizole, Sulfisoxazole, Sulphamethizine, Sulfacetamide*, Sulphapyridine, Sulfamethoxaole*, Sulphadiazine, Mefenide acetate, Sulfasalazine.

Folate reductase inhibitors: Trimethoprim*, Cotrimoxazole.

Sulfones: Dapsone*.

UNIT – V **07 Hours**

Introduction to Drug Design

Various approaches used in drug design.

Physicochemical parameters used in quantitative structure activity relationship (QSAR) such as partition coefficient, Hammet's electronic parameter, Tafts steric parameter and Hansch analysis.

Pharmacophore modeling and docking techniques.

Combinatorial Chemistry: Concept and applications of combinatorial chemistry: solid phase and solution phase synthesis.

Recommended Books (Latest Editions)

1. Wilson and Giswold's Organic medicinal and Pharmaceutical Chemistry.
2. Foye's Principles of Medicinal Chemistry.
3. Burger's Medicinal Chemistry, Vol I to IV.
4. Introduction to principles of drug design- Smith and Williams.
5. Remington's Pharmaceutical Sciences.
6. Martindale's extra pharmacopoeia.
7. Organic Chemistry by I.L. Finar, Vol. II.
8. The Organic Chemistry of Drug Synthesis by Lednicer, Vol. 1-5.
9. Indian Pharmacopoeia.
10. Text book of practical organic chemistry- A.I.Vogel.

PS602; PHARMACOLOGY - III

B.Pharm. III Year II Sem.

L T/P/ C
3 1/0/ 4

Course Objectives: This subject is intended to impart the fundamental knowledge on various aspects (classification, mechanism of action, therapeutic effects, clinical uses, side effects and contraindications) of drugs acting on respiratory and gastrointestinal system, infectious diseases, immuno-pharmacology and in addition, emphasis on the principles of toxicology and chronopharmacology.

Course Outcomes: Upon completion of this course the student should be able to:

- Understand the mechanism of drug action and its relevance in the treatment of different infectious diseases
- Comprehend the principles of toxicology and treatment of various poisonings and appreciate correlation of pharmacology with related medical sciences.

UNIT- I **10 hours**

1. **Pharmacology of drugs acting on Respiratory system**
   a. Anti -asthmatic drugs
   b. Drugs used in the management of COPD
   c. Expectorants and antitussives
   d. Nasal decongestants
   e. Respiratory stimulants
2. **Pharmacology of drugs acting on the Gastrointestinal Tract**
   a. Antiulcer agents.
   b. Drugs for constipation and diarrhoea.
   c. Appetite stimulants and suppressants.
   d. Digestants and carminatives.
   e. Emetics and anti-emetics.

UNIT – II
Chemotherapy **10 hours**

a. General principles of chemotherapy.
b. Sulfonamides and cotrimoxazole.
c. Antibiotics - Penicillins, cephalosporins, chloramphenicol, macrolides, quinolones and fluoroquinolins, tetracycline and aminoglycosides

UNIT – III
Chemotherapy **10 hours**

a. Antitubercular agents
b. Antileprotic agents
c. Antifungal agents
d. Antiviral drugs
e. Anthelmintics
f. Antimalarial drugs
g. Antiamoebic agents

UNIT – IV **08 hours**

1. **Chemotherapy**
   a. Urinary tract infections and sexually transmitted diseases.
   Chemotherapy of malignancy.

2. **Immunopharmacology**
    a. Immunostimulants
    b. Immunosuppressant
    c. Protein drugs, monoclonal antibodies, target drugs to antigen, biosimilars

UNIT – V **07 hours**

Principles of toxicology

a. Definition and basic knowledge of acute, subacute and chronic toxicity.
b. Definition and basic knowledge of genotoxicity, carcinogenicity, teratogenicity and mutagenicity
c. General principles of treatment of poisoning
d. Clinical symptoms and management of barbiturates, morphine, organ ophosphosphorus compound and lead, mercury and arsenic poisoning.

Recommended Books (Latest Editions)

1. Rang H. P., Dale M. M., Ritter J. M., Flower R. J., Rang and Dale's Pharmacology,
2. Churchill Livingstone Elsevier
3. Katzung B. G., Masters S. B., Trevor A. J., Basic and clinical pharmacology, Tata Mc Graw-Hill
4. Goodman and Gilman's, The Pharmacological Basis of Therapeutics
5. Marry Anne K. K., Lloyd Yee Y., Brian K. A., Robbin L.C., Joseph G. B., Wayne A. K., Bradley R.W., Applied Therapeutics, The Clinical use of Drugs. The Point Lippincott Williams & Wilkins
6. Mycek M. J, Gelnet S. B and Perper M.M. Lippincott's Illustrated Reviews-Pharmacology
7. K. D. Tripathi. Essentials of Medical Pharmacology, , JAYPEE Brothers Medical Publishers (P) Ltd, New Delhi.
8. Sharma H. L., Sharma K. K., Principles of Pharmacology, Paras medical publisher Modern Pharmacology with clinical Applications, by Charles R. Craig& Robert,
9. Ghosh MN. Fundamentals of Experimental Pharmacology. Hilton & Company, Kolkata,
10. Kulkarni SK. Handbook of experimental pharmacology. Vallabh Prakashan,
11. N. Udupa and P.D. Gupta, Concepts in Chronopharmacology.

PS603: HERBAL DRUG TECHNOLOGY

B.Pharm. III Year II Sem.

L T/P/ C
3 1/0/ 4

Course Objectives: This subject gives the student the knowledge of basic understanding of herbal drug industry, the quality of raw material, guidelines for quality of herbal drugs, herbal cosmetics, natural sweeteners, nutraceutical etc. The subject also emphasizes on Good Manufacturing Practices (GMP), patenting and regulatory issues of herbal drugs

Course Outcomes: Upon completion of this course the student should be able to:

1. understand raw material as source of herbal drugs from cultivation to herbal drug product
2. know the WHO and ICH guidelines for evaluation of herbal drugs
3. know the herbal cosmetics, natural sweeteners, nutraceuticals
4. appreciate patenting of herbal drugs, GMP .

UNIT – I **6 Hours**

1. **Herbs as raw materials**

Definition of herb, herbal medicine, herbal drug preparation Source of Herbs
Selection, identification and authentication of herbal materials Processing of herbal raw material

2. **Biodynamic Agriculture**

Good agricultural practices in cultivation of medicinal plants including Organic farming.
Pest and Pest management in medicinal plants: Biopesticides/Bioinsecticides.

3. **General Introduction to Herbal Industry**

Herbal drugs industry: Present scope and future prospects.
A brief account of plant based industries and institutions involved in work on medicinal and aromatic plants in India.

UNIT – II **7 Hours**

1. **Nutraceuticals**

General aspects, Market, growth, scope and types of products available in the market. Health benefits and role of Nutraceuticals in ailments like Diabetes, CVS diseases, Cancer, Irritable bowel syndrome and various Gastro intestinal diseases.
Study of following herbs as health food: Alfaalfa, Chicory, Ginger, Fenugreek, Garlic, Honey, Amla, Ginseng, Ashwagandha, Spirulina

2. **Herbal-Drug and Herb-Food Interactions:** General introduction to interaction and classification. Study of following drugs and their possible side effects and interactions: Hypercium, kava-kava, Ginkobiloba, Ginseng, Garlic, Pepper & Ephedra.

UNIT - III **10 Hours**

1. **Herbal Cosmetics**

Principles and preparation of herbal cosmetics formulations- Shampoos, Dyes, face creams, tooth pastes and Bleaching agents.

2. **Herbal excipients:**

Herbal Excipients – Significance of substances of natural origin as excipients – colorants, sweeteners, binders, diluents, viscosity builders, disintegrants, flavors & perfumes.

3. **Herbal formulations :**

Conventional herbal formulations like syrups, mixtures and tablets and Novel dosage forms like phytosomes

UNIT – IV **10 Hours**

1. **Evaluation of Drugs** WHO & ICH guidelines for the assessment of herbal drugs Stability testing of herbal drugs.
2. **Patenting and Regulatory requirements of natural products:**
   a. Definition of the terms: Patent, IPR, Farmers right, Breeder's right, Bioprospecting and Biopiracy
   b. Patenting aspects of Traditional Knowledge and Natural Products. Case study of Curcuma & Neem.
3. **Regulatory Issues** - Regulations in India (ASU DTAB, ASU DCC), Regulation of manufacture of ASU drugs - Schedule Z of Drugs & Cosmetics Act for ASU drugs.

UNIT – V **07 Hours**

Schedule T – Good Manufacturing Practice of Indian systems of medicine Components of GMP (Schedule – T) and its objectives

Infrastructural requirements, working space, storage area, machinery and equipment, standard operating procedures, health and hygiene, documentation and records.

Recommended Books: (Latest Editions)

1. Textbook of Pharmacognosy by Trease & Evans.
2. Textbook of Pharmacognosy by Tyler, Brady & Robber.
3. Pharmacognosy by Kokate, Purohit and Gokhale
4. Essential of Pharmacognosy by Dr. S.H. Ansari
5. Pharmacognosy & Phytochemistry by V.D. Rangari
6. Pharmacopoeal standards for Ayurvedic Formulation (Council of Research in Indian Medicine & Homeopathy)
7. Mukherjee, P.W. Quality Control of Herbal Drugs: An Approach to Evaluation of Botanicals. Business Horizons Publishers, New Delhi, India, 2002.
8. Herbal drug Technology. By SS Agrawal and M Paridhavi
9. Indian Medicinal Plants A compendium of 500 species Vol 1, 11, 111, 1V & V By Arya vaidys sala , Universities Press

PS604: BIOPHARMACEUTICS AND PHARMACOKINETICS

B.Pharm. III Year II Sem.

L T/P/ C
3 1/0/ 4

Course Objectives: This subject is designed to impart knowledge and skills necessary for dose calculations, dose adjustments and to apply Biopharmaceutics theories in practical problem solving. Basic theoretical discussions of the principles of Biopharmaceutics and pharmacokinetics are provided to help the students' to clarify the concepts.

Course Outcomes: Upon completion of the course student shall be able to:

- Understand the basic concepts in biopharmaceutics and pharmacokinetics.
- Use plasma data and derive the pharmacokinetic parameters to describe the process of drug absorption, distribution, metabolism and elimination.
- Critically evaluate biopharmaceutic studies involving drug product equivalency
- Design and evaluate dosage regimens of the drugs using pharmacokinetic and biopharmaceutic parameters.
- Detect potential clinical pharmacokinetic problems and apply basic pharmacokinetic principles to solve them

UNIT – I **10 Hours**

Introduction to Biopharmaceutics

Absorption: Mechanisms of drug absorption through GIT, factors influencing drug absorption though GIT, absorption of drug from Non per oral extra-vascular routes, **Distribution:** Distribution of drugs Tissue permeability of drugs, binding of drugs, apparent, volume of drug distribution, protein binding of drugs, factors affecting protein-drug binding. Kinetics of protein binding, Clinical significance of protein binding of drugs

UNIT – II **10 Hours**

Metabolism & Excretion: Drug metabolism and basic understanding of metabolic pathways. Renal excretion of drugs, factors affecting renal excretion of drugs, renal clearance, Non renal routes of drug excretion of drugs

Bioavailability and Bioequivalence: Objectives of bioavailability studies, absolute and relative bioavailability, measurement of bioavailability, in-vitro drug dissolution models, in-vitro, in-vivo correlations, bioequivalence studies, methods to enhance the bioavailability.

UNIT – III **10 Hours**

Pharmacokinetics:

Introduction to Pharmacokinetics models, Compartment models, Non-compartment models, physiological models, One compartment open model. a. Intravenous Injection (Bolus) b. Intravenous infusion, extra vascular administrations, calculations of Ka, K_E. From plasma and urinary excretion data

UNIT – IV **08 Hours**

Multicompartment models: Two compartment open model. IV bolus

Multiple – Dosage Regimens:

a). Repititive Intravenous injections – One Compartment Open Model

b). Repititive Extravascular dosing – One Compartment Open model

UNIT – V **07 Hours**

Nonlinear Pharmacokinetics: a. Introduction, b. Factors causing Non-linearity. c. Michaelis-menton method of estimating parameters, Biotransformation of drugs

Recommended Books: (Latest Editions)

1. Biopharmaceutics and Clinical Pharmacokinetics by, Milo Gibaldi.
2. Biopharmaceutics and Pharmacokinetics; By Robert F Notari
3. Applied biopharmaceutics and pharmacokinetics, Leon Shargel and Andrew B. C. YU 4th edition, Prentice-Hall International edition. USA
4. Bio pharmaceutics and Pharmacokinetics-A Treatise, By D. M. Brahmankar and Sunil B. Jaiswal, Vallabh Prakashan Pitampura, Delhi
5. Fundamentals of Biopharmaceutics and pharmacokinetics by Dr. V. Venkateshwarlu
6. Pharmacokinetics: By Milo Glbaldi Donald, R. Mercel Dekker Inc.
7. Hand Book of Clinical Pharmacokinetics, By Milo Gibaldi and Laurie Prescott by ADIS Health Science Press.
8. Biopharmaceutics; By Swarbrick
9. Clinical Pharmacokinetics, Concepts and Applications: By Malcolm Rowland and
10. Thomas, N. Tozen, Lea and Febrger, Philadelphia, 1995.
11. Dissolution, Bioavailability and Bioequivalence, By Abdou H.M, Mack, Publishing Company, Pennsylvania 1989.
12. Biopharmaceutics and Clinical Pharmacokinetics-An introduction 4th edition Revised and expanded by Rebort F Notari Marcel Dekker Inn, New York and Basel, 1987.
13. Remington's Pharmaceutical Sciences, By Mack Publishing Company, Pennsylvania.

PS605: BP605T PHARMACEUTICAL QUALITY ASSURANCE
(Open Elective - II)

B.Pharm. III Year II Sem. **L T/P/ C**
3 1/0/ 4

Course Objectives: This course deals with the various aspects of quality control and quality assurance aspects of pharmaceutical industries. It covers the important aspects like cGMP, QC tests, documentation, quality certifications and regulatory affairs.

Course Outcomes: Upon completion of the course student shall be able to:

- Understand the cGMP aspects in a pharmaceutical industry
- Appreciate the importance of documentation
- Understand the scope of quality certifications applicable to pharmaceutical industries
- Understand the responsibilities of QA & QC departments

UNIT – I **10 Hours**

1. Quality Assurance and Quality Management concepts: Definition and concept of Quality control, Quality assurance and GMP

2. Total Quality Management (TQM): Definition, elements, philosophies

3. ICH Guidelines: purpose, participants, process of harmonization, Brief overview of QSEM, with special emphasis on Q-series guidelines, ICH stability testing guidelines **Quality by design 4. (QbD)**: Definition, overview, elements of QbD program, tools

5. ISO 9000 & ISO14000: Overview, Benefits, Elements, steps for registration

6. NABL accreditation: Principles and procedure

UNIT – II **10 Hours**

1. Organization and personnel: Personnel responsibilities, training, hygiene and personal records. **Premises:** Design, construction and plant layout, maintenance, sanitation, environmental control, utilities and maintenance of sterile areas, control of contamination.

2. Equipments and raw materials: Equipments selection, purchase specifications, maintenance, purchase specifications and maintenance of stores for raw materials.

UNIT – II **10 Hours**

Quality Control: Quality control test for containers, rubber closures and secondary packing materials.

Good Laboratory Practices: General Provisions, Organization and Personnel, Facilities, Equipment, Testing Facilities Operation, Test and Control Articles, Protocol for Conduct of a Nonclinical Laboratory Study, Records and Reports, Disqualification of Testing Facilities.

UNIT – IV **08 Hours**

1. Complaints: Complaints and evaluation of complaints, Handling of return good, recalling and waste disposal.

2. Document maintenance in pharmaceutical industry: Batch Formula Record, Master Formula. Record, SOP, Quality audit, Quality Review and Quality documentation, Reports and documents, distribution records.

UNIT – V **07 Hours**

1. Calibration and Validation: Introduction, definition and general principles of calibration, qualification and validation, importance and scope of validation, types of validation, validation master plan. Calibration of pH meter, Qualification of UV-Visible spectrophotometer, General principles of Analytical method Validation.

PRINCIPAL
Princeton College of Pharmacy
Kesaramdu Vill, Vijayapur Colony,
Ghatkesar Mdl, Medchal Dist, Telangana.

PS702: INDUSTRIAL PHARMACY - II

B.Pharm. IV Year I Sem.

L/T/P/C
3/1/0/ 4

Course Objectives: This course is designed to impart fundamental knowledge on pharmaceutical product Commercialization from laboratory to market

Course Outcomes: Upon completion of the course, the student shall be able to:
- Know the process of pilot plant and scale up of pharmaceutical dosage forms
- Understand the process of technology transfer from lab scale to commercial batch
- Know different laws and acts that regulate pharmaceutical industry in India and US
- Understand the approval process and regulatory requirements for drug products

UNIT – I

10 Hours

Pilot plant scale up techniques: General considerations - including significance of personnel requirements, space requirements, raw materials, Pilot plant scale up considerations for solids, liquid orals, semi solids and relevant documentation, SUPAC guidelines, Introduction to Platform technology

UNIT – II

10 Hours

Technology development and transfer: WHO guidelines for Technology Transfer: Terminologies, Technology transfer protocol, Quality risk management, Transfer from R & D to production (Process, packaging and cleaning), Granularity of TT Process (API, excipients, finished products, packing materials) Documentation, Premises and equipments, qualification and validation, quality control, analytical method transfer, Approved regulatory bodies and agencies, Commercialization - practical aspects and problems (case studies), TOT agencies in India - APCTD, NRDC, TIFAC, BCIL, TBSE / SIDBI; Technology of Transfer (TOT) related documentation - confidentiality agreements, licensing, MoUs, legal issues

UNIT – III

10 Hours

1. **Regulatory affairs:** Introduction, Historical overview of Regulatory Affairs, Regulatory authorities, Role of Regulatory affairs department, Responsibility of Regulatory Affairs Professionals
2. **Regulatory requirements for drug approval:** Drug Development Teams, Non-Clinical Drug Development, Pharmacology, Drug Metabolism and Toxicology, General considerations of Investigational New Drug (IND) Application, Investigator's Brochure (IB) and New Drug Application (NDA), Clinical research / BE studies, Clinical Research Protocols, Biostatistics in Pharmaceutical Product Development, Data Presentation for FDA Submissions, Management of Clinical Studies.

UNIT – IV

08 Hours

Quality management systems: Quality management & Certifications: Concept of Quality, Total Quality Management, Quality by design, Six Sigma concept, Out of Specifications (OOS), Change control, Introduction to ISO 9000 series of quality systems standards, ISO 14000, NABL, GLP

UNIT – V

07 Hours

Indian Regulatory Requirements: Central Drug Standard Control Organization (CDSCO) and State Licensing Authority: Organization, Responsibilities, Common Technical Document (CTD), Certificate of Pharmaceutical Product (COPP), Regulatory requirements and approval procedures for New Drugs.

Recommended Books: (Latest Editions)

1. Regulatory Affairs from Wikipedia, the free encyclopedia modified on 7th April available at http://en.wikipedia.org/wiki/Regulatory_Affairs.
2. International Regulatory Affairs Updates, 2005. available at http://www.iraup.com/about.php

3. Douglas J Pisano and David S. Mantus. Text book of FDA Regulatory Affairs A Guide for Prescription Drugs, Medical Devices, and Biologics' 2nd Edition.
4. Regulatory Affairs brought by learning plus, inc. available at http.//www.cgmp.com/ra.htm.
5. Industrial Pharmacy by Roopa K Khar, S. P Vyas, Farhan J Ahmed, Gaurav K Jain, 4th Edition

PS703: PHARMACY PRACTICE

B.Pharm. IV Year I Sem.

L/T/P/C
3/1/0/ 4

Course Objectives: In the changing scenario of pharmacy practice in India, for successful practice of Hospital Pharmacy, the students are required to learn various skills like drug distribution, drug information, and therapeutic drug monitoring for improved patient care. In community pharmacy, students will be learning various skills such as dispensing safe medication and patient counseling.

Course Outcomes: Upon completion of the course, the student shall be able to:

- Know various drug distribution methods in a hospital
- Appreciate the pharmacy stores management and inventory control
- Monitor drug therapy of patient through medication chart review and clinical review
- Know pharmaceutical care services
- do patient counseling in community pharmacy

UNIT – I

10 Hours

1. **Hospital and it's organization**
   Definition, Classification of hospital- Primary, Secondary and Tertiary hospitals, Classification based on clinical and non- clinical basis, Organization Structure of a Hospital, and Medical staffs involved in the hospital and their functions.
2. **Hospital pharmacy and its organization**
   Definition, functions of hospital pharmacy, Organization structure, Location, Layout and staff requirements, and Responsibilities and functions of hospital pharmacists.
3. **Community Pharmacy**
   Organization and structure of retail and wholesale drug store, types and design, Legal requirements for establishment and maintenance of a drug store, Dispensing of proprietary products, maintenance of records of retail and wholesale drug store.

UNIT – II

10 Hours

1. **Drug distribution system in a hospital**
   Dispensing of drugs to inpatients, types of drug distribution systems, charging policy and labelling, dispensing of drugs to ambulatory patients, and Dispensing of controlled drugs.
2. **Therapeutic drug monitoring**
   Need for Therapeutic Drug Monitoring, Factors to be considered during the Therapeutic Drug Monitoring, and Indian scenario for Therapeutic Drug Monitoring.
3. **Community pharmacy management**
   Financial, materials, staff, and infrastructure requirements.

UNIT – III

10 Hours

1. **Drug information services**
   Drug and Poison information centre, Sources of drug information, Computerized services, and storage and retrieval of information.
2. **Patient counseling**
   Definition of patient counseling; steps involved in patient counseling, and Special cases that require the pharmacist
3. **Education and training program in the hospital**
   Role of pharmacist in the education and training program, Internal and external training program, Services to the nursing homes/clinics, Code of ethics for community pharmacy, and Role of pharmacist in the interdepartmental communication and community health education.

UNIT – IV

08 Hours

1. **Clinical Pharmacy**

   Introduction to Clinical Pharmacy, Concept of clinical pharmacy, functions and responsibilities of clinical pharmacist, Drug therapy monitoring - medication chart review, clinical review, pharmacist intervention, Ward round participation, Medication history and Pharmaceutical care.

2. **Over the counter (OTC) sales**

   Introduction and sale of over the counter, and Rational use of common over the counter medications.

UNIT – V

07 Hours

Drug store management and inventory control

Organization of drug store, types of materials stocked and storage conditions, Purchase and inventory control: principles, purchase procedure, purchase order, procurement and stocking, Economic order quantity, Reorder quantity level, and Methods used for the analysis of the drug expenditure

Recommended Books (Latest Edition):

1. Merchant S. H. and Dr. J. S. Quadry. A textbook of hospital pharmacy, 4th ed. Ahmadabad: B.S. Shah Prakakshan; 2001.
2. Parthasarathi G, Karin Nyfort-Hansen, Milap C Nahata. A textbook of Clinical Pharmacy Practice- essential concepts and skills, 1st ed. Chennai: Orient Longman Private Limited; 2004.
3. William E. Hassan. Hospital pharmacy, 5th ed. Philadelphia: Lea & Febiger; 1986.
4. Tipnis Bajaj. Hospital Pharmacy, 1st ed. Maharashtra: Career Publications; 2008.
5. Scott LT. Basic skills in interpreting laboratory data, 4th ed. American Society of Health System Pharmacists Inc; 2009.
6. Parmar N. S. Health Education and Community Pharmacy, 18th ed. India: CBS Publishers & Distributers; 2008.

PS704: NOVEL DRUG DELIVERY SYSTEMS

B.Pharm. IV Year I Sem.

L/T/P/C
3/1/0/ 4

Course Objectives: This subject is designed to impart basic knowledge on the area of novel drug delivery systems.

Course Outcomes: Upon completion of the course student shall be able:

- To understand various approaches for development of novel drug delivery systems.
- To understand the criteria for selection of drugs and polymers for the development of Novel drug delivery systems, their formulation and evaluation

UNIT – I **10 Hours**

1. **Controlled drug delivery systems:** Introduction, terminology/definitions and rationale, advantages, disadvantages, selection of drug candidates. Approaches to design-controlled release formulations based on diffusion, dissolution and ion exchange principles. Physicochemical and biological properties of drugs relevant to controlled release formulations
2. **Polymers:** Introduction, classification, properties, advantages and application of polymers in formulation of controlled release drug delivery systems.

UNIT – II **10 Hours**

1. **Microencapsulation:** Definition, advantages and disadvantages, microspheres /microcapsules, microparticles, methods of microencapsulation, applications
2. **Mucosal Drug Delivery system:** Introduction, Principles of bioadhesion / mucoadhesion, concepts, advantages and disadvantages, transmucosal permeability and formulation considerations of buccal delivery systems
3. **Implantable Drug Delivery Systems:** Introduction, advantages and disadvantages, concept of implantsand osmotic pump

UNIT – III **10 Hours**

1. **Transdermal Drug Delivery Systems:** Introduction, Permeation through skin, factors affecting permeation, permeation enhancers, basic components of TDDS, formulation approaches
2. **Gastroretentive drug delivery systems:** Introduction, advantages, disadvantages, approaches for GRDDS – Floating, high density systems, inflatable and gastroadhesive systems and their applications
3. **Nasopulmonary drug delivery system:** Introduction to Nasal and Pulmonary routes of drug delivery, Formulation of Inhalers (dry powder and metered dose), nasal sprays, nebulizers

UNIT – IV **08 Hours**

Nanotechnology and its Concepts: Concepts and approaches for targeted drug delivery systems, advantages and disadvantages, introduction to liposomes, niosomes, nanoparticles, monoclonal antibodies and their applications

UNIT – V **07 Hours**

1. **Ocular Drug Delivery Systems:** Introduction, intra ocular barriers and methods to overcome – Preliminary study, ocular formulations and ocuserts
2. **Intrauterine Drug Delivery Systems**: Introduction, advantages and disadvantages, development of intra uterine devices (IUDs) and applications

Recommended Books: (Latest Editions)

1. Y W. Chien, Novel Drug Delivery Systems, 2nd edition, revised and expanded, Marcel Dekker, Inc., New York, 1992.
2. Robinson, J. R., Lee V. H. L, Controlled Drug Delivery Systems, Marcel Dekker, Inc., New York, 1992.
3. Encyclopedia of Controlled Delivery. Edith Mathiowitz, Published by Wiley Interscience Publication, John Wiley and Sons, Inc, New York. Chichester/Weinheim
4. N. K. Jain, Controlled and Novel Drug Delivery, CBS Publishers & Distributors, New Delhi, 1st edition 1997 (reprint in 2001).
5. S. P. Vyas and R. K. Khar, Controlled Drug Delivery - concepts and advances, Vallabh Prakashan, New Delhi, 1st edition 2002.

PS705: PHARMACEUTICAL MARKETING (Open Elective - III)

B.Pharm. IV Year I Sem.

L/T/P/C
3/1/0/ 4

Course Objectives: The pharmaceutical industry not only needs highly qualified researchers, chemist, technical people but also requires skilled managers who can take the industry forward by managing and taking the complex decisions which are imperative for the growth of the industry. Sales & Marketing which grooms the people for taking a challenging role in Sales and Product management.

Course Outcome: Provide an understanding of marketing concepts and techniques and the application of the same in the pharmaceutical industry.

UNIT – I

10 Hours

Marketing: Definition, general concepts, and scope of marketing; Distinction between marketing & selling; Marketing environment; Industry and competitive analysis; Analyzing consumer buying behavior; industrial buying behavior.

Pharmaceutical market: Quantitative and qualitative aspects; size and composition of the market; demographic descriptions and socio-psychological characteristics of the consumer; market segmentation& targeting. Consumer profile; Motivation and prescribing habits of the physician; patients' choice of physician and retail pharmacist. Analyzing the Market; Role of market research.

UNIT – II

10 Hours

Product decision: Meaning, Classification, product line and product mix decisions, product life cycle, product portfolio analysis; product positioning; New product decisions; Product branding, packaging and labeling decisions, Product management in pharmaceutical industry.

UNIT – III

10 Hours

Promotion: Meaning and methods, determinants of promotional mix, promotional budget; An overview of personal selling, advertising, direct mail, journals, sampling, retailing, medical exhibition, public relations, online promotional techniques for OTC Products.

UNIT – IV

10 Hours

Pharmaceutical marketing channels: Designing channel, channel members, selecting the appropriate channel, conflict in channels, physical distribution management: Strategic importance, tasks in physical distribution management.

Professional sales representative (PSR): Duties of PSR, purpose of detailing, selection and training, supervising, norms for customer calls, motivating, evaluating, compensation and future prospects of the PSR.

UNIT – V

10 Hours

Pricing: Meaning, importance, objectives, determinants of price; pricing methods and strategies, issues in price management in pharmaceutical industry. An overview of DPCO (Drug Price Control Order) and NPPA (National Pharmaceutical Pricing Authority).

Emerging concepts in marketing: Vertical & Horizontal Marketing; Rural Marketing; Consumerism; Industrial Marketing; Global Marketing.

Recommended Books: (Latest Editions)

1. Philip Kotler and Kevin Lane Keller: Marketing Management, Prentice Hall of India, New Delhi
2. Walker, Boyd and Larreche: Marketing Strategy- Planning and Implementation, Tata McGraw Hill, New Delhi.
3. Dhruv Grewal and Michael Levy: Marketing, Tata McGraw Hill

4. Arun Kumar and N Menakshi: Marketing Management, Vikas Publishing, India
5. Rajan Saxena: Marketing Management; Tata MC Graw-Hill (India Edition)
6. Ramaswamy, U.S & Nanakamari, S: Marketing Management: Global Perspective, Indian Context, Macmillan India, New Delhi.
7. Shanker, Ravi: Service Marketing, Excell Books, New Delhi
8. Subba Rao Changanti, Pharmaceutical Marketing in India (GIFT – Excel series) Excel Publications.

PS706: PHARMACEUTICAL REGULATORY SCIENCE (Open Elective - III)

B.Pharm. IV Year I Sem.

L/T/P/C
3/1/0/ 4

Course Objectives: This course is designed to impart the fundamental knowledge on the regulatory requirements for approval of new drugs, drug products in regulated countries like US, EU, Japan, Australia and Canada. It prepares the students to learn in detail on the regulatory requirements, documentation requirements, and registration procedures for marketing the drug products in regulated countries.

Course Outcomes: Upon completion of the subject student shall be able to:

- Know about the process of drug discovery and development
- Know the regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals
- Know the regulatory approval process and their registration in Indian and international markets

UNIT – I

New Drug Discovery and development **10 Hours**

Stages of drug discovery, Drug development process, pre-clinical studies, non-clinical activities, clinical studies, Innovator and generics, Concept of generics, Generic drug product development.

UNIT – II

10 Hours

Regulatory Approval Process: Approval processes and timelines involved in Investigational New Drug (IND), New Drug Application (NDA), Abbreviated New Drug Application (ANDA) in US. Changes to an approved NDA / ANDA.

Regulatory authorities and agencies: Overview of regulatory authorities of United States, European Union, Australia, Japan, Canada (Organization structure and types of applications)

UNIT – III

10 Hours

Registration of Indian drug product in overseas market: Procedure for export of pharmaceutical products, Technical documentation, Drug Master Files (DMF), Common Technical Document (CTD), electronic Common Technical Document (eCTD), ASEAN Common Technical Document (ACTD) research.

UNIT – IV

08 Hours

Clinical trials: Developing clinical trial protocols, Institutional Review Board / Independent Ethics committee - formation and working procedures, Informed consent process and procedures, GCP obligations of Investigators, sponsors & Monitors, Managing and Monitoring clinical trials, Pharmacovigilance - safety monitoring in clinical trials

UNIT – V

07 Hours

Regulatory Concepts: Basic terminologies, guidance, guidelines, regulations, laws and acts, Orange book, Federal Register, Code of Federal Regulatory, Purple book

Recommended books (Latest edition):

1. Drug Regulatory Affairs by Sachin Itkar, Dr. N. S. Vyawahare, Nirali Prakashan.
2. The Pharmaceutical Regulatory Process, 2nd Edition Edited by Ira R. Berry and Robert P. Martin, Drugs and the Pharmaceutical Sciences, Vol.185. Informa Health care Publishers.
3. New Drug Approval Process: Accelerating Global Registrations by Richard A Guarino, MD, 5th edition, Drugs and the Pharmaceutical Sciences, Vol.190.
4. Guidebook for drug regulatory submissions / Sandy Weinberg. By John Wiley & Sons. Inc.

5. FDA Regulatory Affairs: a guide for prescription drugs, medical devices, and biologics /edited by Douglas J. Pisano, David Mantus.
6. Generic Drug Product Development, Solid Oral Dosage forms, Leon Shargel and Isader Kaufer, Marcel Dekker series, Vol.143
7. Clinical Trials and Human Research: A Practical Guide to Regulatory Compliance by Fay A. Rozovsky and Rodney K. Adams
8. Principles and Practices of Clinical Research, 2nd Edition Edited by John I. Gallin and Frederick P. Ognibene
9. Drugs: From Discovery to Approval, 2nd Edition by Rick N

PS707: PHARMACOVIGILANCE (Open Elective - III)

B.Pharm. IV Year I Sem.

L/T/P/C
3/1/0/ 4

Course Objective: This paper will provide an opportunity for the student to learn about development of pharmacovigilance as a science, basic terminologies used in pharmacovigilance, global scenario of Pharmacovigilance, train students on establishing pharmacovigilance programme in an organization, various methods that can be used to generate safety data and signal detection.

Course Outcomes: At completion of this paper it is expected that students will be able to (know, do, and appreciate):

- Why drug safety monitoring is important?
- History and development of pharmacovigilance
- National and international scenario of pharmacovigilance
- International standards for classification of diseases and drugs
- Adverse drug reaction reporting systems and communication in pharmacovigilance
- Data during pre-clinical, clinical and post approval.
- Pharmacovigilance Program of India (PvPI)
- ICH guidelines for ICSR, PSUR, expedited reporting, pharmacovigilance planning

UNIT - I **10 Hours**

Introduction to Pharmacovigilance:

a) History and development of Pharmacovigilance
b) Importance of safety monitoring of Medicine
c) WHO international drug monitoring programme
d) Pharmacovigilance Program of India (PvPI)

Introduction to adverse drug reactions:

a) Definitions and classification of ADRs
b) Detection and reporting
c) Methods in Causality assessment
d) Severity and seriousness assessment
e) Predictability and preventability assessment

Basic terminologies used in pharmacovigilance:

a) Terminologies of adverse medication related events
b) Regulatory terminologies

UNIT – II **10 hours**

Drug and disease classification:

a) Anatomical, therapeutic and chemical classification of drugs
b) International classification of diseases
c) Daily defined doses

Drug dictionaries and coding in pharmacovigilance:

a) WHO adverse reaction terminologies
b) MedDRA and Standardized MedDRA queries
c) WHO drug dictionary

Information resources in pharmacovigilance:

a) Basic drug information resources

Establishing pharmacovigilance programme:

a) Establishing in a hospital
b) Establishment & operation of drug safety department in industry
c) Contract Research Organizations (CROs)

UNIT – III **10 Hours**

Vaccine safety surveillance:

a) Vaccine Pharmacovigilance
b) Vaccination failure
c) Adverse events following immunization

Pharmacovigilance methods:

a) Passive surveillance – Spontaneous reports and case series
b) Stimulated reporting
c) Active surveillance – Sentinel sites, drug event monitoring and registries
d) Comparative observational studies – Cross sectional study, case control study and cohort study
e) Targeted clinical investigations

UNIT – IV **08 Hours**

Statistical methods for evaluating medication safety data

Safety data generation:

a) Pre-clinical phase
b) Clinical phase
c) Post approval phase

ICH Guidelines for Pharmacovigilance:

a) Organization and objectives of ICH
b) Expedited reporting
c) Individual case safety reports
d) Periodic safety update reports
e) Post approval expedited reporting
f) Pharmacovigilance planning
g) Good clinical practice in pharmacovigilance studies

UNIT – V **07 hours**

Pharmacogenomics of adverse drug reactions:

Drug safety evaluation in special population

a) Pediatrics
b) Pregnancy and lactation
c) Geriatrics

Recommended Books (Latest edition):

1. Textbook of Pharmacovigilance: S K Gupta, Jaypee Brothers, Medical Publishers.
2. Practical Drug Safety from A to Z By Barton Cobert, Pierre Biron, Jones and Bartlett Publishers.
3. Mann's Pharmacovigilance: Elizabeth B. Andrews, Nicholas, Wiley Publishers.
4. Stephens' Detection of New Adverse Drug Reactions: John Talbot, Patrick Walle, Wiley Publishers.
5. An Introduction to Pharmacovigilance: Patrick Waller, Wiley Publishers.

6. Cobert's Manual of Drug Safety and Pharmacovigilance: Barton Cobert, Jones& Bartlett Publishers.

7. Textbook of Pharmacoepidemiolog edited by Brian L. Strom, Stephen E Kimmel, Sean Hennessy, Wiley Publishers.
8. A Textbook of Clinical Pharmacy Practice -Essential Concepts and Skills: G. Parthasarathi, Karin Nyfort Hansen, Milap C. Nahata
9. National Formulary of India
10. Text Book of Medicine by Yashpal Munjal
11. Text book of Pharmacovigilance: concept and practice by GP Mohanta and PK Manna
12. http://www.whoumc.org/DynPage.aspx?id=105825&mn1=7347&mn2=7259&mn3=7297
13. http://www.ich.org/
14. http://www.cioms.ch/
15. http://cdsco.nic.in/
16. http://www.who.int/vaccine_safety/en/
17. http://www.ipc.gov.in/PvPI/pv_home.html

PS708: QUALITY CONTROL AND STANDARDIZATION OF HERBALS (Open Elective - III)

B.Pharm. IV Year I Sem.

L/T/P/C
3/1/0/ 4

Course Objective: In this subject the student learns about the various methods and guidelines for evaluation and standardization of herbs and herbal drugs. The subject also provides an opportunity for the student to learn cGMP, GAP and GLP in traditional system of medicines.

Course Outcomes: Upon completion of the subject student shall be able to:

- Know WHO guidelines for quality control of herbal drugs
- Know Quality assurance in herbal drug industry
- Know the regulatory approval process and their registration in Indian and international markets
- Appreciate EU and ICH guidelines for quality control of herbal drugs

UNIT – I **10 hours**

Basic tests for drugs – Pharmaceutical substances, Medicinal plants materials and dosage forms. WHO guidelines for quality control of herbal drugs. Evaluation of commercial crude drugs intended for use

UNIT – II **10 hours**

Quality assurance in herbal drug industry of cGMP, GAP, GMP and GLP in traditional system of medicine. WHO Guidelines on current good manufacturing Practices (cGMP) for Herbal Medicines WHO Guidelines on GACP for Medicinal Plants.

UNIT – III **10 hours**

EU and ICH guidelines for quality control of herbal drugs.
Research Guidelines for Evaluating the Safety and Efficacy of Herbal Medicines

UNIT – IV **08 hours**

Stability testing of herbal medicines. Application of various chromatographic techniques in standardization of herbal products.
Preparation of documents for new drug application and export registration GMP requirements and Drugs & Cosmetics Act provisions.

UNIT – V **07 hours**

Regulatory requirements for herbal medicines.
WHO guidelines on safety monitoring of herbal medicines in pharmacovigilance systems Comparison of various Herbal Pharmacopoeias.
Role of chemical and biological markers in standardization of herbal products

Recommended Books: (Latest Editions)

1. Pharmacognosy by Trease and Evans
2. Pharmacognosy by Kokate, Purohit and Gokhale
3. Rangari, V.D., Text book of Pharmacognosy and Phytochemistry Vol. I , Carrier Pub., 2006.
4. Aggrawal, S.S., Herbal Drug Technology. Universities Press, 2002.
5. EMEA. Guidelines on Quality of Herbal Medicinal Products/Traditional Medicinal Products,
6. Mukherjee, P.W. Quality Control of Herbal Drugs: An Approach to Evaluation of Botanicals. Business Horizons Publishers, New Delhi, India, 2002.
7. Shinde M.V., Dhalwal K., Potdar K., Mahadik K. Application of quality control principles to herbal drugs. International Journal of Phytomedicine 1(2009); p. 4-.

8. WHO. Quality Control Methods for Medicinal Plant Materials, World Health Organization, Geneva, 1998. WHO. Guidelines for the Appropriate Use of Herbal Medicines. WHO Regional Publications, Western Pacific Series No 3, WHO Regional office for the Western Pacific, Manila, 1998.
9. WHO. The International Pharmacopeia, Vol. 2: Quality Specifications, 3rd edn. World Health Organization, Geneva, 1981. WHO. Quality Control Methods for Medicinal Plant Materials. World Health Organization, Geneva, 1999.
10. WHO. WHO Global Atlas of Traditional, Complementary and Alternative Medicine. 2 vol. set. Vol. 1 contains text and Vol. 2, maps. World Health Organization, Geneva, 2005.
11. WHO. Guidelines on Good Agricultural and Collection Practices (GACP) for Medicinal Plants. World Health Organization, Geneva, 2004.

PS709: INSTRUMENTAL METHODS OF ANALYSIS LAB

B.Pharm. IV Year I Sem.

L/T/P/C
0/0/4/ 2

List of Experiments:

1. Determination of absorption maxima and effect of solvents on absorption maxima of organic compounds
2. Estimation of dextrose by colorimetry
3. Estimation of sulfanilamide by colorimetry
4. Simultaneous estimation of ibuprofen and paracetamol by UV spectroscopy
5. Assay of paracetamol by UV- Spectrophotometry
6. Estimation of quinine sulfate by fluorimetry
7. Study of quenching of fluorescence
8. Determination of sodium by flame photometry
9. Determination of potassium by flame photometry
10. Determination of chlorides and sulphates by nephelo turbidometry
11. Separation of amino acids by paper chromatography
12. Separation of sugars by thin layer chromatography
13. Separation of plant pigments by column chromatography
14. Demonstration experiment on HPLC
15. Demonstration experiment on Gas Chromatography

Recommended Books (Latest Editions):

1. Instrumental Methods of Chemical Analysis by B.K Sharma
2. Organic spectroscopy by Y.R Sharma
3. Text book of Pharmaceutical Analysis by Kenneth A. Connors
4. Vogel's Text book of Quantitative Chemical Analysis by A.I. Vogel
5. Practical Pharmaceutical Chemistry by A.H. Beckett and J.B. Stenlake
6. Organic Chemistry by I. L. Finar
7. Organic spectroscopy by William Kemp
8. Quantitative Analysis of Drugs by D. C. Garrett
9. Quantitative Analysis of Drugs in Pharmaceutical Formulations by P. D. Sethi
10. Spectrophotometric identification of Organic Compounds by Silverstein

PS710: PRACTICE SCHOOL

B.Pharm. IV Year I Sem.

L/T/P/ C
0 /0/4/ 2

Course Objectives: Practice school is an educational innovation seeking to link industry/hospital/ pharmacy experience with university instruction. The student will:

- Meet the rapidly changing needs and challenges of a professional work place.
- Acquire knowledge and skills.
- Bear an economic relevance to the society.

Course Outcome: Institutionalized linkage between university/college and industry. Student's involvement in real life projects continues internal evaluation and monitoring the faculty help by student to understand the practical issues. After successful completion of 150 hrs, the students will submit the detailed report in the following field.

Note: Any domains relevant to pharmacy can be given to students. Following domains for for reference

Industry oriented PS:
It comprises industry visits and interactions with executives to facilitate the process of learning by observations and discussions duly aided by the check list. It promotes learning by doing in various departments like production quality control and assurance, R&D etc. Taking one issue and working on it for prescribed hours and submit the report.

Hospital oriented PS:
The student is asked to visit the hospitals and work on some case studies like cardiovascular, diabetics, gastrointestinal, gynecological, pulmonary pediatric etc. related cases of some 5 to 6 to be studied and detailed data to be submitted.

Retail pharmacy-oriented PS:
The students have to visit different pharmacy shops and collect the data related to the most prescribed medicines in that area, prescription patterns, medical audit etc and submit the report.

Election of medicinal plants orientated PS:
The students have to visit medicinal plant gardens and collect some medicinal plants those are useful to various disorders and submit the report in detail about the plants they come across during their study period

Regulatory affairs: collect and analyse the regulatory affairs. Some important cases filed by drug control officers to be analysed and reported.

National poison centre: visit the local poison centre and write the relevant matter

Formulation aspects: Formulations using any equipments which otherwise are not usually used for regular practicals

PRINCIPAL
Princeton College of Pharmacy
Kommula Vill, Vajpeyi Colony,
Ghatkesar Mdl, Medchal Dist, Telangana.

PS801: BIOSTATISTICS AND RESEARCH METHODOLOGY

B.Pharm. IV Year II Sem.

L/T/P/ C
3/1/0/ 4

Course Objectives: To understand the applications of Biostatics in Pharmacy. This subject deals with descriptive statistics, Graphics, Correlation, Regression, ANOVA, Introduction to Design of Experiments, Phases of Clinical trials and Observational and Experimental studies.

Course Outcomes: Upon completion of the course the student shall be able to

- Know the operation of M.S. Excel, SPSS, R and MINITAB®, DoE (Design of Experiment)
- Know the various statistical techniques to solve statistical problems
- Appreciate statistical techniques in solving the problems.

UNIT – I **10 Hours**

Introduction: Statistics, Biostatistics, Frequency distribution

Measures of central tendency: Mean, Median, Mode- Pharmaceutical examples

Measures of dispersion: Dispersion, Range, standard deviation, Pharmaceutical problems

Correlation: Definition, Karl Pearson's coefficient of correlation, Multiple correlation -Pharmaceuticals examples

UNIT – II **10 Hours**

Regression: Curve fitting by the method of least squares, fitting the lines y= a + bx and x = a + by, Multiple regression, standard error of regression– Pharmaceutical Examples.

Sample, Population, large sample, small sample, Null hypothesis, alternative hypothesis, sampling, essence of sampling, types of sampling, Error-I type, Error-II type, Standard error of mean (SEM) - Pharmaceutical examples

Parametric test: t-test (Sample, Pooled or Unpaired and Paired), ANOVA, (One way and Two way), Least Significance difference

UNIT – III **10 Hours**

Non-Parametric tests: Wilcoxon Rank Sum Test, Mann-Whitney U test, Kruskal-Wallis test, Friedman Test

Introduction to Research: Need for research, Need for design of Experiments, Experiential Design Technique, plagiarism

Graphs: Histogram, Pie Chart, Cubic Graph, response surface plot, Counter Plot graph.

Designing the methodology: Sample size determination and Power of a study, Report writing and presentation of data, Protocol, Cohorts studies, Observational studies, Experimental studies, Designing clinical trial, various phases.

UNIT – IV **8 Hours**

Introduction to Practical components of Industrial and Clinical Trials Problems: Statistical Analysis Using Excel, SPSS, MINITAB®, DESIGN OF EXPERIMENTS, R - Online Statistical Software's to Industrial and Clinical trial approach

UNIT – V **7 Hours**

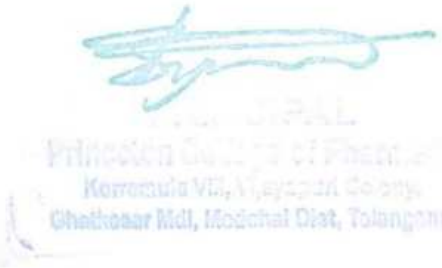
Design and Analysis of experiments:

Factorial Design: Definition, 2^2, 2^3 design. Advantage of factorial design

Response Surface methodology: Central composite design, Historical design, Optimization Techniques

Recommended Books (Latest edition):

1. Pharmaceutical Statistics - Practical and clinical applications, Sanford Bolton, Publisher Marcel Dekker Inc. New York.
2. Fundamental of Statistics – Himalaya Publishing House- S. C. Guptha
3. Design and Analysis of Experiments – PHI Learning Private Limited, R. Pannerselvam,
4. Design and Analysis of Experiments – Wiley Students Edition, Douglas and C. Montgomery



PS802: SOCIAL AND PREVENTIVE PHARMACY

B.Pharm. IV Year II Sem.

L/T/P/ C
3/1/0/ 4

Course Objectives: The purpose of this course is to introduce to students a number of health issues and their challenges. This course also introduced a number of national health programmes. The roles of the pharmacist in these contexts are also discussed.

Course Outcomes: After the successful completion of this course, the student shall be able to:

- Acquire high consciousness/realization of current issues related to health and pharmaceutical problems within the country and worldwide.
- Have a critical way of thinking based on current healthcare development.
- Evaluate alternative ways of solving problems related to health and pharmaceutical issues

UNIT – I **10 Hours**

Concept of health and disease: Definition, concepts and evaluation of public health. Understanding the concept of prevention and control of disease, social causes of diseases and social problems of the sick.

Social and health education: Food in relation to nutrition and health, Balanced diet, Nutritional deficiencies, Vitamin deficiencies, Malnutrition and its prevention.

Sociology and health: Socio cultural factors related to health and disease, Impact of urbanization on health and disease, Poverty and health

Hygiene and health: personal hygiene and health care; avoidable habits

UNIT – II **10 Hours**

Preventive medicine: General principles of prevention and control of diseases such as cholera, SARS, Ebola virus, influenza, acute respiratory infections, malaria, chicken guinea, dengue, lymphatic filariasis, pneumonia, hypertension, diabetes mellitus, cancer, drug addiction-drug substance abuse

UNIT – III **10 Hours**

National health programs, its objectives, functioning and outcome of the following: HIV and AIDS control programme, TB, Integrated disease surveillance program (IDSP), National leprosy control programme, National mental health program, National

programme for prevention and control of deafness, Universal immunization programme, National programme for control of blindness, Pulse polio programme.

UNIT – IV **08 Hours**

National health intervention programme for mother and child, national family welfare programme, national tobacco control programme, national malaria prevention program, national programme for the health care for the elderly, social health programme; role of *who in indian national program

UNIT – V **07 Hours**

Community services in rural, urban and school health: Functions of PHC, Improvement in rural sanitation, national urban health mission, Health promotion and education in school.

Recommended Books (Latest edition):

1. Short Textbook of Preventive and Social Medicine, Prabhakara G N, 2nd Edition, 2010, ISBN: 9789380704104, JAYPEE Publications
2. Textbook of Preventive and Social Medicine (Mahajan and Gupta), Edited by Roy Rabindra Nath, Saha Indranil, 4th Edition, 2013, ISBN: 9789350901878, JAYPEE Publications

3. Review of Preventive and Social Medicine (Including Biostatistics), Jain Vivek, 6th Edition, 2014, ISBN: 9789351522331, JAYPEE Publications
4. Essentials of Community Medicine - A Practical Approach, Hiremath Lalita D, Hiremath Dhananjaya A, 2nd Edition, 2012, ISBN: 9789350250440, JAYPEE Publications
5. Park Textbook of Preventive and Social Medicine, K Park, 21st Edition, 2011, ISBN-14: 9788190128285, Banarsidas Bhanot Publishers.
6. Community Pharmacy Practice, Ramesh Adepu, BSP publishers, Hyderabad

PS803: PHARMACEUTICAL JURISPRUDENCE

B.Pharm. IV Year II Sem. L/T/P/ C
3/0/0/ 3

Course Objectives: This course is designed to impart basic knowledge on several important legislations related to the profession of pharmacy in India.

Course Outcomes: Upon completion of the course, the student shall be able to understand:

- The Pharmaceutical legislations and their implications in the development and marketing
- Various Indian pharmaceutical Acts and Laws
- The regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals
- The code of ethics during the pharmaceutical practice

UNIT – I **10 Hours**

Drugs and Cosmetics Act, 1940 and its rules 1945:

Objectives, Definitions, Legal definitions of schedules to the act and rules

Import of drugs – Classes of drugs and cosmetics prohibited from import, Import under license or permit. Offences and penalties.

Manufacture of drugs – Prohibition of manufacture and sale of certain drugs,

Conditions for grant of license and conditions of license for manufacture of drugs, Manufacture of drugs for test, examination and analysis, manufacture of new drug, loan license and repacking license.

UNIT – II **10 Hours**

Drugs and Cosmetics Act, 1940 and its rules 1945.

Detailed study of Schedule G, H, M, N, P,T,U, V, X, Y, Part XII B, Sch F & DMR (OA)

Sale of Drugs - Wholesale, Retail sale and Restricted license. Offences and penalties

Labeling & Packing of drugs - General labeling requirements and specimen labels for drugs and cosmetics, List of permitted colors. Offences and penalties.

Administration of the act and rules - Drugs Technical Advisory Board, Central drugs Laboratory, Drugs Consultative Committee, Government drug analysts, Licensing authorities, controlling authorities, Drugs Inspectors

UNIT – III **10 Hours**

Pharmacy Act - 1948: Objectives, Definitions, Pharmacy Council of India; its constitution and functions, Education Regulations, State and Joint state pharmacy councils; its constitution and functions, Registration of Pharmacists, Offences and
Penalties

Medicinal and Toilet Preparation Act -1955: Objectives, Definitions, Licensing, Manufacture In bond and Outside bond, Export of alcoholic preparations, Manufacture of Ayurvedic, Homeopathic, Patent & Proprietary Preparations. Offences and Penalties.

Narcotic Drugs and Psychotropic substances Act-1985 and Rules: Objectives, Definitions, Authorities and Officers, Constitution and Functions of narcotic & Psychotropic Consultative Committee, National Fund for Controlling the Drug Abuse, Prohibition, Control and Regulation, opium poppy cultivation and production of poppy straw, manufacture, sale and export of opium, Offences and Penalties

UNIT – IV **08 Hours**

Study of Salient Features of Drugs and magic remedies Act and its rules: Objectives, Definitions, Prohibition of certain advertisements, Classes of Exempted advertisements, Offences and Penalties

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Prevention of Cruelty to animals Act-1960: Objectives, Definitions, Institutional Animal Ethics Committee, Breeding and Stocking of Animals, Performance of Experiments, Transfer and acquisition of animals for experiment, Records, Power to suspend or revoke registration, Offences and Penalties
National Pharmaceutical Pricing Authority: Drugs Price Control Order (DPCO)-2013. Objectives, Definitions, Sale prices of bulk drugs, Retail price of formulations, Retail price and ceiling price of scheduled formulations, National List of Essential Medicines (NLEM)

UNIT – V **07 Hours**

Pharmaceutical Legislations – A brief review, Introduction, Study of drugs enquiry committee, Health survey and development committee, Hathi committee and Mudaliar committee
Code of Pharmaceutical ethics - Definition, Pharmacist in relation to his job, trade, medical profession and his profession, Pharmacist's oath
Medical Termination of pregnancy act
Right to information Act
Introduction to Intellectual Property Rights (IPR)

Recommended books: (Latest Edition)

1. Forensic Pharmacy by B. Suresh
2. Text book of Forensic Pharmacy by B.M. Mithal
3. Hand book of drug law-by M. L. Mehra
4. A text book of Forensic Pharmacy by N.K. Jain
5. Drugs and Cosmetics Act/Rules by Govt. of India publications.
6. Medicinal and Toilet preparations act 1955 by Govt. of India publications.
7. Narcotic drugs and psychotropic substances act by Govt. of India publications
8. Drugs and Magic Remedies act by Govt. of India publication
9. Bare Acts of the said laws published by Government. Reference books (Theory)

PS804: COMPUTER AIDED DRUG DESIGN (Open Elective - IV)

B.Pharm. IV Year II Sem. L/T/P/ C 3/1/0/ 4

Course Objectives: This subject is designed to provide detailed knowledge of rational drug design process and various techniques used in rational drug design process.

Course Outcomes: Upon completion of the course, the student shall be able to understand:

- Design and discovery of lead molecules
- The role of drug design in drug discovery process
- The concept of QSAR and docking
- Various strategies to develop new drug like molecules.
- The design of new drug molecules using molecular modeling software

UNIT – I **10 Hours**

Introduction to Drug Discovery and Development: Stages of drug discovery and development

Lead discovery and Analog Based Drug Design

Rational approaches to lead discovery based on traditional medicine, Random screening, Non-random screening, serendipitous drug discovery, lead discovery based on drug metabolism, lead discovery based on clinical observation.

Analog Based Drug Design: Bioisosterism, Classification, Bioisosteric replacement. Any three case studies

UNIT – II **10 Hours**

Quantitative Structure Activity Relationship (QSAR): SAR versus QSAR, History and development of QSAR, Types of physicochemical parameters, experimental and theoretical approaches for the determination of physicochemical parameters such as Partition coefficient, Hammet's substituent constant and Tafts steric constant. Hansch analysis, Free Wilson analysis, 3D-QSAR approaches like COMFA and COMSIA.

UNIT – III **10 Hours**

Molecular Modeling and virtual screening techniques

Virtual Screening techniques: Drug likeness screening, Concept of pharmacophore mapping and pharmacophore-based Screening

Molecular docking: Rigid docking, flexible docking, manual docking, Docking based screening. De novo drug design.

UNIT – IV **08 Hours**

Informatics & Methods in drug design: Introduction to Bioinformatics, chemoinformatics. ADME databases, chemical, biochemical and pharmaceutical databases.

UNIT – V **07 Hours**

Molecular Modeling: Introduction to molecular mechanics and quantum mechanics. Energy Minimization methods and Conformational Analysis, global conformational minima determination.

Recommended Books (Latest Editions):

1. Robert GCK, ed., "Drug Action at the Molecular Level" University Prak Press Baltimore.
2. Martin YC. "Quantitative Drug Design" Dekker, New York.
3. Delgado JN, Remers WA eds "Wilson & Gisvolds's Text Book of Organic Medicinal & Pharmaceutical Chemistry" Lippincott, New York.
4. Foye WO "Principles of Medicinal chemistry 'Lea & Febiger.

5. Koro Ikovas A, Burckhalter JH. "Essentials of Medicinal Chemistry" Wiley Interscience.
6. Wolf ME, ed "The Basis of Medicinal Chemistry, Burger's Medicinal Chemistry" John Wiley & Sons, New York.
7. Patrick Graham, L., An Introduction to Medicinal Chemistry, Oxford University Press.
8. Smith HJ, Williams H, eds, "Introduction to the principles of Drug Design" Wright Boston.
9. Silverman R.B. "The organic Chemistry of Drug Design and Drug Action" Academic Press New York.

PS805: NANO TECHNOLOGY (Open Elective - IV)

B.Pharm. IV Year II Sem.

L/T/P/ C
3/1/0/ 4

Course Objectives: To develop expertise regarding suitability and evaluation of nanomaterials, able to apply the properties to the fabrication of nanopharmaceutical, evaluate the intensity of dosage forms and availability for targeting and controlled delivery.

Course Outcomes: The students should be able to select the right kind of materials, able to develop nano formulations with appropriate technologies, evaluate the product related test and for identified diseases

UNIT - I

Introduction to Nanotechnology

a. Definition of nanotechnology
b. History of nanotechnology
c. Unique properties of nanomaterials
d. Classification of nanomaterials

UNIT - II

Synthesis of Nanomaterials

Methods for synthesis of:

a. Gold nanoparticles
b. Magnetic nanoparticles
c. Polymeric nanoparticles
d. Self – assembly structures such as liposomes, Niosomes, micelles, aquasomes and nanoemulsions

UNIT - III

Biomedical applications of Nanotechnology

a. Nanotechnology products used for in vitro diagnostics
b. Applications in imaging and targeting.

UNIT - IV

Design of nanomaterials for drug delivery, pulmonary, nasal drug delivery, cardiovascular diseases and localized drug delivery systems.

UNIT - V

Characterization, drug release and stability studies of nanomaterials

Recommended Books (Latest Editions):

1. Nanomedicine and Nanoproducts: Applications, Disposition and Toxicology in the Human body, Eiki Igarashi, CRC press. 2015
2. Nanotechnology and Drug Delivery Volume one and two: Nanoplatforms in Drug Delivery, Jose L. Arias, CRC press
3. Nano: The Essentials: Understanding Nanosicence and Nanotechnology, T. Pradeep, Tata McGraw-Hill Publishing Company Limited, New Delhi, 2008.
4. Nanocrystals: Synthesis, Properties and Applications, C. N. R. Rao, P.J. Thomas and G.U. Kulakarni, Springer (2007)
5. Nanostructures and Nanomaterials: Synthesis, Properties and Application, Guozhong Gao, Imperial College Press (2004)

6. Nano chemistry: A Classical Approach to Nanomaterials – Royal Society for Chemistry, Cambridge, UK (2005)
7. Nanocomposite science and technology, pulickel M. Ajayan, Linda S. Schadler, paul V. Braun, Wiley-VCH Verlag, Weiheim (2003)
8. Nanoscale materials in chemistry, Edited by Kenneth J. Klabunde, John Wiley & Sons, 2009
9. Nanoparticles as Drug carriers, Vladimir P Torchiling, Imperial College Press, USA, 2006
10. Introduction to Nano Science and Technologies, Ankaneyulu Yerramilli, BS Publications. 2016

PS806: EXPERIMENTAL PHARMACOLOGY (Open Elective - IV)

B.Pharm. IV Year II Sem.

L/T/P/ C
3/1/0/ 4

Course Objectives: This subject is designed to impart the knowledge on preclinical evaluation of drugs and recent experimental techniques in the drug discovery and development. The subject content helps the student to understand the maintenance of laboratory animals as per the guidelines.

Course Outcomes: Upon completion of the course the student shall be able to,

- Appraise the regulations and ethical requirement for the usage of experimental animals.
- Describe the various animals and newer screening methods used in the drug discovery
- Understand the Research methodology to be followed Bio-statistical data interpretation of the assays

UNIT - I

Laboratory Animals: Description and applications of different species and strains of animals. Popular transgenic and mutant animals. Techniques for collection of blood and common routes of drug administration in laboratory animals, Techniques of blood collection and euthanasia

UNIT - II

Preclinical screening models: Dose selection, calculation and conversions, preparation of drug solution/suspensions, grouping of animals and importance of sham negative and positive control groups

UNIT - III

Preclinical screening models: for ANS activity, sympathomimetics, sympatholytics, parasympathomimetics, parasympatholytics and skeletal muscle relaxants.

UNIT - IV

Preclinical screening models for diuretics, anticoagulants and anticancer activities

UNIT - V

Research methodology and Bio-statistics, Selection of research topic, review of literature, research hypothesis and study design, Interpretation using Student't' test and One-way ANOVA. Graphical representation of data.

Recommended Books (Latest Editions):

1. Biological standardization by J.H. Burn D.J. Finney and I.G. Goodwin.
2. Screening methods in Pharmacology by Robert Turner. A.
3. Methods in Pharmacology by Arnold Schwartz.
4. Pharmacological screening methods and Toxicology by A Srinivasa Rao and N. Bhagya Lakshmi
5. Fundamentals of experimental Pharmacology by M. N. Ghosh.
6. Experimental Pharmacology for undergraduates by M C Prabhakara.
7. Drug discovery and Evaluation by Vogel H. G.
8. Experimental Pharmacology by R. K. Goyal.
9. Preclinical evaluation of new drugs by S.K. Gupta.
10. Handbook of Experimental Pharmacology, S K. Kulkarni.
11. Practical Pharmacology and Clinical Pharmacy, S K. Kulkarni, 3rd Edition.
12. Screening Methods in Pharmacology, Robert A. Turner.

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PS807: ADVANCED INSTRUMENTATION TECHNIQUES (Open Elective - IV)

B.Pharm. IV Year II Sem.

L/T/P/ C
3/1/0/ 4

Course Objectives: This subject deals with the application of instrumental methods in qualitative and quantitative analysis of drugs. This subject is designed to impart advanced knowledge on the principles and instrumentation of spectroscopic and chromatographic hyphenated techniques. This also emphasizes on theoretical and practical knowledge on modern analytical instruments that are used for drug testing.

Course Outcomes: Upon completion of the course the student shall be able to:

- Understand the advanced instruments used and its applications in drug analysis
- Understand the chromatographic separation and analysis of drugs.
- Understand the calibration of various analytical instruments
- Know analysis of drugs using various analytical instruments.

UNIT – I **10 Hours**

Nuclear Magnetic Resonance spectroscopy

Principles of H-NMR and C-NMR, chemical shift, factors affecting chemical shift, coupling constant, Spin - spin coupling, relaxation, instrumentation and applications

Mass Spectrometry - Principles, Fragmentation, Ionization techniques - Electron impact, chemical ionization, instrumentation and applications.

UNIT - II **10 Hours**

Thermal Methods of Analysis: Principles, instrumentation and applications of Thermogravimetric Analysis (TGA), Differential Thermal Analysis (DTA), Differential Scanning Calorimetry (DSC)

X-Ray Diffraction Methods: Origin of X-rays, basic aspects of crystals, X-ray Crystallography, rotating crystal technique, single crystal diffraction, powder diffraction and applications.

UNIT - III **10 Hours**

Calibration and validation-as per ICH and USFDA guidelines

Calibration of following Instruments

Electronic balance, UV-Visible spectrophotometer, IR spectrophotometer, Fluorimeter, Flame Photometer, HPLC and GC

UNIT – IV **08 Hours**

Radio immune assay: Importance, various components, Principle, different methods, Limitation and Applications of Radio immuno assay

Extraction Techniques: General principle and procedure involved in the solid phase extraction and liquid-liquid extraction

UNIT – V **07 Hours**

Hyphenated techniques - LC-MS/MS, GC-MS/MS, HPTLC-MS.

Recommended Books (Latest Editions):

1. Instrumental Methods of Chemical Analysis by B. K Sharma
2. Organic spectroscopy by Y. R Sharma
3. Text book of Pharmaceutical Analysis by Kenneth A. Connors
4. Vogel's Text book of Quantitative Chemical Analysis by A.I. Vogel
5. Practical Pharmaceutical Chemistry by A.H. Beckett and J.B. Stenlake
6. Organic Chemistry by I. L. Finar

7. Organic spectroscopy by William Kemp
8. Quantitative Analysis of Drugs by D. C. Garrett
9. Quantitative Analysis of Drugs in Pharmaceutical Formulations by P. D. Sethi
10. Spectrophotometric identification of Organic Compounds by Silverstein

Cont: 8977014929

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Chowdariguda(V), Korremula, Ghatkesar (M), Medchal- Malkajgiri (Dist.) - 500 088

E mail: princeton.pharmacy@gmail.com, Website: pcop.ac.in

1.3.2 Average percentage of courses that include experiential learning through project work/field work/internship during last year

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1.3.2Average percentage of courses that include experiential learning through project work/field work/internship during last year

Program name	Program code	Name of the Course that include experiential learning through project work/field work/internship	Course code	Year of offering	Name of the student studied course on experiential learning through project work/field work/internship	Link to the relevant document
B.PHARMACY	R00	Project Work	PS808	2023-2024	A NANDINI	
B.PHARMACY	R00	Project Work	PS808	2023-2024	MADAM VENKATA SUPRIYA	
B.PHARMACY	R00	Project Work	PS808	2023-2024	PATHI REDDY SOUMYA	
B.PHARMACY	R00	Project Work	PS808	2023-2024	PATHULOTHU SHIVAJI NAIK	
B.PHARMACY	R00	Project Work	PS808	2023-2024	P ANUSHA	
B.PHARMACY	R00	Project Work	PS808	2023-2024	GUNUGANTTI DEEKSHITHA	
B.PHARMACY	R00	Project Work	PS808	2023-2024	FAREEN BEGUM	
B.PHARMACY	R00	Project Work	PS808	2023-2024	ALA SUMA	
B.PHARMACY	R00	Project Work	PS808	2023-2024	MALOTHU SUNITHA	
B.PHARMACY	R00	Project Work	PS808	2023-2024	BHIMANANI RISHIKA	
B.PHARMACY	R00	Project Work	PS808	2023-2024	YEMMA MANISHA	
B.PHARMACY	R00	Project Work	PS808	2023-2024	JATOTH NAVYA	

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B.PHARMACY	R00	Project Work	PS808	2023-2024	ADDULA POOJASRI	
B.PHARMACY	R00	Project Work	PS808	2023-2024	MITTAPELLI ARAVIND	
B.PHARMACY	R00	Project Work	PS808	2023-2024	CHANDRAGIRI CHANDANA	
B.PHARMACY	R00	Project Work	PS808	2023-2024	ATHINIVENI ROSHINI	
B.PHARMACY	R00	Project Work	PS808	2023-2024	D.LOCHAN DEEP	
B.PHARMACY	R00	Project Work	PS808	2023-2024	BATHOJU SHARATH NISCHAL	
B.PHARMACY	R00	Project Work	PS808	2023-2024	AYIL SHRAVANI	
B.PHARMACY	R00	Project Work	PS808	2023-2024	SURAGANI UDAY KIRAN	
B.PHARMACY	R00	Project Work	PS808	2023-2024	AJJAM SRINIVAS	
B.PHARMACY	R00	Project Work	PS808	2023-2024	KAMTAM VIJAYKUMAR	
B.PHARMACY	R00	Project Work	PS808	2023-2024	CHUREPALLI SRAVAN KUMAR	
B.PHARMACY	R00	Project Work	PS808	2023-2024	DONTHOJI AKHILA	
B.PHARMACY	R00	Project Work	PS808	2023-2024	JANAGAMA BHAVANA	
B.PHARMACY	R00	Project Work	PS808	2023-2024	RATHOD PARAMESHWA R	
B.PHARMACY	R00	Project Work	PS808	2023-2024	DAPPU UMAMAHESHWARI	
B.PHARMACY	R00	Project Work	PS808	2023-2024	BADAVATH RANJITH	
B.PHARMACY	R00	Project Work	PS808	2023-2024	KUNNI ANKITHA	
B.PHARMACY	R00	Project Work	PS808	2023-2024	BUKHYA THARUN	
B.PHARMACY	R00	Project Work	PS808	2023-2024	J RESHMA	
B.PHARMACY	R00	Project Work	PS808	2023-2024	BEERLA KAVYA	
B.PHARMACY	R00	Project Work	PS808	2023-2024	BALLI SHIVA KUMAR	
B.PHARMACY	R00	Project Work	PS808	2023-2024	VAGGU PAVANI	
B.PHARMACY	R00	Project Work	PS808	2023-2024	BANAVATH VINOD	

B.PHARMACY	R00	Project Work	PS808	2023-2024	GARA SNEHITHA	
B.PHARMACY	R00	Project Work	PS808	2023-2024	BOJJAM SNEHA	
B.PHARMACY	R00	Project Work	PS808	2023-2024	BATHULA SANDEEP	
B.PHARMACY	R00	Project Work	PS808	2023-2024	PYALARAM BHAVANI	
B.PHARMACY	R00	Project Work	PS808	2023-2024	SNIGDHA HALDAR	
B.PHARMACY	R00	Project Work	PS808	2023-2024	PATHLOTH SRIKANTH	
B.PHARMACY	R00	Project Work	PS808	2023-2024	POLKAM PAVAN KUMAR	
B.PHARMACY	R00	Project Work	PS808	2023-2024	GONURU SINDHUJA	
B.PHARMACY	R00	Project Work	PS808	2023-2024	BUYYANKAR PAVANI	
B.PHARMACY	R00	Project Work	PS808	2023-2024	BHASKAR VIJAYA DURGA	
B.PHARMACY	R00	Project Work	PS808	2023-2024	BELIJA NANDHINI	
B.PHARMACY	R00	Project Work	PS808	2023-2024	CHENDETI HEMA LATHA	
B.PHARMACY	R00	Project Work	PS808	2023-2024	VEMPATI UDAY KIRAN	
B.PHARMACY	R00	Project Work	PS808	2023-2024	KONI VARSHA	
B.PHARMACY	R00	Project Work	PS808	2023-2024	SATTI SAI TEJA	
B.PHARMACY	R00	Project Work	PS808	2023-2024	RAI SUHANI	
B.PHARMACY	R00	Project Work	PS808	2023-2024	DABBEDA SRINIPA	
B.PHARMACY	R00	Project Work	PS808	2023-2024	KUNDU ARCHANA	
B.PHARMACY	R00	Project Work	PS808	2023-2024	TADICHERLA SRAVANI	
B.PHARMACY	R00	Project Work	PS808	2023-2024	ALUVALA MOUNIKA	
B.PHARMACY	R00	Project Work	PS808	2023-2024	SAKA VEENA	
B.PHARMACY	R00	Project Work	PS808	2023-2024	BIREDAR VEERESH	
B.PHARMACY	R00	Project Work	PS808	2023-2024	VELPUKONDA SAIPOOJA	
B.PHARMACY	R00	Project Work	PS808	2023-2024	NAREDDY YESHASHWINI	

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B.PHARMACY	R00	Project Work	PS808	2023-2024	DHUDI SUSHMITHA	
B.PHARMACY	R00	Project Work	PS808	2023-2024	DEVASARI PRATHYUSHA	
B.PHARMACY	R00	Project Work	PS808	2023-2024	KAHRGAWE LAKSHMI	
B.PHARMACY	R00	Project Work	PS808	2023-2024	AJMEERA SATHISH	
B.PHARMACY	R00	Project Work	PS808	2023-2024	CHEKKAPALLY BINDU	
B.PHARMACY	R00	Project Work	PS808	2023-2024	ANSARI MOHD ANAS KHURSHEED AHMED	
B.PHARMACY	R00	Project Work	PS808	2023-2024	SHAIKH TABISH	
B.PHARMACY	R00	Project Work	PS808	2023-2024	ANSARI MOHAMMAD SHADAB	
B.PHARMACY	R00	Project Work	PS808	2023-2024	KHAN MAJID ALI ZAHID ALI	
B.PHARMACY	R00	Project Work	PS808	2023-2024	ANSARI MOHD NAZIR	
B.PHARMACY	R00	Project Work	PS808	2023-2024	MANSOORI ZIYAUDDIN	
B.PHARMACY	R00	Project Work	PS808	2023-2024	KHALIKA MAROOF SAYED	
B.PHARMACY	R00	Project Work	PS808	2023-2024	SHAIKH NAAZ SHAMIM	
B.PHARMACY	R00	Project Work	PS808	2023-2024	SAWOOD ALAM	
B.PHARMACY	R00	Project Work	PS808	2023-2024	LAVIZA RIYAZ BUBERE	
B.PHARMACY	R00	Project Work	PS808	2023-2024	VANKALE ARUN KUMAR	
B.PHARMACY	R00	Project Work	PS808	2023-2024	SIDDIQUI NIKHAT JAHAN	
B.PHARMACY	R00	Project Work	PS808	2023-2024	KARISHMA T	
B.PHARMACY	R00	Project Work	PS808	2023-2024	MEKALA ANUSHA	
B.PHARMACY	R00	Project Work	PS808	2023-2024	CHILUMUKOTA BHARGHAVI	
B.PHARMACY	R00	Project Work	PS808	2023-2024	BANURI RAM REDDY	
B.PHARMACY	R00	Project Work	PS808	2023-2024	GUGULOTH SONY	

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B.PHARMACY	R00	Project Work	PS808	2023-2024	SAFURA SANOBER QUADRI	
B.PHARMACY	R00	Project Work	PS808	2023-2024	MOURYA RAJENDER	
B.PHARMACY	R00	Project Work	PS808	2023-2024	KOMMULA GOUTHAMI	
B.PHARMACY	R00	Project Work	PS808	2023-2024	KONDURU SRAVANI	
B.PHARMACY	R00	Project Work	PS808	2023-2024	SIKILAMBATLA NAVEEN	
B.PHARMACY	R00	Project Work	PS808	2023-2024	J GOVARDHAN	
B.PHARMACY	R00	Project Work	PS808	2023-2024	MANCHI SAI KIRAN	
B.PHARMACY	R00	Project Work	PS808	2023-2024	THUMMA ANKITHA	
B.PHARMACY	R00	Project Work	PS808	2023-2024	MACHA VINOD	
M.PHARMACY	S03	Project Work		2023-2024	PADATHAM JYOTHISHNA	
M.PHARMACY	S03	Project Work		2023-2024	AKKI SANTHOSHI	
M.PHARMACY	S03	Project Work		2023-2024	SANA SULTANA	
M.PHARMACY	S03	Project Work		2023-2024	GUDISE K DINESH CHANDRA	
M.PHARMACY	S03	Project Work		2023-2024	PORANDLA ALEKHYA	
M.PHARMACY	S03	Project Work		2023-2024	SUNNAPU UMAMAHESHW ARI	
M.PHARMACY	S03	Project Work		2023-2024	SINGAPURAM KAVYA	
M.PHARMACY	S03	Project Work		2023-2024	ELURI MENAKA	
M.PHARMACY	S03	Project Work		2023-2024	BUDDE MANUSRI	
M.PHARMACY	S03	Project Work		2023-2024	KATHA HARSHA KIRAN REDDY	
M.PHARMACY	S03	Project Work		2023-2024	GORRE SUSHMITHA	
M.PHARMACY	S03	Project Work		2023-2024	DRISI MOHD FAHEEM MOHD MUKEEM	
M.PHARMACY	S03	Project Work		2023-2024	SILVERU PALLAVI	
M.PHARMACY	S01	Project Work		2023-2024	CHOWHAN ANJALI	
M.PHARMACY	S01	Project Work		2023-2024	SABAVATH VIJAYA	

					LAKSHMI	
M.PHARMACY	S01	Project Work		2023-2024	SHAGARLA SINDHU	
M.PHARMACY	S01	Project Work		2023-2024	VEMULA ANUSHA	
M.PHARMACY	S01	Project Work		2023-2024	SUNDARAGIRI MANEESHA	
M.PHARMACY	S01	Project Work		2023-2024	MARUPAKA SATEESH KUMAR	
M.PHARMACY	S01	Project Work		2023-2024	KONA SHARANYA	
M.PHARMACY	S01	Project Work		2023-2024	SAYYED MOHD AYAZ MOHD NIYAZ	
M.PHARMACY	S01	Project Work		2023-2024	NANGUNURI NEERAJ KUMAR	
M.PHARMACY	S12	Project Work		2023-2024	KEMPAIAHGARI KALPANA	
M.PHARMACY	S12	Project Work		2023-2024	PIRISINGULA LAVANYA	
M.PHARMACY	S12	Project Work		2023-2024	MUNTHA SOWJANYA	
M.PHARMACY	S12	Project Work		2023-2024	GOLLA UMA MAHESHWARI	
M.PHARMACY	S12	Project Work		2023-2024	KOLLAPURAM KUSHMITHA LAHARI	
M.PHARMACY	S12	Project Work		2023-2024	KODURI SRAVANTHI	
M.PHARMACY	S12	Project Work		2023-2024	SHARMA YERSHA	
M.PHARMACY	S12	Project Work		2023-2024	OGGU SRILATHA	
M.PHARMACY	S12	Project Work		2023-2024	MUDA ANUSHA	
M.PHARMACY	S12	Project Work		2023-2024	BAIRI BHUVANESHWARI	
M.PHARMACY	S12	Project Work		2023-2024	JANGA MEGHANADH	
M.PHARMACY	S12	Project Work		2023-2024	KOTI DIVYA	
M.PHARMACY	S12	Project Work		2023-2024	CHAVVA HARITHA	
M.PHARMACY	S12	Project Work		2023-2024	SHAIKH TUBA JAMEEL	

					AHMED	
M.PHARMACY	S12	Project Work		2023-2024	BALLEPOD SUNIL SAINATH	
M.PHARMACY	S02	Project Work		2023-2024	MUTHUNOORI AKANKSHA	
M.PHARMACY	S02	Project Work		2023-2024	MANDALA SANDEEP	
M.PHARMACY	S02	Project Work		2023-2024	GANGISHETTI AJAYKUMAR	
M.PHARMACY	S02	Project Work		2023-2024	CHAMAKURI SRIKANTH	
M.PHARMACY	S02	Project Work		2023-2024	T SHRUTHI	
M.PHARMACY	S02	Project Work		2023-2024	POTHARAJ RAJU	
M.PHARMACY	S02	Project Work		2023-2024	VANAMDAS SAINATH GOUD	
M.PHARMACY	S02	Project Work		2023-2024	KOPALLI ALEKHYA	
M.PHARMACY	S02	Project Work		2023-2024	KANDELA SRILEKHA	
M.PHARMACY	S02	Project Work		2023-2024	VEMU AKHILA	
M.PHARMACY	S02	Project Work		2023-2024	KOLLA ROHITAA REDDY	
M.PHARMACY	S13	Project Work		2023-2024	BHANURI SHIVASAI	
M.PHARMACY	S13	Project Work		2023-2024	KUKKADUVVU AKANKSHA	
M.PHARMACY	S13	Project Work		2023-2024	MANCHIKANTI GAYITHRI	
M.PHARMACY	S13	Project Work		2023-2024	NASHIKANTI SAIKISHORE	
M.PHARMACY	S13	Project Work		2023-2024	VENKATESHW ARLU LAXMI SARANYA	
M.PHARMACY	S13	Project Work		2023-2024	MUKKA SAI TEJA	
M.PHARMACY	S13	Project Work		2023-2024	ENUGANTI SWARNALATHA	
M.PHARMACY	S13	Project Work		2023-2024	VANAMALA	

Cont: 8977014929

PRINCETON COLLEGE OF PHARMACY
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Chowdariguda(V), Korremula, Ghatkesar (M), Medchal- Malkajgiri (Dist.) - 500 088
E mail: princeton.pharmacy@gmail.com, Website: pcop.ac.in

1.3.3 Percentage of Students undertaking project work/ field work /internships

Cont: 8977014929

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E mail: princeton.pharmacy@gmail.com, Website: pcop.ac.in

S.NO	HT.NO	NAME OF THE STUDENT
1	20GA1R0001	A NANDINI
2	20GA1R0002	MADAM VENKATA SUPRIYA
3	20GA1R0003	PATHI REDDY SOUMYA
4	20GA1R0004	PATHULOTHU SHIVAJI NAIK
5	20GA1R0005	P ANUSHA
6	20GA1R0006	GUNUGANTTI DEEKSHITHA
7	20GA1R0007	FAREEN BEGUM
8	20GA1R0008	ALA SUMA
9	20GA1R0009	MALOTHU SUNITHA
10	20GA1R0010	BHIMANANI RISHIKA
11	20GA1R0011	YEMMA MANISHA
12	20GA1R0012	JATOTH NAVYA
13	20GA1R0013	ADDULA POOJASRI
14	20GA1R0014	MITTAPELLI ARAVIND
15	20GA1R0015	CHANDRAGIRI CHANDANA
16	20GA1R0016	ATHINIVENI ROSHINI
17	20GA1R0017	D.LOCHAN DEEP
18	20GA1R0018	BATHOJU SHARATH NISCHAL
19	20GA1R0019	AYIL SHRAVANI
20	20GA1R0020	SURAGANI UDAY KIRAN
21	20GA1R0021	AJJAM SRINIVAS
22	20GA1R0022	KAMTAM VIJAYKUMAR
23	20GA1R0023	CHUREPALLI SRAVAN KUMAR
24	20GA1R0024	DONTHOJI AKHILA
25	20GA1R0025	JANAGAMA BHAVANA
26	20GA1R0026	RATHOD PARAMESHWA R
27	20GA1R0027	DAPPU UMAMAHESHWARI
28	20GA1R0029	BADAVATH RANJITH
29	20GA1R0030	KUNNI ANKITHA
30	20GA1R0031	BUKHYA THARUN
31	20GA1R0032	J RESHMA
32	20GA1R0033	BEERLA KAVYA

33	20GA1R0034	BALLI SHIVA KUMAR
34	20GA1R0035	VAGGU PAVANI
35	20GA1R0036	BANAVATH VINOD
36	20GA1R0037	GARA SNEHITHA
37	20GA1R0039	BOJJAM SNEHA
38	20GA1R0040	BATHULA SANDEEP
39	20GA1R0041	PYALARAM BHAVANI
40	20GA1R0042	SNIGDHA HALDAR
41	20GA1R0043	PATHLOTH SRIKANTH
42	20GA1R0044	POLKAM PAVAN KUMAR
43	20GA1R0045	GONURU SINDHUJA
44	20GA1R0046	BUYYANKAR PAVANI
45	20GA1R0047	BHASKAR VIJAYA DURGA
46	20GA1R0048	BELIJA NANDHINI
47	20GA1R0049	CHENDETI HEMA LATHA
48	20GA1R0050	VEMPATI UDAY KIRAN
49	20GA1R0051	KONI VARSHA
50	20GA1R0052	SATTI SAI TEJA
51	20GA1R0053	RAI SUHANI
52	20GA1R0054	DABBEDA SRINIPA
53	20GA1R0055	KUNDU ARCHANA
54	20GA1R0056	TADICHERLA SRAVANI
55	20GA1R0057	ALUVALA MOUNIKA
56	20GA1R0058	SAKA VEENA
57	20GA1R0059	BIREDAR VEERESH
58	20GA1R0060	VELPUKONDA SAIPOOJA
59	20GA1R0062	NAREDDY YESHASHWINI
60	20GA1R0064	DHUDI SUSHMITHA
61	20GA1R0065	DEVASARI PRATHYUSHA
62	20GA1R0066	KAHRGAWE LAKSHMI
63	20GA1R0067	AJMEERA SATHISH
64	20GA1R0070	CHEKKAPALLY BINDU
65	20GA1R0072	ANSARI MOHD ANAS KHURSHEED AHMED
66	20GA1R0073	SHAIKH TABISH
67	20GA1R0074	ANSARI MOHAMMAD SHADAB
68	20GA1R0075	KHAN MAJID ALI ZAHID ALI
69	20GA1R0076	ANSARI MOHD NAZIR
70	20GA1R0077	MANSOORI ZIYAUDDIN

71	20GA1R0078	KHALIKA MAROOF SAYED
72	20GA1R0079	SHAIKH NAAZ SHAMIM
73	20GA1R0081	SAWOOD ALAM
74	20GA1R0083	LAVIZA RIYAZ BUBERE
75	20GA1R0084	VANKALE ARUN KUMAR
76	20GA1R0085	SIDDIQUI NIKHAT JAHAN
77	20GA1R0086	KARISHMA T
78	20GA1R0087	MEKALA ANUSHA
79	20GA1R0089	CHILUMUKOTA BHARGHAVI
80	20GA1R0090	BANURI RAM REDDY
81	20GA1R0091	GUGULOTH SONY
82	20GA1R0092	SAFURA SANOBER QUADRI
83	20GA1R0093	MOURYA RAJENDER
84	20GA1R0094	KOMMULA GOUTHAMI
85	20GA1R0095	KONDURU SRAVANI
86	20GA1R0096	SIKILAMBATLA NAVEEN
87	20GA1R0097	J GOVARDHAN
88	20GA1R0098	MANCHI SAI KIRAN
89	20GA1R00A0	THUMMA ANKITHA
90	21GA5R0001	MACHA VINOD

M.PHARMACY STUDENT LIST 2023-24

PHARMACOLOGY

S.NO	NAME OF THE STUDENT	H.T.No
1	CHOWHAN ANJALI	22GA1S0101
2	SABAVATH VIJAYA LAKSHMI	22GA1S0102
3	SHAGARLA SINDHU	22GA1S0103
4	VEMULA ANUSHA	22GA1S0104
5	SUNDARAGIRI MANEESHA	22GA1S0105
6	MARUPAKA SATEESH KUMAR	22GA1S0106
7	KONA SHARANYA	22GA1S0107
8	SAYYED MOHD AYAZ MOHD NIYAZ	22GA1S0108
9	NANGUNURI NEERAJ KUMAR	22GA1S0109

PRINCIPAL

M.PHARMACY STUDENT LIST 2023-24

PHARMACEUTICAL CHEMISTRY

S.NO	NAME OF THE STUDENT	H.T.No
1	MUTHUNOORI AKANKSHA	22GA1S0201
2	MANDALA SANDEEP	22GA1S0202
3	GANGISHETTI AJAYKUMAR	22GA1S0203
4	CHAMAKURI SRIKANTH	22GA1S0204
5	T SHRUTHI	22GA1S0205
6	POTHARAJ RAJU	22GA1S0206
7	VANAMDAS SAINATH GOUD	22GA1S0207
8	KOPALLI ALEKHYA	22GA1S0208
9	KANDELA SRILEKHA	22GA1S0209
10	VEMU AKHILA	22GA1S0210
11	KOLLA ROHITAA REDDY	22GA1S0211

PRINCIPAL

M.PHARMACY STUDENT LIST 2023-24

PHARMACEUTICS

S.NO	NAME OF THE STUDENT	H.T.No
1	PADATHAM JYOTHISHNA	22GA1S0301
2	AKKI SANTHOSHI	22GA1S0302
3	SANA SULTANA	22GA1S0303
4	GUDISE K DINESH CHANDRA	22GA1S0304
5	PORANDLA ALEKHYA	22GA1S0305
6	SUNNAPU UMAMAHESHW ARI	22GA1S0306
7	SINGAPURAM KAVYA	22GA1S0307
8	ELURI MENAKA	22GA1S0308
9	BUDDE MANUSRI	22GA1S0309
10	KATHA HARSHA KIRAN REDDY	22GA1S0310
11	GORRE SUSHMITHA	22GA1S0311
12	DRISI MOHD FAHEEM MOHD MUKEEM	22GA1S0312
13	SILVERU PALLAVI	22GA1S0313

PRINCIPAL

M.PHARMACY STUDENT LIST 2023-24

PHARMACEUTICAL ANALYSIS

S.NO	NAME OF THE STUDENT	H.T.No
1	KEMPAIAHGARI KALPANA	22GA1S1201
2	PIRISINGULA LAVANYA	22GA1S1202
3	MUNTHA SOWJANYA	22GA1S1203
4	GOLLA UMA MAHESHWARI	22GA1S1204
5	KOLLAPURAM KUSHMITHA LAHARI	22GA1S1205
6	KODURI SRAVANTHI	22GA1S1206
7	SHARMA YERSHA	22GA1S1207
8	OGGU SRILATHA	22GA1S1208
9	MUDA ANUSHA	22GA1S1209
10	BAIRI BHUVANESHW ARI	22GA1S1210
11	JANGA MEGHANADH	22GA1S1211
12	KOTI DIVYA	22GA1S1212
13	CHAVVA HARITHA	22GA1S1213
14	SHAIKH TUBA JAMEEL AHMED	22GA1S1214
15	BALLEPOD SUNIL SAINATH	22GA1S1215

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M.PHARMACY STUDENT LIST 2023-24

REGULATORY AFFAIRS

S.NO	NAME OF THE STUDENT	H.T.No
1	BHANURI SHIVASAI	22GA1S1301
2	KUKKADUVVU AKANKSHA	22GA1S1302
3	MANCHIKANTI GAYITHRI	22GA1S1303
4	NASHIKANTI SAIKISHORE	22GA1S1304
5	VENKATESHW ARLU LAXMI SARANYA	22GA1S1305
6	MUKKA SAI TEJA	22GA1S1306
7	ENUGANTI SWARNALATHA	22GA1S1307
8	VANAMALA AKAANKSHA	22GA1S1308
9	ERIKI PRAVEEN KUMAR	22GA1S1309
10	KONDRU DIVYA	22GA1S1310
11	SABAVAT MANOHAR	22GA1S1311
12	MAMATHA MATAM	22GA1S1312
13	KRUSHNA CHANDRA PANDA	22GA1S1313
14	KONTHAM RAGHURAM REDDY	22GA1S1314
15	RADA DILEEP	22GA1S1315
16	ANGURU SREE DEEPTHI	22GA1S1316

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M.PHARMACY STUDENT LIST 2023-24

PHARMACY PRACTICE

S.NO	NAME OF THE STUDENT	H.T.No
1	K ARUNA	22GA1S1501
2	NAVVA SAHITHI	22GA1S1502
3	SUBASIS PRADHAN	22GA1S1503

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E mail: princeton.pharmacy@gmail.com, Website: pcop.ac.in

S.No	Name of the course	Ht.No of Student	Name of the student	Name of the Faculty guide	Title of the Project	Signature of the Guide
1	B.Pharmacy	20GA1R0006	G.Deekshitha	Dr.L.Harikiran	Analgesicand anti-inflammatory effects of Methanolic extract of Tridaxprocumbens	
		20GA1R0029	B. Ranjith			
		20GA1R0031	B.Tharun			
		20GA1R0036	B.Vinod			
		20GA1R0075	Zahidali			
		20GA5R0001	M.Vinod			
2	B.Pharmacy	20GA1R0001	A.Nandini	Dr.K.Sundeep	Synthesis and Docking studies of Benzoxazinone chalcones as anti-inflammatory agents	
		20GA1R0003	Sowmya			
		20GA1R0013	Pooja Sri			
		20GA1R0047	B.VijayaDurga			
		20GA1R0086	Karishma			
		20GA1R0093	M.Rajender			
3	B.Pharmacy	20GA1R0012	Jatothnavya	Mrs.Thejovathi. B	Formulation and Evaluation of Oral Disintegrating Tablets of Domperidone	
		20GA1R0046	Buyyankarpavani			
		20GA1R0078	Khalikamaroofsayed			
		20GA1R0081	Sawoodalam			
		20GA1R0098	Manchisaikiran			
4	B.Pharmacy	20GA1R0014	M.Aravind Reddy	Dr.Madhusudhan Reddy A	Formulation and Evaluation of Anti-microbial Herbal cream	
		20GA1R0017	D.Lochandeep			
		20GA1R0090	B.Ramreddy			
		20GA1R0059	B.Veeresh			
		20GA1R0020	S.Udaykiran			
5	B.Pharmacy	20GA1R0008	A.Suma	Dr. M.Divya	Study of Hepatoprotective effect of Ethanolic Extract of *Basellarubra* Leaves	
		20GA1R0009	M.Sunitha			
		20GA1R0054	D.Srinipa			
		20GA1R0074	Ansari shadab			
		20GA1R0076	Ansari Nazir			
		20GA1R0096	S.Naveen			

6	B.Pharmacy	20GA1R0035	V.Pavani	Mrs.S.Sunayana	In-vitro Anti-coagulant activity of Ethanolic extract of *Nelumboneucifera*	
		20GA1R0045	G.Sindhuja			
		20GA1R0065	B.Prathyusha			
		20GA1R0091	G.Sony			
		20GA1R0097	J.Govardhan			
7	B.Pharmacy	20GA1R0018	B.Sharath	Ms.G.Lavanya	Design synthesis and characterization of Pyrazole-Benzothiazole hybrids as efficient Anti-proliferative agent	
		20GA1R0030	P.Ankitha			
		20GA1R0033	B.Kavya			
		20GA1R0056	T.Sravani			
		20GA1R0077	Mansoori Ziyaunddin			
8	B.Pharmacy	20GA1R0066	K.Lakshmi	Mrs.N.Ramya	Formulation and Evaluation of DiacereinEthosomal gel	
		20GA1R0083	LavizaRiyaz			
		20GA1R0058	S.Veena			
		20GA1R0027	D.UmaMaheshwari			
		20GA1R0067	A.Sathish			
		20GA1R0055	K.Archana			
9	B.Pharmacy	20GA1R0007	Farheen Begum	Mrs.K.Usha	Development and validation of RP HPLC method for the estimation of Osimertinibin pharmaceutical tablet	
		20GA1R0015	Ch.Chandana			
		20GA1R0032	Reshmitha			
		20GA1R0053	R.Suhani			
10	B.Pharmacy	20GA1R0005	P.Anusha	Ms.Zareena Begum	Anti-helminthic activity of Stem extracts of *Abutilon indica*	
		20GA1R0022	K.Vijaykumar			
		20GA1R0049	Ch.Hemalatha			
		20GA1R0079	ShaikNaaz			
		20GA1R0085	Siddiqui Nikhat			
11	B.Pharmacy	20GA1R0004	Pathulothu shivajinaik	Mr.B.Sandeep	Study of Anti Diabetic activity on *Averrhoa carambola* Leaves	
		20GA1R0010	Bhimananirishika			
		20GA1R0039	Bojjamsneha			
		20GA1R0044	Polkampavankumar			
		20GA1R0024	Donthojiakhila			

		20GA1R0062	Nareddy yeshashwini			
12	B.Pharmacy	20GA1R0042	Snigdhahaldar	Mrs.Ch.sunitha	Pharmacognostic studies on *Chrysanthemum indicum*	
		20GA1R0043	Pathlothsrikanth			
		20GA1R0084	Vankalearunkumar			
		20GA1R0095	Kondurusravani			
13	B.Pharmacy	20GA1R0002	Madam venkatasupriya	Mrs.V.Lavanya	Formulation and in-vitro Evaluation of Didanosin sustained released tablet	
		20GA1R0037	Garasnehitha			
		20GA1R0040	Bathulasandeep			
		20GA1R0070	Chekkapallybindu			
		20GA1R0087	Mekalaanusha			
14	B.Pharmacy	20GA1R0011	Yemmamanisha	Mr. Ch.Anil Kumar	Formulation and Evaluation of Amoxicillin gastro Retentive floating matrix tablets	
		20GA1R0016	Athiniveniroshini			
		20GA1R0052	Sattisaiteja			
		20GA1R0057	Aluvalamounika			
		20GA1R0064	Dhudisushmitha			
		20GA1R0073	Shaikh tabish			
15	B.Pharmacy	20GA1R00A0	Thummaankitha	Mr. C.M. Shiva raj Kumar	Commercial aspects of Regulatory approval and Regulations in G8 Countries as per ICH Guidelines	
		20GA1R0026	Rathod parameshwar			
		20GA1R0072	Ansari mohdanaskhurshee dahmed			
16	B.Pharmacy	20GA1R0019	Ayilshravani	Mrs. K.Devamani	Formulation and Development of Fenefluramine oral dispersible tablet	
		20GA1R0025	Janagamabhavana			
		20GA1R0048	Belijanandhini			
		20GA1R0060	Velpukonda saipooja			
		20GA1R0092	Safura sanoberquadri			
		20GA1R0094	Kommula gouthami			

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