

B. Pharm. (Four year) programme

Semester -1 **BP101T Human Anatomy and Physiology I– Theory**

Course outcome:

Fundamental knowledge on structure and functions of various systems, organs and their coordinated working pattern in human body.

1. Identify various tissues and organs in human body.
2. Perform various experiments related to special senses and nervous systems.
- 3.

Semester -1 **BP107P. HUMAN ANATOMY AND PHYSIOLOGY (Practical)**

Course outcome:

By the end of this subject students will be able to:

1. Explain the gross morphology, structure and functions of various organs of the human body.
2. Describe the various homeostatic mechanisms and their imbalances.
3. Identify the various tissues and organs of different systems of human body.
4. Perform the various experiments related to special senses and nervous system.
5. Appreciate coordinated working pattern of different organs of each system

Semester -1 **BP102T. PHARMACEUTICAL ANALYSIS (Theory)**

Course Outcomes:

The Student:

1. Describes the principles, concepts & applications of volumetric analysis, and electrochemical analysis.
2. Computes problems based on the volumetric principles.
3. Demonstrates the requisite practical skills based on the theoretical understanding.

Semester -1 **BP108P. PHARMACEUTICAL ANALYSIS (Practical)**

Course Outcomes:

1. Describes the principles, concepts & applications of volumetric analysis, and electrochemical analysis.
2. Computes problems based on the volumetric principles.
3. Demonstrates the requisite practical skills based on the theoretical understanding.

Semester -1 **BP103T. Pharmaceutics- I (Theory)**

Course Outcomes:

1. Students develop skill to know the profession of pharmacy from historical background to modern days.
2. Students learn pharmaceutical formulations from historical point of view to modern days.
3. They understand to prepare mixtures, solutions and elixirs with their evaluations.
4. They develop the knowledge and preparation of suppositories and its evaluation.
5. They become expert in preparation of ointment, cream, and other semisolid dosage forms with its evaluation.

Semester -1 **BP109P. Pharmaceutics (Practical)**

Course Outcomes:

1. Learned basics of various dosage form
2. Learned active ingredients and use of various medicament
3. Understand the pharmaceutical calculation preparation of various dosage form Acquiring the skills of drugs, dose and its usage.

Semester -1 **BP104T. PHARMACEUTICAL INORGANIC CHEMISTRY (Theory)**

Course Outcomes:

1. Student will be able to determine the impurities in inorganic drugs and pharmaceuticals
2. Student will be able to understand the medicinal and pharmaceutical importance of inorganic compounds
3. Student will be able to understand the analysis of inorganic pharmaceuticals and their application.

Semester -1 **BP110P. Pharmaceutical Inorganic Chemistry (Practical)**

Course Outcomes:

1. Students will understand the principles and procedures of analysis of drugs and also regarding the application of inorganic pharmaceuticals.
2. They will know the analysis of the inorganic pharmaceuticals their applications; and appreciate the importance of inorganic pharmaceuticals in preventing and curing the disease.

Semester -1 **BP105T.COMMUNICATION SKILLS (Theory)**

Course Outcomes:

The Student should be able to:

1. Understand the behavioral needs of a Pharmacist for functioning effectively in the areas of pharmaceutical operation.
2. Communicate (Verbal and Non Verbal) effectively and act as team player.
3. Develop interview skills and Leadership qualities.

Semester -1 **BP111P.Communication Skills (Practical)**

Course Outcomes:

1. Upon completion of the course the student shall be able to
2. Understand the behavioral needs for a Pharmacist to function effectively in the areas of pharmaceutical operation
3. Communicate effectively (Verbal and Non Verbal)
4. Effectively manage the team as a team player
5. Develop interview skills
6. Develop Leadership qualities and essentials

Semester -1 **BP 106RBT. REMEDIAL BIOLOGY (Theory)**

Course Outcomes:

1. Understand the basics, classification and salient features of five kingdoms of life.
2. Explain basic tissues & tissue systems & apply that knowledge in understanding of anatomy of different parts of plant.
3. Know the basic concepts of different human body system.
4. Explain the modes of nutrition & how these influence in evolution of chemical defense in autotrophs. Explain basic photosynthetic process.
5. Explain basic components of cell, their functions & fundamental processes of cell division.

Semester -1 **BP112RBP.REMEDIAL BIOLOGY (Practical)**

Course Outcomes:

1. Demonstrate skill of plant material sectioning, staining, mounting & focusing.
2. To decide on staining reagents required for specific part of plant.
3. Identify the parts of plants from its morphological & microscopical features.
4. Draw morphological, microscopical diagrams of different plant part and be able to label different components or parts.
5. Identify the type and functions of bone in human skeletal system.
6. Study of methods for collection and identification of blood group, measure the blood

7. pressure and determination of tidal volume.

Semester -1 BP 106 RMT.Remedial Mathematics (Theory)

Course Outcomes:

Upon completion of the course the student shall be able to:-

1. Know the theory and their application in Pharmacy
2. Solve the different types of problems by applying theory
3. Appreciate the important application of mathematics in Pharmacy

Semester – II BP 201T. HUMAN ANATOMY AND PHYSIOLOGY-II (Theory)

Course Outcomes:

Students will understand the anatomy of the organs present our body.

1. They will know the physiology and functions of various organs in our body.
2. They will understand the mechanism of every organ, how they are working, importance of organ and disorders of each and every organ in our body.

Semester – II BP 207 P. HUMAN ANATOMY AND PHYSIOLOGY (Practical)

Course Outcome:

The Students shall be able to

1. Describe the various Functions of Human system.
2. Importance of the role sensory organs and their functions (Eye, Skin, Ear and Nose etc)
3. To learn about the Body Temperature and measure the fever (body Temp).
4. Demonstrate the Respiratory system and respiration is measured by Spiro meter.
5. To learn about Family planning methods and discussed with male and female family planning (Temporary and Permanent) methods and their models.

Semester – II BP202T. Pharmaceutical Organic Chemistry – I (Theory)

Course Outcomes:

The student shall be able to

1. Write the structure, name and type of isomerism of the organic compound.
2. Write the reactions, mechanisms and applications and orientations of synthetic reactions.
3. Account for reactivity/stability of compounds.
4. Write the synthesis and reactions of various organic compounds like alkane, alkene, alkyl halides, carbonyl compounds, carboxylic acids and aliphatic amines.

Semester – II BP208P. Pharmaceutical Organic Chemistry -I (Practical)

Course Outcomes:

The student shall be able to identify the unknown organic compounds by performing

1. Preliminary tests: color, odour, aliphatic/aromatic compounds, saturation and unsaturation, etc.
2. Detection of extra elements like Nitrogen, Sulphur and halogen by Lassaigne's test. Solubility test
3. Functional group tests like Phenols, Amides/Urea, Carbohydrates, Amines, Carboxylic acids, Aldehydes and ketones, Alcohols, esters, Nitro compounds and anilides. Melting point/ Boiling point of Organic compounds.
4. Preparation of the solid derivatives of the organic compounds and confirmation of that compound by melting/boiling point determination.
5. Construction of molecular models

Semester – II BP203 T. Biochemistry (Theory)

Course Outcomes:

1. Compares the principle, concepts and importance of human metabolic pathways, bio energetics of carbohydrate, proteins and lipids.
2. Describes the genetics organization of mammalian genome and DNA: (replication, transcription and translation process)
3. Describes the principle, concepts and classification, nomenclature, function of enzymes
4. To understand the introduction and metabolic disorders about Carbohydrate, protein and lipids.

Semester – II BP 209 P. Biochemistry (Practical)

Course Outcomes:

The student shall able to identify the known and unknown sample of carbohydrate, proteins,

1. Test for the known and unknown sample of carbohydrate.
2. Test for the known and unknown sample of proteins.
3. Normal constituents of urine analysis.
4. Abnormal constituents of urine analysis

Semester – II BP 204T.Pathophysiology (THEORY)

Course Outcomes:

Upon completion of the course, students will be able to:

1. Explain the causes of the diseases and mechanism of diseases in the body,
2. Describe the basic principles of cell injury and cellular adaptation,
3. Describe mechanism involved in the process of inflammation and repair,
4. Understand the signs, symptoms, classification, etiology and pathogenesis and complications of the cancer, peptic ulcer, respiratory diseases and nervous diseases,
5. Know the Pathogenesis of the cardiovascular diseases, infectious diseases, sexually transmitted diseases, thyroid diseases, renal diseases, disease of bones and hematological diseases.

Semester – II BP205 T. Computer Applications in Pharmacy (Theory)

Course Outcomes:

The Students shall be able to

1. know the various types of application of computers in pharmacy
2. know the various types of databases
3. know the various applications of databases in pharmacy

Semester – II BP210P. Computer Applications in Pharmacy (Practical)

Course Outcomes:

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

1. Know the various types of Word Processing and HTML
2. Know various types of databases
3. Know various applications of databases in Pharmacy
4. Understand Tables, Queries, Forms and Reports to Web Pages
5. Understand Tables, Queries, Forms and Reports to XML Pages

Semester – II BP 206 T. Environmental Sciences (Theory)

Course Outcomes:

the student shall be able to:

1. Create the awareness about environmental problems among learners. Impart basic knowledge about the environment and its allied problems.
2. Develop an attitude of concern for the environment.
3. Motivate learner to participate in environment protection and environment improvement.

4. Acquire skills to help the concerned individuals in identifying and solving environmental problems.
5. Strive to attain harmony with Nature.

Semester III: BP301T. PHARMACEUTICAL ORGANIC CHEMISTRY –II (Theory)

Course Outcomes:

After completion of the course, the student shall be able to

1. Write the structure, name and the type of isomerism of the Organic compound.
2. Write the reaction, name the reaction and orientation of the reactions.
3. Account for the reactivity/ stability of the compounds.
4. Preparations and reactions of various organic compounds like benzene, phenols, aromatic amines, poly nuclear hydrocarbons and cyclo alkanes.

Semester III BP305P. PHARMACEUTICAL ORGANIC CHEMISTRY -II (Practical)

Course outcome:

The student shall be able to

1. Determine the acid, saponification and iodine values.
2. Know the techniques of re crystallization and steam distillation.
3. Prepare various organic compounds like; Benzanilide, phenyl benzoate, acetanilide, para bromo acetanilide, benzoic acid by oxidation and hydrolysis reactions, benzyl, cinnamic acid by perkin reaction, para iodo benzoic acid etc.

Semester III BP302T. PHYSICAL PHARMACEUTICS-I (Theory)

Course Outcomes:

Upon completion of the course student shall be able to:

1. Understand various physicochemical properties of drug molecules in the designing the dosage forms
2. Know the principles of chemical kinetics & to use them for stability testing and determination of expiry date of formulations
3. Demonstrate use of physicochemical properties in the formulation development and evaluation of dosage forms
4. Understand the complexation and protein binding of drugs
5. understand the preparation, applications of buffer and determination of pH.

Semester III BP306P. PHYSICAL PHARMACEUTICS – I (Practical)

Course Outcomes:

1. Do the determination the solubility of drug at room temperature, Determination of pKa value by Half Neutralization/ Henderson Hassel Balch equation. Determination of Partition co-efficient of benzoic acid in benzene and water
2. Do the determination of Partition co- efficient of Iodine in CCl₄ and water. Determination of % composition of NaCl in a solution using phenol-water system by CST method. Determination of surface tension of given liquids by drop count and drop weight method
3. Do the determination of HLB number of a surfactant by saponification method, Determination of Freundlich and Langmuir constants using activated char coal, Determination of critical micellar concentration of surfactants
4. Do the determination of stability constant and donor acceptor ratio of PABA- Caffeine complex by solubility method, Determination of stability constant and donor acceptor ratio of Cupric- Glycine complex by Ph titration method

Semester III BP 303 T. Pharmaceutical Microbiology (Theory)

COURSE OUTCOMES:

Upon completion of the course, students will be able to:

1. Explain the history, branches and importance of microbiology
2. Understand methods of identification, cultivation and preservation of various microorganisms.
3. Describe morphology, classification, reproduction and cultivation of fungi and viruses and quantitative measurement of bacterial growth.
4. Understand the importance and implementation of various sterilization methods and classification and mode of action of disinfectants, antiseptics and their evaluations and sterility test.
5. Know the different microbiological assay, method for standardization of antibiotics, vitamins and amino acids and understand the cell culture technology and its application in pharmaceutical industries.

Semester III BP 307P.PHARMACEUTICAL MICROBIOLOGY (Practical)

COURSE OUTCOMES:

Upon completion of the course, students will be able to:

1. Explain the history, branches and importance of microbiology
2. Understand methods of identification, cultivation and preservation of various microorganisms.
3. Describe morphology, classification, reproduction and cultivation of fungi and viruses and quantitative measurement of bacterial growth.
4. Understand the importance and implementation of various sterilization methods and classification and mode of action of disinfectants, antiseptics and their evaluations and sterility test.
5. Know the different microbiological assay, method for standardization of antibiotics, vitamins and amino acids and understand the cell culture technology and its application in pharmaceutical industries.

Semester III BP 304 T. PHARMACEUTICAL ENGINEERING (Theory)

Course Outcomes:

Upon completion of the course, students will be able to:

1. Know various unit operations used in Pharmaceutical industries. Understand the material handling techniques.
2. Performing various processes involved in pharmaceutical manufacturing process.
3. Understand various tests to prevent environmental pollution and comprehend significance of plant lay out design for optimum use of resources.
4. Know the various preventive methods used for corrosion control in Pharmaceutical industries.

Semester III BP308P - Pharmaceutical Engineering

Course Outcomes:

1. Understand principle of loss on dring, moisture content determination weight loss of mass that occurs material is heated.
2. Know the various pharmaceutical machinery which is highly useful in preparation of pharmaceutical products.
3. Understand humidity amount of water vapour present in the air using various methods
4. Learned steam distillation, which is vaporize the compound at lower temperature.

Semester IV BP401T. Pharmaceutical Organic Chemistry –III (Theory)

Course Outcomes:

1. Students will understand the principles and procedures of analysis of drugs and also regarding the application of inorganic pharmaceuticals.

2. They will know the analysis of the inorganic pharmaceuticals their applications; and appreciate the importance of inorganic pharmaceuticals in preventing and curing the disease.

Semester IV BP402T Medicinal Chemistry – I (Theory)

Course Outcomes:

Upon completion of the course the student shall be able to

1. understand the chemistry of drugs with respect to their pharmacological activity
2. understand the drug metabolic pathways, adverse effect and therapeutic value of drugs
3. know the Structural Activity Relationship (SAR) of different class of drugs
4. write the chemical synthesis of some drugs

Semester IV BP406P. Medicinal Chemistry – I (Practical)

Course Outcomes:

Upon completion of the course, students shall be able to:

1. Understand the methods of preparation for various organic compounds
2. Determine the percentage purity of drugs by official methods as per pharmacopoeia
3. Determine partition coefficient for drug

Semester IV BP 403 T. Physical Pharmaceutics-II (Theory)

Course Outcomes:

Upon completion of the course, students will be able to:

1. Describe the general principles and basic knowledge of pharmaceutical suspensions and colloids
2. Describe the flow behavior of fluids and the concept of thixotropy in pharmaceutical formulations
3. Explain particle size distribution and the effects of particle size on pharmaceuticals
4. Know the principles of chemical kinetics and use them in assigning expiry date of a pharmaceutical
5. Apply the physicochemical properties of drug molecules in the development of pharmaceutical dosage form

Semester IV BP 407P. Physical Pharmaceutics- II (Practical)

Course Outcomes:

Upon completion of the course, students will be able to:

1. Relate the theoretical aspects to practical application and acquire laboratory skills
2. Analyze derived properties of pharmaceutical powders and select optimum behavior
3. Determine viscosity of Newtonian and non-Newtonian fluid using various viscometers
4. Evaluate pharmaceutical suspensions based on sedimentation volume and degree of flocculation
5. Perform chemical kinetics study and accelerated stability study in predicting shelf life of a drug molecule

Semester IV BP 404 T. Pharmacology-I (Theory)

Course Outcomes:

1. Students will understand definition scope, source, routes of administration and importance pharmacology
2. Students will understand pharmacokinetics and pharmacodynamics
3. Students will understand adverse drug reaction
4. Students will understand drug interaction (drug-drug, drug-food)

Semester V BP501T. Medicinal Chemistry – II (Theory)

Course Outcomes:

1. Upon completion of the course the student shall

2. Understand the chemistry of drugs with respect to their pharmacological activity
3. Understand the drug metabolic pathways, adverse effect and therapeutic value of drugs
4. Know the Structural Activity Relationship of different class of drugs
5. Study the chemical synthesis of selected drugs

Semester V BP 502 T. Industrial PharmacyI (Theory)

Course Outcomes:

1. Know the various pharmaceutical dosage forms and their manufacturing techniques. Know various considerations in development of pharmaceutical dosage forms
2. Know the Formulation of solid, liquid and semisolid dosage forms and evaluation of their quality Course.

Semester V P503.T. Pharmacology-II (Theory)

Course Outcomes:

By the end of this subject students will be able to:

1. Understand the mechanism of drug action and its relevance in the treatment of different diseases
2. Demonstrate isolation of different organs/tissues from the laboratory animals by simulated experiments
3. Demonstrate the various receptor actions using isolated tissue preparation
4. Appreciate correlation of pharmacology with related medical sciences

Semester V BP 507 P. Pharmacology-II (Practical)

Course Outcomes:

1. Students will understand Introduction to in-vitro pharmacology and physiological salt solutions.
2. Students will understand Effect of drugs on isolated frog heart.
3. Students will understand Effect of drugs on blood pressure and heart rate of dog.
4. Students will understand Study of diuretic activity of drugs using rats/mice.

Semester V BP504 T. Pharmacognosy and Phytochemistry II (Theory)

Course Outcomes:

1. Understand the fundamental development and significance of secondary metabolites production in plants and other organisms. To derive their consequence as a pharmaceutically important molecules.
2. Illustrate the meaning, introduction & significance of pharmacognostical parameters & pharmacognostical studies of various crude drugs based on the presence of secondary metabolites.
3. Understand the source, name, chemical structures, and methods of extraction, qualitative & quantitative analysis of secondary metabolites from plant origin.
4. Recognize the importance of metabolites comprehensively from source to their Pharmaceutical & Industrial applications.
5. Explain the modern methods of extraction techniques and mention their significance compare with other conventional methods. Understand and application of spectroscopic techniques in phytochemical analysis.

Semester V BP 508 P. Pharmacognosy and Phytochemistry II (Practical)

Course Outcomes:

1. Demonstrate skill of plant material sectioning, staining, mounting & focusing. To decide on staining reagents required for specific part of plant.
2. Identify the parts of plants from its morphological & microscopical features.

3. Draw morphological, microscopical and powder characteristics diagrams and be able to label different component or parts. Conduct the extractions/isolations of secondary metabolite from crude drug and explain significance of use of various chemicals & physical conditions.
4. Identify and analyse the unorganized crude drugs using morphological, physical and chemical characteristics including qualitative analysis.
5. Expand skills involved in preparation and development of paper and thin layer chromatogram for both isolated components and herbal extracts.

Semester V BP 505 T. Pharmaceutical Jurisprudence (Theory)

Course Outcomes:

1. Understand the Pharmaceutical legislations and their implications in the development and marketing.
2. Know the various Indian pharmaceutical acts and laws.
3. Knowing the regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals.
4. Understand the code of ethics during the pharmaceutical practice.

Semester- VI BP601T. Medicinal Chemistry – III (Theory)

Course Outcomes:

Upon completion of the course the student shall be able to

1. understand the chemistry of drugs with respect to their pharmacological activity
2. understand the drug metabolic pathways, adverse effect and therapeutic value of drugs
3. know the Structural Activity Relationship (SAR) of different class of drugs
4. write the chemical synthesis of some drugs

Semester- VI BP607P. Medicinal Chemistry- III (Practical)

Course Outcomes:

Demonstrates the requisite practical skills based on the theoretical understanding

1. Preparation of drugs and intermediates, Assay of drugs
2. Preparation of medicinally important compounds or intermediates by Microwave
3. irradiation technique and Drawing structures and reactions using chemdraw
4. Determination of physicochemical properties such as logP, clogP, MR, Molecular weight, Hydrogen bond donors and acceptors for class of drugs course content using drug design software Drug likeliness screening (Lipinskies RO5)

Semester- VI BP602 T. PHARMACOLOGY-III (Theory)

Course Outcome

By the end of this subject students will be able to:

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

Semester- VI BP 608 P. Pharmacology-III (Practical)

Course Outcomes:

1. Know dose calculations in pharmacological experiments, calculation of pharmacokinetic parameters and determination of acute oral toxicity of a drug from given data.

2. Understand the biostatistics methods such as student's t test, ANOVA, Chi square test and Wilcoxon signed rank test in experimental pharmacology.
3. Understanding the evaluation of pharmacological activities like NSAID's induced ulcer model, effects of drugs on gastrointestinal motility, effect of agonist and antagonists, test for pyrogens, insulin hypoglycemic effect, effect of saline purgative on intestine and determination of acute skin and eye irritation.
4. Experiments are demonstrated by computer based tutorials and videos.

Semester- VI BP 603 T. Herbal Drug TECHNOLOGY (Theory)

Course Outcomes:

1. Understand the general methods to select, identify, authentication and processing of herbal raw materials for market. Understand; explain to need and significance of biodynamic agriculture approaches for the cultivation or production of medicinal plants.
2. Know the concept and treatment aspects of Indian system of medicine, their preparation and standardization methods.
3. Understand the concept of nutraceutical & functional foods as dietary supplements including drug interactions. Comprehend the herbal cosmetics, herbal excipients and herbal formulations.
4. Understand the concept of WHO & ICH guidelines for the assessment of herbal drugs including stability testing of herbal drugs.
5. Learner knowledge about Patenting and regulatory requirement of natural products.

Semester- VI BP 609 P. Herbal Drug Technology (Practical)

Course Outcomes:

1. Analyse and identify the classes of phytochemicals by qualitative analysis
2. Evaluate the marketed ayurvedic formulation as per standard monograph
3. Standardize the marketed cosmetic & nutraceutical formulations
4. Explain herbal formulations and labelling of syrups, mixtures and tablets and their evaluation as per pharmacopoeial requirements
5. Explain the standard methods to determine the total alkaloids, aldehyde and phenol Content

Semester- VI BP 604 T. BIOPHARMACEUTICS AND PHARMACOKINETICS (Theory)

Course Outcomes:

Upon completion of the course student shall be able to:

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

Semester- VI BP 605 T. Pharmaceutical Biotechnology (Theory)

Course Outcomes:

Upon completion of the course, the student will be able to:

1. Understand the relation between Pharmacy and Biotechnology
2. Understand the concepts of Mutation and Genetic engineering and their role in production of Pharmaceuticals
3. Understand the concepts of Immunology and about immunological products
4. Appreciate the fermentation technology and its products

Semester- VI BP606 T pharmaceutical Quality Assurance (Theory)

Course Outcomes:

1. Able to know and practice the Cgmp aspects in a Pharmaceutical industry
2. Students gain the importance of documentation in Pharmaceutical industries
3. Understand the scope of quality certifications applicable to Pharmaceutical industries
4. Students recognize the responsibilities of Quality Assurance and Quality Control departments in Pharmaceutical industries.
5. Students can able to maintain the analytical laboratory as per the Good Laboratory Practice guidelines.

Semester VII BP701T. Instrumental Methods of Analysis (Theory)

Course Outcomes:

1. Describes the principles Involved in interactions of matter with electromagnetic radiation & its applications in drug analysis.
2. The student computes Beer –Lambert law associated quantitative analysis problems.
3. The student computes basic IR spectral interpretation.
4. Describes the principles of chromatographic separation & analysis of drugs.
5. Demonstrates the requisite quantitative & qualitative practical skills based on the theoretical

Semester VII BP705P. Instrumental Methods of Analysis (Practical)

Course Outcomes:

1. The students learn the basic practical knowledge of the instrumentation available
2. Practical skills for the analysis of drugs and excipients using various instrumentation techniques
3. To make accurate analysis and report the results in defined statements
4. To learn documentation and express the observation with clarity
5. To understand the professional and safety responsibilities and working in the analysis laboratory

Semester VII BP 702 T. Industrial Pharmacy-II (Theory)

Course Outcomes:

1. ☑ Know the process of pilot plant and scale up of pharmaceutical dosage forms.
2. ☑ Understand the process of technology transfer from lab scale to commercial batch.
3. ☑ Know different Laws and Acts that regulate pharmaceutical industry.
4. ☑ Understand the approval process and regulatory requirements for drug products.

Semester VII BP 703T. Pharmacy Practice (Theory)

Course Outcomes:

By the end of this subject students will be able to:

1. ☑ Know various drug distribution methods in a hospital, Appreciate the pharmacy stores management and inventory control
2. ☑ Monitor drug therapy of patient through medication chart review and clinical review
3. ☑ Obtain medication history interview and counsel the patients, Identify drug related problems, Detect and assess adverse drug reactions
4. ☑ Interpret selected laboratory results (as monitoring parameters in therapeutics) of specific disease states, Know pharmaceutical care services, patient counseling in community pharmacy Appreciate the concept of rational drug therapy.

Semester VII BP 704T: Novel Drug Delivery Systems (Theory)

Course Outcomes:

Upon completion of the course student shall be able

1. To understand various approaches for development of Controlled drug delivery systems.

2. To understand various approaches of microencapsulation process.
3. To understand the criteria for selection of drugs and polymers for the development of Novel drug delivery systems, their formulation and evaluation.
4. To know the various Novel drug delivery systems and its applications.
5. To Characterize and Evaluate Novel Drug Delivery systems.

Semester-VIII BP801T. Biostatistics and Research Methodology (Theory)

Course Outcomes:

1. Students should able to select use and interpret results of, descriptive statistical methods effectively;
2. Students should able to demonstrate an understanding of the central concepts of modern statistical theory and their probabilistic foundation;
3. Student should able to interpret the results of statistical analyses accurately and effectively & to make appropriate use of statistical software.
4. Students should able to choose an appropriate experimental design based on the study objectives
5. Students should able to construct and implement the design selected and analyze the data based on the design used and its underlying assumptions.

Semester-VIII BP 802T Social and Preventive Pharmacy

Course Outcomes:

The students will understand the concepts and develop competency:

1. To explain the concept of health and public health;
2. To describe the transmission and preventive strategies available for various communicable diseases;; describe the various vertical National Health
3. Programmes like RNTCP, AIDS Control, National Immunization, Mother and Child, National Malaria Control Programme, Tobacco Control Programme etc.;
4. To describe the features and functioning of National Health Mission;; participate in community driven health interventional programmes;
5. To critically explore the link health issues with pharmaceutical problems; and explore alternate pathways to solve the various health issues of the country.

Semester-VIII P803ET. Pharma Marketing Management (Theory)

Course Outcomes:

1. Students acquire understanding about various aspects of marketing
2. Students gain Knowledge and awareness about various aspects of Pharmaceutical market- like quantitative, qualitative, composition; market segmentation motivation for sales force, 2498analyzing market research.
3. Students acquire knowledge about Product, product life cycle, new product, packaging and product management in Pharma industry.
4. Students gain capability to apply knowledge acquired about promotion, supply chain management, pricing etc.
5. Enumerate the role of professional sales representative (PSR).

Semester-VIII BP804ET Pharmaceutical Regulatory Science – Theory

Course Outcomes:

1. Understanding the regulatory concepts
2. Able to write and review Regulatory Documents
3. Marketing authorization from different countries
4. Know the regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals

5. Know the regulatory approval process and their registration in Indian and international markets

Semester-VIII BP 805T: Pharmacovigilance (Theory)

Course Outcomes:

1. Understand the development of pharmacovigilance as a science, basic terminologies used in pharmacovigilance, global scenario of Pharmacovigilance,
2. Know the establishing pharmacovigilance programme in an organization, various methods that can be used to generate safety data and signal detection, Acquiring the skills of classifying drugs, diseases and adverse drug reactions.
3. Knowing the following of concepts involved in Dictionaries, coding and terminologies used in pharmacovigilance and Methods to generate safety data during pre- clinical, clinical and post approval phases of drugs' life cycle.
4. Understand the Drug safety evaluation in paediatrics, geriatrics, pregnancy and lactation and Pharmacovigilance Program of India (PvPI), ICH guidelines for ICSR, PSUR, expedited reporting, pharmacovigilance planning , CIOMS requirements for ADR reporting.

Semester-VIII BP-806: ET. Quality Control and Standardization of Herbals (Theory)

Course Outcomes:

Upon completion of the course, students shall be able to:

1. Know WHO guidelines for quality control of herbal drugs
2. Know Quality assurance in herbal drug industry
3. Appreciate EU and ICH guidelines for quality control of herbal drugs
4. Understand the types of standardization and methods of HPTLC for validation
5. Know the regulatory approval process and their registration in Indian and International markets

Semester-VIII BP 807 ET. Computer aided Drug Design (Theory)

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

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

Semester-VIII BP808ET: Cell and Molecular Biology (Elective subject)

Course Outcomes:

1. The students must exposed to the basic knowledge about cell, the structure of prokaryote and eukaryotic cells, cell cycle, cell signaling, structure of DNA, RNA etc. do carry out independent research on cell biology to develop drug molecule against various disease.
2. Understanding and execution of cell biology techniques is very essential to identify the diseases and to develop novel drug molecules.
3. The knowledge of cell biology and molecular biology is very essential to the students of developing countries like India to identify new diseases and to develop drugs to cancer, HIV, Tuberculosis etc. are the major threat to the world.
4. The knowledge on cell biology and molecular biology will be useful to carry out advance research on microbes within the country or outside the country.

Semester-VIII BP809ET. Cosmetic Science(Theory)

Course Outcomes:

Upon completion of the course:

1. Students will be able to acquire basis of different types of cosmetic preparation.
2. Able to prepare cosmetics
3. Students will be able to test the quality of cosmetic preparations.
4. Able to prepare herbal cosmetics
5. Analyze the cosmetic preparations based on Bureau of Indian Standards

Semester-VIII BP810 ET. Pharmacological Screening Methods

Course Outcomes:

1. Students will acquire basic understanding on the principles of laboratory animal experimentation.
2. Students can appreciate the maintenance and handling of laboratory animals.
3. Screening methods can help to understand the nature of drug action.
4. The vulnerability of the living systems to the alteration by chemicals.
5. New therapeutic agents can be developed.
6. Toxic consequences of chemicals/drugs can be understood.

Semester-VIII BP 811 ET. Advanced Instrumentation Techniques

Course Outcomes:

1. To acquire knowledge in the advanced instruments used and its applications in drug analysis
2. To understand the chromatographic separation and analysis of drugs
3. To understand the calibration of various analytical instruments
4. To give the knowledge of analysis of drugs using various analytical instruments

Semester-VIII BP 812: ET. Dietary Supplements and Nutraceuticals

Course Outcomes:

Upon completion of the course

1. Students will be able to acquire knowledge on phytochemicals used as nutraceuticals
2. Able to know free radicals
3. Students will be able to understand the pharmaceutical specification on nutraceuticals.
4. Able to understand the various regulatory aspects related to nutraceuticals
5. To appreciate the analytical method for nutraceuticals.

Semester-VIII Elective course on Pharmaceutical Product Development

Course Outcomes:

1. Understand regulation, related to preformulation, formulation development, stability assessment, manufacturing and quality control testing of different types of dosage forms
2. Understand the Pharmaceutical Excipients in pharmaceutical product development with a special reference to the various categories such as solvents and solubilizers, Cyclodextrins and Non – ionic surfactants and suspending and 2520 emulsifying agents. Semi solid excipients
3. Understand the excipients in pharmaceutical product development of various categories such as Tablet and capsule, directly compressible vehicles, coat materials, parenterals and aerosols products, formulation of NDDS selection specific industrial applications
4. Know the various Optimization techniques pharmaceutical product development with specific examples and also understand Optimization by factorial designs and their applications
5. Know selection and quality control testing of packaging materials for pharmaceutical product development- regulatory consideration

M. Pharm. (Two years programme)

Semester 1 - MODERN PHARMACEUTICAL ANALYSIS (MPA101T)

Course Outcomes:

The Student:

- 1] Describes the principles & applications of instruments Involved in drug analysis.
- 2] Discusses analysis of various drugs in single and combination dosage forms using various analytical Instruments.
- 3] Able to do spectral interpretation and analytical problem solving.

Semester 1 ADVANCED PHARMACOLOGY-I (MPL101T)

Course Outcomes

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

1. Discuss the pathophysiology and pharmacotherapy of certain diseases
2. Explain the mechanism of drug actions at cellular and molecular level
3. Understand the adverse effects, contraindications and clinical uses of drugs used in treatment of diseases

Semester 1 PHARMACOLOGICAL AND TOXICOLOGICAL SCREENING METHODS-I (MPL102T)

Course Outcomes

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

1. Describe the regulations and ethical requirement for the usage of experimental animals..
2. Describe the various animal models used in the drug discovery process and good laboratory practices in maintenance and handling of experimental animals
3. Describe the various newer screening methods involved in the drug discovery process and correlate the preclinical data to humans.

Semester 1 CELLULAR AND MOLECULAR PHARMACOLOGY (MPL103T)

Course Outcomes

The Student:

- 1] Able to describe receptor signal transduction processes (Cell biology, Cell signalling)
- 2] Able to describe molecular pathways affected by drugs.
- 3] Able to describe molecular pharmacology and biomarkers in drug discovery process, molecular biology techniques as applicable for pharmacology (Genomic and proteomic tools, Pharmacogenomics, Cell culture techniques).

SEMESTER II ADVANCED PHARMACOLOGY-II (MPL201T)

Course Outcomes

The Student:

1. Able to describe the mechanism of drug actions at cellular and molecular level
2. Able to describe the Pathophysiology and pharmacotherapy of certain diseases.

3. Able to describe the adverse effects, contraindications and clinical uses of drugs used in treatment of diseases

SEMESTER II TOXICOLOGICAL SCREENING METHODS (MPL202T)

COURSE OUTCOMES

The Student:

- 1] Demonstrates the practical skills required to conduct the preclinical toxicity studies in the drug discovery process and good laboratory practices in maintenance and handling of experimental animals (CPCSEA guidelines, Bioassay)
- 2] Able to apply newer screening methods involved in the drug discovery process (Preclinical screening – In Vivo, In Vitro, animal alternative models), Correlate the preclinical data to humans.
- 3] Able to do Toxicity studies, ethical and regulatory requirements for toxicity studies (IND studies, Reproductive toxicology studies), skills required to conduct the preclinical toxicity studies (Toxicokinetic).

SEMESTER II PRINCIPLES OF DRUG DISCOVERY (MPL203T)

COURSE OUTCOMES

The Student:

- 1] Able to describe stages of drug discovery, significance of the role of genomics, proteomics and bioinformatics in drug discovery.
- 2] Able to describe the targets for drug discovery, lead seeking method and lead optimization,
- 3] Able to describe the role of computer aided drug design in drug discovery.

CLINICAL RESEARCH AND PHARMACOVIGILANCE (MPL204T)

COURSE OUTCOMES

The Student is able to:

- 1] Describe regulatory requirements for conducting clinical trial, Clinical trial designs.
- 2] Describe the responsibilities of key players involved in clinical trials, Safety monitoring, reporting and close-out activities.
- 3] Describe the principles of pharmacovigilance, new adverse drug reactions and their assessment, adverse drug reaction reporting systems and communication in pharmacovigilance.

M. PHARM. INDUSTRIAL PHARMACY (MIP)

SEMESTER I MODERN PHARMACEUTICAL ANALYSIS (MPA101T)

Course Outcomes:

The Student:

- 1] Describes the principles & applications of instruments involved in drug analysis.
- 2] Discusses analysis of various drugs in single and combination dosage forms using various analytical Instruments.
- 3] Able to do spectral interpretation and analytical problem solving.

Semester 1 PHARMACEUTICAL FORMULATION DEVELOPMENT (MIP101T)

COURSE OUTCOMES:

The Student:

- 1] Describes and protocol for the Pre-formulation Studies.
- 2] Describes, explores the use of Formulation Additives.
- 3] Able to describe, analyse, evaluate solubility, dissolution and product stability studies.

Semester 1 CUSTOMIZED DRUG DELIVERY SYSTEMS (MIP102T)

Course Outcomes

The student:

1. Able to describe the need, concept, design and evaluate various customized, sustained and controlled release dosage forms.
2. Able to describe, formulate, evaluate various customized/novel drug delivery systems and trends in personalised medicines.

Semester 1 INTELLECTUAL PROPERTY RIGHTS (MIP103T)**Course Outcomes****The Student:**

1. Able to describe, assist in regulatory audit process.
2. Able to describe regulatory guidelines for drug and drug products.
3. Able to describe the regulatory requirements for contract research organization.

SEMESTER II ADVANCED BIOPHARMACEUTICS & PHARMACOKINETICS (MIP201T)**Course Outcomes**

1. Describe the basic concept of biopharmaceutics & pharmacokinetics and concept of ADME in human body
2. Use plasma data and derive the pharmacokinetic parameters to describe the process of drug absorption, distribution, metabolism and elimination
3. Determine the various pharmacokinetic parameters from plasma concentration or urinary excretion data for a drug
4. Describe the concepts of bioavailability and bioequivalence, and Apply these concepts related to developing BE study protocol for generic products.
5. Design novel drug delivery products based on pharmacokinetics data consideration

SEMESTER II SCALE UP AND TECHNOLOGY TRANSFER (MIP202T)**Course Outcomes**

1. Students should be able to identify the variables in the process and parameters are controlled and sufficient in the face of the rigors of a commercial production environment
2. Students should be able to validate parameters established during development are still within the determined design space and/or adjusted at scale-up
3. Students should be able to prevent accidents in the plant by reducing the hazard to minimum.
4. Students should be able to eliminate accident caused work stoppage and lost production.
5. Students should be able to achieve lower workmen's compensation, insurance rates and reduce all other direct and indirect costs of accidents.

SEMESTER II PHARMACEUTICAL PRODUCTION TECHNOLOGY (MIP203T)**Course Outcomes**

1. This course is designed to impart knowledge and skills necessary to train the students to be on par with the routine of Industrial activities in Production
2. At completion of this course it is expected that students will be able to understand:
3. Handle the scheduled activities in a Pharmaceutical firm.
4. Manage the production of large batches of pharmaceutical formulations.

SEMESTER II ENTREPRENEURSHIP MANAGEMENT (MIP204T)**Course Outcomes****The Student:**

1. Able to describe the role of enterprise in national and global economy.
2. Able to describe the dynamics of motivation, concepts of entrepreneurship and imbibe the spirit of entrepreneurship.

3. Able to describe the demands and challenges of Growth Strategies and networking.

Semester-2(MIP205P): INDUSTRIAL PHARMACY PRACTICALS-II

Course Outcomes

The student:

1. Able to describe and apply concepts involved in Pharmaceutical Formulation Development for routine Industrial activities.
2. Able to describe and apply Novel Drug Delivery Systems,
3. Biopharmaceutics & Pharmacokinetics in R&D and F&D.

M. PHARM. PHARMACEUTICAL QUALITY ASSURANCE (MQA)

SEMESTER I MODERN PHARMACEUTICAL ANALYSIS (MPA101T)

Course Outcomes:

The Student:

- 1] Describes the principles & applications of instruments involved in drug analysis.
- 2] Discusses analysis of various drugs in single and combination dosage forms using various analytical Instruments.
- 3] Able to interpret spectra and solve analytical problems.

SEMESTER I QUALITY MANAGEMENT SYSTEMS (MQA101T)

COURSE OUTCOMES:

The Student:

- 1] Able to describe the importance of quality management systems.
- 2] Able to describe the tools for quality improvement studies.
- 3] Able to describe and implement quality evaluation protocols of pharmaceuticals.
- 4] Able to describe stability testing of drug and drug substances and statistical approaches for quality.

SEMESTER I QUALITY CONTROL AND QUALITY ASSURANCE (MQA102T)

QUALITY CONTROL AND QUALITY ASSURANCE (MQA102T) COURSE OUTCOMES:

The Student:

- 1] Able to describe & appreciate the importance of cGMP aspects, documentation & implement in pharmaceutical industry.
- 2] Able to describe & appreciate the scope of quality certifications applicable to Pharmaceutical industries
- 3] Able to describe the responsibilities of QA & QC departments.

SEMESTER I PRODUCT DEVELOPMENT AND TECHNOLOGY TRANSFER (MQA103T)

COURSE OUTCOMES:

The Student:

- 1] Able to describe the new product development process.
- 2] Able to describe the protocol to transfer technology from R&D to actual manufacturing by sorting out various information obtained during R&D
- 3] Able to describe the procedures involved in technology transfer - R & D to production.

SEMESTER I QUALITY ASSURANCE PRACTICAL-I (MQA104P)

COURSE OUTCOMES:

The Student:

- 1] Able to analyse drugs, excipients, finished products by both classical and modern analytical techniques and instruments.
- 2] Able to describe, perform, apply statistical protocols in manufacturing process.

- 3] Able to do preformulation studies, stability testing of drug and improve solubility of drug.
- 4] Able to perform quality control tests on packaging.

SEMESTER II HAZARDS AND SAFETY MANAGEMENT (MPA201T)

COURSE OUTCOMES:

The Student:

- 1] Is able to describe, with involvement (concern) environment and its allied hazard problems specific to the industry and universal environment at large.
- 2] Able to describe and ensure safety standards in pharmaceutical industry.
- 3] Able to describe and impart the method of Hazard assessment, procedure, methodology for providing safe industrial atmosphere.

SEMESTER II PHARMACEUTICAL VALIDATION (MQA202T)

COURSE OUTCOMES:

The Student:

- 1] Is able to describe the concepts of calibration, qualification and validation of various equipments and instruments, process validation protocol of different dosage forms
- 2] Able to describe and implement analytical validation protocol.
- 3] Able to describe and implement the cleaning validation protocol of equipments employed in the manufacture of pharmaceuticals.

SEMESTER II AUDITS AND REGULATORY COMPLIANCE (MPA203T)

COURSE OUTCOMES:

The Student:

- 1] Able to describe the concepts of auditing, methodology of auditing, implementing audit process in production, analytical quality control.
- 2] Able to prepare audit report.
- 3] Able to describe auditing protocols applied in different sections of pharmaceutical industry.

SEMESTER II PHARMACEUTICAL MANUFACTURING TECHNOLOGY (MPA204T)

COURSE OUTCOMES:

The Student:

- 1] Able to describe the Common practices in pharmaceutical industry, plant layout and production planning, principles and practices of aseptic process technology, non-sterile manufacturing technology and packaging technology.
- 2] Able to describe Implementation of Quality by design (QbD - QTPP. CMA, CQA, CPP, RLD, Design space, Design of Experiments).
- 3] Able to describe process analytical technology (PAT) in pharmaceutical manufacturing.

SEMESTER II QUALITY ASSURANCE PRACTICAL-II(MQA204P)

COURSE OUTCOMES:

The Student:

- 1] Able to analyse drug by classical and modern analytical techniques and instruments.
- 2] Able to perform, apply validation protocols on method of drug analysis, cleaning, processing areas etc.
- 3] Able to create check lists for processes, vendors etc.
- 4] Able to create Design of plant layout for sterile and non-sterile products.
- 5] Able to go through case studies on applications of QbD, PAT.

SEMESTER III MRM 301T Research Methodology & Biostatistics

COURSE OUTCOMES

The Student:

- 1] Able to describe research problem, methodology, literature study, design of experiments.
2587
- 2) Able to apply appropriate statistical parametric and non parametric tools.
- 3] Able to describe ethical research and its significance.
- 4] Able to describe CPCSEA guidelines for laboratory animal facility.
- 5] Able to describe the significance of Heslinki declaration.

SEMESTER IV Project Work

COURSE OUTCOMES

The Studentable to:

- 1] Identify, formulate, research literature, and analyse complex pharmaceutical problems relevant to industry reaching substantiated conclusions using first principles of physical, natural sciences, and applied sciences.
- 2) Apply appropriate statistical parametric and non parametric tools and experimental design.
- 3] Express with clarity and sound reasoning student's work by the way of speech and writing.

DEPARTMENT OF PHARMACY
DOCTOR OF PHARMACY (five year programme)

1.1 HUMAN ANATOMY & PHYSIOLOGY (THEORY)

Course outcome:

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

1. Describe the structure (gross and histology) and functions of various organs of the human body.
2. Describe the various homeostatic mechanisms and their imbalances of various systems; c. identify the various tissues and organs of the different systems of the human body.
3. Perform the hematological tests and also record blood pressure, heart rate, pulse and Respiratory volumes.
4. Appreciate coordinated working pattern of different organs of each system
5. Appreciate the interlinked mechanisms in the maintenance of normal functioning (homeostasis) of human body.

1.1 HUMAN ANATOMY & PHYSIOLOGY (PRACTICAL)

Course outcome:

Upon completion of the course the student shall be able to practically demonstrate

Practically.

1. The structure (gross and histology) and functions of various organs of the human body.
2. The various homeostatic mechanisms and their imbalances of various systems;
3. identify the various tissues and organs of the different systems of the human body.
4. The hematological tests and also record blood pressure, heart rate, pulse and Respiratory volumes.
5. Coordinated working pattern of different organs of each system
6. The interlinked mechanisms in the maintenance of normal functioning (homeostasis) of human body.
- 7.

1.2 PHARMACEUTICS (THEORY)

Course Outcomes

1. Understand about the formulation aspects of different dosage forms.
2. Gain ability to perform various pharmaceutical calculations involved in formulation
3. Formulate different types of dosage forms.
4. Appreciate the significance and advantage of good formulation towards improved pharmaceutical care and therapeutic effectiveness

1.3 PHARMACEUTICS (PRACTICAL)

COURSE OUTCOMES: NIL

1.4 MEDICINAL BIOCHEMISTRY (THEORY)

Course Outcomes

1. Understand the catalytic activity of enzymes and importance of isoenzymes in diagnosis of diseases.
2. Know the metabolic process of biochemical in health and illness (metabolic disorders)
3. Understand the genetic organization of mammalian genome, protein synthesis, replication, mutation, and repair mechanism.
4. Know the biochemical principles of organ function, test of kidney, liver and endocrine gland.
5. Do the qualitative analysis and determination of biomolecules in the body fluids.

1.2 MEDICINAL BIOCHEMISTRY (PRACTICAL)

Course Outcome

1. Do the qualitative analysis of normal constituents of urine.

2. Do the qualitative analysis of abnormal constituents of urine.
3. Do the quantitative estimation of urine sugar by benedict's method.
4. Do the quantitative estimation of urine creatinine.
5. Do the test for lipids.
6. Do the titrable acidity and ammonia in urine.
7. Do the separation of amino acids by paper chromatography and determine the R_f
8. value.
9. Do the determination of amino acids by ninhydrin method.
10. Do the determination of chromic period of salivary amylase.
11. Understand the qualitative and quantitative estimation.

1.3 PHARMACEUTICAL ORGANIC CHEMISTRY (THEORY)

Course Outcomes

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

1. IUPAC/Common system of nomenclature of simple organic compounds belonging to different classes of organic compounds.
2. Some important physical properties of organic compounds
3. Free radical/ nucleophilic [alkyl/ acyl/ aryl] /electrophilic substitution, freeradical/nucleophilic / electrophilic addition, elimination, oxidation and reduction reactions with mechanism, orientation of the reaction, order of reactivity, stability of compounds;
4. Some named organic reactions with mechanisms;
5. Methods of preparation, test for purity, principle involved in the assay, important medicinal uses of some important organic compounds.

1.4 PHARMACEUTICAL ORGANIC CHEMISTRY (PRACTICAL)

Course Outcomes

Upon completion of the course, the student shall be able to demonstrate

1. Various synthesis of organic compounds involving different mechanism and principles.
2. Systematically analysis of unknown organic compound
3. Identify the given organic compound by performing various chemical tests. Use of Stereomodels of Methane, Ethane, Ethylene, Acetylene, Cis alkene, Trans alkene

1.5. PHARMACEUTICAL INORGANIC CHEMISTRY (THEORY)

Course Outcomes

1. Student will be able to understand of analysis of inorganic pharmaceuticals and their application.
2. Student will be able to understand the importance of inorganic pharmaceuticals in preventing and curing diseases.
3. Student will be able to understand the importance of Radiopharmaceutical and their application

1.5 PHARMACEUTICAL INORGANIC CHEMISTRY (PRACTICAL)

Course Outcome

1. Students will understand the principles and procedures of analysis of drugs and also regarding the application of inorganic pharmaceuticals.
2. They will know the analysis of the inorganic pharmaceuticals their applications; and appreciate the importance of inorganic pharmaceuticals in preventing and curing the disease.

Second year

2.1 PATHOPHYSIOLOGY (THEORY)

Course Outcomes

1. Understand to identify the sign and symptoms of various diseases
2. Know the abnormal laboratory findings related to causes of illness

3. Understand the pathology and management of various diseases
4. Understand the complication of diseases
5. Acquiring the skills of patient counselling and non pharmacological management

.2. PHARMACEUTICAL MICROBIOLOGY (PRACTICAL)

Course Outcomes

1. Better understanding of theory concepts by the student.
2. The student will be familiar about various apparatuses and equipments used in Pharmaceutical Microbiology Lab.
3. The student will be skilled to perform experiments using microorganisms, to operate various equipments and to handle apparatuses in Pharmaceutical Microbiology Lab.

2.3 PHARMACOGNOSY & PHYTOPHARMACEUTICALS (THEORY)

Course Outcomes

1. Explain meaning of the term pharmacognosy, its history, development, linkages to other branches of pharmaceutical sciences. Significance of study of natural products
2. Explain need, approaches of classification of crude drug along with their merits & demerits.
3. Explain significance of internationally accepted standards of nomenclature.
4. Illustrate the different methods of propagation with merits and demerits including production, collection, processing and storage of crude drugs as per prescribed standards.
5. Explain basic components of cell, their functions & fundamental processes of cell division.
6. Clarify on basic tissues & tissue systems & apply that knowledge in understanding of anatomy of different parts of plant.
7. Understand the botanical source, family, chemical structures, pharmaceutical importance and qualitative analysis of plant sources.
8. Identify and analyse the unorganized crude drugs using morphological, physical and chemical characteristics including qualitative analysis.
9. Describe the different methods of adulteration of crude drugs and herbal formulation with suitable example.

2.3 PHARMACOGNOSY & PHYTOPHARMACEUTICALS (PRACTICAL)

Course Outcomes

- Explain correct use of glassware and various equipment/instruments in
1. Pharmacognosy laboratory. Learn the importance and identify the different part of microscope for histological study. Handle simple and compound microscope technically in a correct way.
 2. Demonstrate skill of plant material sectioning, staining, mounting & focusing. Decide on staining and chemical reagents required for specific part of plant. Identify the anatomy of plants from its morphological & microscopical features by applying experimental & theoretical knowledge of morphology & anatomy obtained in theory classes.
 3. Draw morphological & microscopical diagrams of different plant part & able to label different component/parts.
 4. Detect and identify the unorganized crude drugs by various qualitative as well as quantitative tests.
 5. Analyse and identify the adulterant in fixed oil by various qualitative test

2.4 PHARMACOLOGY – I (THEORY)

Course Outcomes

1. This subject will provide a basic opportunity for the student to learn about the drug with regard to classification, pharmacodynamics and pharmacokinetic aspects,
2. adverse effects, uses, dose, and route of administration, precautions, contraindications and interaction with other drugs.
In this subject, apart from general pharmacology, drugs acting on autonomic nervous system, cardiovascular system, central nervous system, blood and blood forming agents and renal system will be clearly understood by the students
3. In addition to theoretical knowledge, the students will understand about the mechanism of drugs how it acts on the body system
4. The students was able to know the dosage of each and every drugs

2.5 COMMUNITY PHARMACY (THEORY)

Course Outcomes

Know the Pharmaceutical care services.

1. Understand the business and professional practice management skills in community pharmacies.
2. Know the Patient counselling and provide health screening services to public community pharmacy.
3. Understand about respond to minor ailments and provide appropriate medication.
4. Know empathy and sympathy to patients.
5. Understand the concept of Rational drug therapy.

2.6 PHARMACOTHERAPEUTICS – I (THEORY)

Course Outcomes

By the end of this subject students will be able to understand:

1. The pathophysiology of selected disease states and the rationale for drug therapy
2. The therapeutic approach to management of these diseases
3. The controversies in drug therapy
4. The importance of preparation of individualised therapeutic plans based on diagnosis
5. Needs to identify the patient-specific parameters relevant in initiating drug therapy, and monitoring therapy (including alternatives, time-course of clinical and laboratory indices of therapeutic response and adverse effects)
6. Describe the pathophysiology of selected disease states and explain the rationale for drug therapy
7. Summarise the therapeutic approach to management of these diseases including reference to the latest available evidence
8. Discuss the controversies in drug therapy
9. Discuss the preparation of individualised therapeutic plans based on diagnosis
10. Identify the patient-specific parameters relevant in initiating drug therapy, and monitoring therapy (including alternatives, time-course of clinical and laboratory indices of therapeutic response and adverse effects)

2.6 PHARMACOTHERAPEUTICS – I (PRACTICAL)

Course Outcomes

By the end of this subject students will be able to understand:

1. Describe the pathophysiology of selected disease states and explain the rationale for drug therapy
2. Summarise the therapeutic approach to management of these diseases including reference to the latest available evidence
3. Discuss the controversies in drug therapy
4. Discuss the preparation of individualised therapeutic plans based on diagnosis

5. Identify the patient-specific parameters relevant in initiating drug therapy, and monitoring therapy (including alternatives, time-course of clinical and laboratory indices of therapeutic response and adverse effects)

Third Year

3.1 PHARMACOLOGY – II (THEORY)

Course Outcomes

1. The students will understand the pharmacological aspect of drugs acting on Blood and Blood forming organs, renal system, Chemotherapy, immune pharmacology.
2. The students will understand the evaluation of toxicity on animals
3. The students will understand the molecular biology and rDNA technology and gene therapy.

3.1 PHARMACOLOGY – II (PRACTICAL)

Course Outcomes

The students will understand the pharmacological aspect of drugs by doing simulated animal experiments in computers.

3.2 PHARMACEUTICAL ANALYSIS (THEORY)

Course Outcomes

1. Understand the design and working principles of various analytical instruments
2. Students comes out with the knowledge of regulatory control and validation protocol
3. Able to design the bio analytical method for therapeutic drug monitoring
4. Students can able to maintain the analytical laboratory as per the Good Laboratory Practice guidelines

3.2 PHARMACEUTICAL ANALYSIS (PRACTICAL)

Course Outcomes

1. Students are able to identify the separated compounds based on the Paper chromatography and Thin layer chromatography
2. Manage to analyse the Pharmaceutical compounds in bulk and in the formulations
3. Able to estimate the drug using UV Visible spectrophotometry, flame photometry, fluorimetry and nephelometry
4. Gains knowledge to find out the presence of functional groups in the pharmaceutical compounds using interpretation of IR spectra

3.3 PHARMACOTHERAPEUTICS – II (THEORY)

Course Outcome

1. Understand the pathophysiology of selected disease states and the rationale for drug therapy and the therapeutic approach to management of these diseases.
2. Know the controversies in drug therapy and the importance of preparation of individualised therapeutic plans based on diagnosis.
3. Understand the patient-specific parameters relevant in initiating drug therapy, and monitoring therapy (including alternatives, time-course of clinical and laboratory indices of therapeutic response and adverse effects)

3.3 PHARMACOTHERAPEUTICS – II (PRACTICAL)

Course Outcomes

1. Understand the principles and practice involved in ward round participation and clinical discussion on selection of drug therapy by P hospital postings for a period of at least one month.

2. Understanding the practical- clinical discussion by attending ward rounds; follow up the progress and changes made in drug therapy in allotted patients with case presentation upon discharge.

3.4 PHARMACEUTICAL JURISPRUDENCE (THEORY)

Course Outcomes

1. Practice the Professional ethics
2. Understands the various concepts of the pharmaceutical legislation in India
3. Know the various parameters in the Drug and Cosmetic Act and rules
4. Knows the Drug policy, DPCO, Patent and design act
5. Understand the labeling requirements and packaging guidelines for drugs and cosmetics
6. Be able to understand the concepts of Dangerous Drugs Act, Pharmacy Act and Excise duties Act
7. Other laws as prescribed by the Pharmacy Council of India from time to time including International Laws.

3.5. MEDICINAL CHEMISTRY (THEORY)

Course Outcomes

1. To understand the chemistry of drugs with respect to their biological activity
2. To understand the different modern techniques and concepts of drug design
3. To know the mechanism of action, adverse effect and therapeutic activity of drugs
4. To know the appropriate SAR of some important drug classes.
5. To acquire knowledge in the chemotherapy for cancer and microbial diseases and different antiviral agents
6. To give knowledge about drugs used in the treatment of diabetes and hypertension
7. To have been introduced to a variety of drug classes and some pharmacological problems

3.6 PHARMACEUTICAL FORMULATIONS (PRACTICAL)

Course Outcomes

☑ Students can learn about basics on drug formulations and various approaches of dosage form design.

FOURTH YEAR / FIRST YEAR (POST BACCALAUREATE)

4.1 PHARMACOTHERAPEUTICS – III (THEORY)

Course Outcomes

By the end of this subject students will be able to understand:

Etiopathogenesis and pharmacotherapy of diseases associated with following systems/ diseases:

1 **Gastrointestinal system:** Peptic ulcer disease, Gastro Esophageal Reflux Disease, Inflammatory bowel disease, Liver disorders – Alcoholic liver disease, Viral hepatitis including jaundice, and Drug induced liver disorders.

2 **Haematological system:** Anaemias, Venous thromboembolism, Drug induced blood disorders.

3 **Nervous system:** Epilepsy, Parkinsonism, Stroke, Alzheimer's disease,

4 **Psychiatry disorders:** Schizophrenia, Affective disorders, Anxiety disorders, Sleep disorders, Obsessive Compulsive disorders

5 Pain management including Pain pathways, neuralgias, headaches.

6 Evidence Based Medicine

1. The pathophysiology of selected disease states and the rationale for drug therapy
2. The therapeutic approach to management of these diseases
3. The controversies in drug therapy
4. The importance of preparation of individualised therapeutic plans based on diagnosis

5. Needs to identify the patient-specific parameters relevant in initiating drug therapy, and monitoring therapy (including alternatives, time-course of clinical and laboratory indices of therapeutic response and adverse effects)
6. Describe the pathophysiology of selected disease states and explain the rationale for drug therapy
7. Summarise the therapeutic approach to management of these diseases including reference to the latest available evidence
8. Discuss the controversies in drug therapy
9. Discuss the preparation of individualised therapeutic plans based on diagnosis
10. Identify the patient-specific parameters relevant in initiating drug therapy, and monitoring therapy (including alternatives, time-course of clinical and laboratory indices of therapeutic response and adverse effects)

4.1 PHARMACOTHERAPEUTICS – III (PRACTICAL)

4.2 HOSPITAL PHARMACY (THEORY)

Course Outcomes

1. Understand about the storage condition of various medicine in the Hospital
2. Provide population based care
3. To promote health and wellness
4. Provide care through the Drug and Poison Information services
5. Understand about budgeting and inventory control
6. Understand about handling, safe usage and storage of Drugs.

4.3 CLINICAL PHARMACY (THEORY)

Course Outcomes

1. Know the monitoring the drug therapy of patient through medication chart review and clinical review; the medication history interview and counsel the patients.
2. Understanding to identify and resolve drug related problems.
3. Understanding the activities include detection, assessment and monitor of adverse drug reaction.
4. Know to interpret selected laboratory results (as monitoring parameters in therapeutics) of specific disease states; and retrieve, analyse, interpret and formulate drug or medicine information.

4.3 CLINICAL PHARMACY (PRACTICAL)

Course Outcomes

1. Know the monitoring the drug therapy of patient through medication chart review and clinical review; the medication history interview and counsel the patients.
2. Understanding to identify and resolve drug related problems.
3. Understanding the activities include detection, assessment and monitor of adverse drug reaction.
4. Know to interpret selected laboratory results (as monitoring parameters in therapeutics) of specific disease states; and retrieve, analyse, interpret and formulate drug or medicine information.

4.4 BIOSTATISTICS AND RESEARCH METHODOLOGY (THEORY)

Course Outcomes

1. Students should able to write a proposal, engage in independent studies and work collaboratively and in biostatistics.
2. Students should able to identify correct sampling technique and fix optimal power of the study.
3. Students should able to solve basic statistics, including probability, descriptive statistics and inferential statics for means and proportions, and regression methods are presented.
4. Students should able to demonstrate skills in the analysis of epidemiological data.

5. Students should be able to utilize the computers effectively in the process of drug information system, dispensing of prescriptions and inventory controlling

4.5 BIOPHARMACEUTICS AND PHARMACOKINETICS (THEORY)

Course Outcomes

The students will have the knowledge on basic concepts in biopharmaceutics, pharmacokinetics such as ADME, application of pharmacokinetics.

4.5 BIOPHARMACEUTICS AND PHARMACOKINETICS (PRACTICAL)

Course Outcomes

☑ The students will have the knowledge on basic concepts in biopharmaceutics, pharmacokinetics such as ADME, application of pharmacokinetics.

4.6 CLINICAL TOXICOLOGY (THEORY)

Course Outcomes

1. Know the general principles involved in the management of poisoning, antidotes and its clinical applications, gut decontamination, elimination enhancement, toxicokinetics and supportive care in clinical toxicology. Understand the clinical symptoms and management of poisoning including: Heavy metals, Pesticide, hydrocarbons, alcohols, opiates overdose, caustics and Radiation poisoning.
2. Know the various drugs induced poisoning like NASID's, antidepressants, barbiturates, benzodiazepines, paracetamol and salicylates including clinical symptoms, prevention, pre & post-hospital management of drug induced poisoning.
3. Understand the venomous snake bites, arthropod bites and stings, mycotoxins, mushroom and food poisoning (including toxic dose, mechanism of action, general management, early manifestations and hospital management). Know the signs and symptoms of substance abuse and treatment of dependence including: CNS stimulants and depressants, opioids, hallucinogens, cannabis group and tobacco

4.7 PHARMACOTHERAPEUTICS I & II (THEORY)

[For I Pharm.D. (Post Baccalaureate) only]

Course Outcomes

1. Know the pathophysiology of selected disease states and the rationale for drug
2. therapy and the therapeutic approach to management of these diseases and the controversies in drug therapy
3. Understanding the importance of preparation of individualised therapeutic plans based on diagnosis and identifying the patient-specific parameters relevant in initiating drug therapy, and monitoring therapy (including alternatives, time-course of clinical and laboratory indices of therapeutic response and adverse effects)
4. Understand the management of the diseases including reference to the latest available evidence
5. Discuss the preparation of individualised therapeutic plans based on diagnosis.

4.7 P PHARMACOTHERAPEUTICS – I & II (PRACTICAL)

[For I Pharm.D. (Post Baccalaureate) only]

Course Outcomes

By the end of this subject students will be able to understand:

1. Describe the pathophysiology of selected disease states and explain the rationale for drug therapy

2. Summarise the therapeutic approach to management of these diseases including reference to the latest available evidence
3. Discuss the controversies in drug therapy
4. Discuss the preparation of individualised therapeutic plans based on diagnosis
5. Identify the patient-specific parameters relevant in initiating drug therapy, and monitoring therapy (including alternatives, time-course of clinical and laboratory indices of therapeutic response and adverse effects)

5.2 PHARMACOEPIDEMIOLOGY AND PHARMACOECONOMICS (THEORY)

Course Outcomes

The students will understand the concepts and develop competency:

1. To explain the terminology used in Pharmacoepidemiological studies;
2. To describe the advantages, disadvantages and application of various Pharmacoepidemiological methods;
3. To calculate the various parameters in risk assessment: risk, attributable risk, relative risk, time – risk relationship and odds ratio;
4. To explain the safety issues associated with vaccines, drugs causing birth defects;
5. To describe the pharmaceutical pricing policy, regulatory mechanism of price control and access to medicines;
6. To describe pharmacoeconomic methods and perform pharmacoeconomic evaluations: cost minimization, cost effective, cost benefit and cost utility analysis; and
7. To apply pharmacoeconomic principles in practice

5.3 CLINICAL PHARMACOKINETICS AND PHARMACOTHERAPEUTIC DRUG MONITORING (THEORY)

Course Outcomes

Students will be exposed to regulations, drug-drug interactions, and positive therapeutic outcomes by conducting therapeutic drug monitoring for various drugs.

5.4 CLERKSHIP

Course Outcomes

The students would have competency:

1. To work in a healthcare team;
2. To identify drug related issues and plan for intervention;
3. To provide drug information service;
4. To identify and document the ADRs; and
5. To provide patient counselling in promoting medication adherence and appropriate use.