B.Pharm - Program Specific Outcomes (PSOs)

PSO 1: Detail understanding of theoretical and practical knowledge of all core and allied subjects of pharmaceutical sciences, which consist of dosage form design, routes of administration of various drugs, their mechanism of action, chemical moiety involved, doses of drugs, patient treatment, patient counseling, drug dispensing, hospital administration, drug manufacturing, QA/QC and regulation etc.

PSO2: Highlight the concepts and operative components of pharmacovigilance, clinical pharmacy, hospital pharmacy, community pharmacy, pharmaceutical care, pharmacovigilance, pharmacoeconomic, clinical research, clinical pharmacokinetics and other related areas for the benefit of academicians, hospital/community pharmacists and industry, emphasizing the consequences of the use of medications.

PSO3: Rigorous core course-work in biopharmaceutics, drug transport, pharmacokinetics & pharmacodynamics, drug delivery systems, cell and molecular biology, synthetic and macromolecular chemistry, chemical and biomedical engineering, materials science, physiology and pharmacology

PSO4: Emphasis on Drug Discovery and Design, Drug Delivery, Drug Action and Clinical Sciences, Drug Analysis, Cost Effectiveness of Medicines (Pharmacoeconomics), Drug Regulatory Affairs etc.

B. Pharm - Program Outcomes (POs)

The Graduate shall be able to:

PO1. Domain Knowledge: Demonstrate comprehension of basic principles of pharmaceutical and allied sciences in all pertinent scenarios. Exhibit skills associated with the profession of pharmacy, pharmaceutical manufacturing practices and quality control.

PO2. Problem analysis: Use domain knowledge, analytical and critical thinking for solving problems and taking decisions during everyday practice in profession, industry and all work environments.

PO3. Research and Development: Exhibit knowledge from his major domain in problem identification, critical thinking, analysis and providing solutions to pharmaceutical and allied technology disciplines.

PO4. Modern tools usage: Demonstrate an ability to handle/use various tools, apparatus, instrument, equipment or machinery pertinent to the pharmaceutical domain with practical knowledge on standard operating procedures and safety aspects.

PO5. The Pharmacist and Society: Use contextual knowledge – informed reasoning to understand medical prescription, perform patient counseling. Recognize the necessity to engage in independent and life-long learning.

PO6. Environment and sustainability: Demonstrate knowledge and responsibility while handling pharmaceutical techniques/ processes that have social and environmental impacts and promote sustainable development.

PO7. Ethics: Demonstrate exemplary professional, ethical, and legal behaviors in accordance with all drug, pharmaceutical, and pharmacy-related central, state laws and regulations.

PO8. Individual and Team skills: Function effectively as an individual member or leader in different teams and multidisciplinary settings. Assume a participatory or lead role in an organization's planning and execution of transformational projects to enhance its prospects.

PO9. Communication: Communicate effectively with the pharmaceutical scientific community, workforce and with society at large, with abilities to comprehend and write effective reports, make effective presentations and documentation.

PO10. Project management abilities: Demonstrate effective delegation and organizational skills. Organize work with necessary planning and execution to meet deadlines. Demonstrate knowledge and understanding of pharmaceutical, legal processes and apply them in project management.

SEMESTER – I

BP101T HUMAN ANATOMY AND PHYSIOLOGY-I

Upon completion of this course the student should 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.

BP102T. PHARMACEUTICAL ANALYSIS

Upon completion of the course student shall be able to

1. understand the principles of volumetric and electro chemical analysis
2. carryout various volumetric and electrochemical titrations 3. develop analytical skills

BP103T. PHARMACEUTICS- I

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

1. Know the history of profession of pharmacy
2. Understand the basics of different dosage forms, pharmaceutical incompatibilities and pharmaceutical calculations
3. Understand the professional way of handling the prescription 4. Preparation of various conventional dosage form

BP104T. PHARMACEUTICAL INORGANIC CHEMISTRY

Upon completion of course student shall be able to

1. know the sources of impurities and methods to determine the impurities in inorganic drugs and pharmaceuticals
2. understand the medicinal and pharmaceutical importance of inorganic compounds

BP105T. COMMUNICATION SKILLS

Upon completion of the course the student shall be able to

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

BP 106RBT .REMEDIAL BIOLOGY

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

1. know the classification and salient features of five kingdoms of life
2. understand the basic components of anatomy & physiology of plant
3. know understand the basic components of anatomy & physiology animal with special reference to human

BP 106RMT. REMEDIAL MATHEMATICS

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

Upon completion of this course the student should 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 hematological tests like blood cell counts, haemoglobin estimation, bleeding/clotting time etc and also record blood pressure, heart rate, pulse and respiratory volume.
5. Appreciate coordinated working pattern of different organs of each system 6. Appreciate the interlinked mechanisms in the maintenance of normal functioning (homeostasis) of human body.

BP202T. PHARMACEUTICAL ORGANIC CHEMISTRY –I

Upon 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 reactions
3. account for reactivity/stability of compounds,
4. identify/confirm the identification of organic compound

BP203 T. BIOCHEMISTRY

Upon completion of course student shell able to

1. Understand the catalytic role of enzymes, importance of enzyme inhibitors in design of new drugs, therapeutic and diagnostic applications of enzymes.
2. Understand the metabolism of nutrient molecules in physiological and pathological conditions.
3. Understand the genetic organization of mammalian genome and functions of DNA in the synthesis of RNAs and proteins.

BP 204T.PATHOPHYSIOLOGY

Upon completion of the subject student shall be able to –

1. Describe the etiology and pathogenesis of the selected disease states; 2. Name the signs and symptoms of the diseases; and
3. Mention the complications of the diseases.

BP205 T. COMPUTER APPLICATIONS IN PHARMACY

Upon completion of the course the student 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

BP 206 T. ENVIRONMENTAL SCIENCES

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

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

SEMESTER-III

BP301T. PHARMACEUTICAL ORGANIC CHEMISTRY –II

Upon 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 reactions
3. account for reactivity/stability of compounds, 4. prepare organic compounds

BP302T. PHYSICAL PHARMACEUTICS-I

Upon the 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 nad determination of expiry date of formulations
3. Demonstrate use of physicochemical properties in the formulation development and evaluation of dosage forms.

BP 303 T. PHARMACEUTICAL MICROBIOLOGY

Upon completion of the subject student shall be able to;

1. Understand methods of identification, cultivation and preservation of various microorganisms
2. To understand the importance and implementation of sterlization in pharmaceutical processing and industry
3. Learn sterility testing of pharmaceutical products.
4. Carried out microbiological standardization of Pharmaceuticals.
5. Understand the cell culture technology and its applications in pharmaceutical industries.

BP 304 T. PHARMACEUTICAL ENGINEERING

Upon completion of the course student shall be able:

1. To know various unit operations used in pharmaceutical industries.
2. To understand the material handling techniques.
3. To perform various processes involved in pharmaceutical manufacturing process.
4. To carry out various test to prevent environmental pollution.
5. To appreciate and comprehend significance of plant lay out design for optimum use of resources.
6. To appreciate the various preventive methods used for corrosion control in pharmaceutical industries.

SEMESTER-IV

BP401T. PHARMACEUTICAL ORGANIC CHEMISTRY –III

At the end of the course, the student shall be able to

1. understand the methods of preparation and properties of organic compounds
2. explain the stereo chemical aspects of organic compounds and stereo chemical reactions
3. know the medicinal uses and other applications of organic compounds

BP402T. MEDICINAL CHEMISTRY – I

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

BP 403 T. PHYSICAL PHARMACEUTICS-II

Upon the 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 nad determination of expiry date of formulations
3. Demonstrate use of physicochemical properties in the formulation development and evaluation of dosage forms.

BP 404 T. PHARMACOLOGY-I

Upon completion of this course the student should be able to

1. Understand the pharmacological actions of different categories of drugs
2. Explain the mechanism of drug action at organ system/sub cellular/ macromolecular levels.
3. Apply the basic pharmacological knowledge in the prevention and treatment of various diseases.
4. Observe the effect of drugs on animals by simulated experiments
5. Appreciate correlation of pharmacology with other bio medical sciences

BP 405 T.PHARMACOGNOSY AND PHYTOCHEMISTRY I

Upon completion of the course, the student shall be able

1. to know the techniques in the cultivation and production of crude drugs
2. to know the crude drugs, their uses and chemical nature
3. know the evaluation techniques for the herbal drugs
4. to carry out the microscopic and morphological evaluation of crude drugs

Semester-V

BP501T. MEDICINAL CHEMISTRY – II

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 of different class of drugs
4. Study the chemical synthesis of selected drugs

BP 502 T. Industrial Pharmacy-I

Upon completion of the course the student shall be able to

1. Know the various pharmaceutical dosage forms and their manufacturing techniques.
2. Know various considerations in development of pharmaceutical dosage forms
3. Formulate solid, liquid and semisolid dosage forms and evaluate them for their quality

BP503.T. PHARMACOLOGY-II

Upon completion of this course the student should 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

BP504 T. PHARMACOGNOSY AND PHYTOCHEMISTRY II

Upon completion of the course, the student shall be able

1. to know the modern extraction techniques, characterization and identification of the herbal drugs and phytoconstituents
2. to understand the preparation and development of herbal formulation.
3. to understand the herbal drug interactions
4. to carryout isolation and identification of phytoconstituents

BP 505 T. PHARMACEUTICAL JURISPRUDENCE

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

1. The Pharmaceutical legislations and their implications in the development and marketing of pharmaceuticals.

2. Various Indian pharmaceutical Acts and Laws
3. The regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals
4. The code of ethics during the pharmaceutical practice

SEMESTER-VI

BP601T. MEDICINAL CHEMISTRY – III

Upon completion of the course student shall be able to

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

BP602 T. PHARMACOLOGY-III

Upon completion of this course the student should 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 poisoningsand
3. appreciate correlation of pharmacology with related medical sciences.

BP 603 T. HERBAL DRUG TECHNOLOGY

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 .

BP 604 T. BIOPHARMACEUTICS AND PHARMACOKINETICS

Upon completion of the course student shall be able to:

1. Understand the basic concepts in biopharmaceutics and pharmacokinetics and their significance.
2. Use of plasma drug concentration-time data to calculate the pharmacokinetic parameters to describe the kinetics of drug absorption, distribution, metabolism, excretion, elimination.
3. To understand the concepts of bioavailability and bioequivalence of drug products and their significance.
4. Understand various pharmacokinetic parameters, their significance & applications.

BP 605 T. PHARMACEUTICAL BIOTECHNOLOGY

Upon completion of the subject student shall be able to;

1. Understanding the importance of Immobilized enzymes in Pharmaceutical Industries
2. Genetic engineering applications in relation to production of pharmaceuticals
3. Importance of Monoclonal antibodies in Industries
4. Appreciate the use of microorganisms in fermentation technology

BP606TPHARMACEUTICAL QUALITY ASSURANCE

Upon completion of the course student shall be able to:

1. understand the cGMP aspects in a pharmaceutical industry
2. appreciate the importance of documentation
3. understand the scope of quality certifications applicable to pharmaceutical industries
4. understand the responsibilities of QA & QC departments

SEMESTER-VII

BP701T. INSTRUMENTAL METHODS OF ANALYSIS

Upon completion of the course the student shall be able to

1. Understand the interaction of matter with electromagnetic radiations and its applications in drug analysis
2. Understand the chromatographic separation and analysis of drugs.
3. Perform quantitative & qualitative analysis of drugs using various analytical instruments.

BP 702 T. INDUSTRIAL PHARMACYII

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

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

BP 703T. PHARMACY PRACTICE

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

1. know various drug distribution methods in a hospital
2. appreciate the pharmacy stores management and inventory control
3. monitor drug therapy of patient through medication chart review and clinical review
4. obtain medication history interview and counsel the patients
5. identify drug related problems
6. detect and assess adverse drug reactions
7. interpret selected laboratory results (as monitoring parameters in therapeutics) of specific disease states

8. know pharmaceutical care services
9. do patient counseling in community pharmacy;
10. appreciate the concept of Rational drug therapy.

BP 704T: NOVEL DRUG DELIVERY SYSTEMS

Upon completion of the course student shall be able

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

SEMESTER-VIII

BP801T. BIOSTATISITCS AND RESEARCH METHODOLOGY

Upon completion of the course the student shall be able to

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

BP 802T SOCIAL AND PREVENTIVE PHARMACY

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

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

BP803ET. PHARMA MARKETING MANAGEMENT

The course aims to provide an understanding of marketing concepts and techniques and their applications in the pharmaceutical industry.

BP804 ET: PHARMACEUTICAL REGULATORY SCIENCE

Upon completion of the subject student shall be able to;

1. Know about the process of drug discovery and development

2. Know the regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals
3. Know the regulatory approval process and their registration in Indian and international markets

BP 805T: PHARMACOVIGILANCE

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

1. Why drug safety monitoring is important?
2. History and development of pharmacovigilance
3. National and international scenario of pharmacovigilance
4. Dictionaries, coding and terminologies used in pharmacovigilance
5. Detection of new adverse drug reactions and their assessment
6. International standards for classification of diseases and drugs
7. Adverse drug reaction reporting systems and communication in pharmacovigilance
8. Methods to generate safety data during pre clinical, clinical and post approval phases of drugs' life cycle
9. Drug safety evaluation in paediatrics, geriatrics, pregnancy and lactation
10. Pharmacovigilance Program of India (PvPI) requirement for ADR reporting in India
11. ICH guidelines for ICSR, PSUR, expedited reporting, pharmacovigilance planning
12. CIOMS requirements for ADR reporting
13. Writing case narratives of adverse events and their quality.

BP 806 ET. QUALITY CONTROL AND STANDARDIZATION OF HERBALS

Upon completion of the subject student shall be able to;

1. know WHO guidelines for quality control of herbal drugs
2. know Quality assurance in herbal drug industry
3. know the regulatory approval process and their registration in Indian and international markets
4. appreciate EU and ICH guidelines for quality control of herbal drugs

BP 807 ET. COMPUTER AIDED DRUG DESIGN

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

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

BP808ET: CELL AND MOLECULAR BIOLOG

Upon completion of the subject student shall be able to; 1. Summarize cell and molecular biology history.

2. Summarize cellular functioning and composition. 3. Describe the chemical foundations of cell biology.

4. Summarize the DNA properties of cell biology.
5. Describe protein structure and function.
6. Describe cellular membrane structure and function.
7. Describe basic molecular genetic mechanisms.
8. Summarize the Cell Cycle

BP810 ET. PHARMACOLOGICAL SCREENING METHODS

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

1. Appreciate the applications of various commonly used laboratory animals.
2. Appreciate and demonstrate the various screening methods used in preclinical research
3. Appreciate and demonstrate the importance of biostatistics and researchmethodology 4. Design and execute a research hypothesis independently

BP 811 ET. ADVANCED INSTRUMENTATION TECHNIQUES

Upon completion of the course the student shall be able to

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

BP 812 ET. DIETARY SUPPLEMENTS AND NUTRACEUTICALS

This module aims to provide an understanding of the concepts behind the theoretical applications of dietary supplements. By the end of the course, students should be able to :

1. Understand the need of supplements by the different group of people to maintain healthy life.
2. Understand the outcome of deficiencies in dietary supplements.
3. Appreciate the components in dietary supplements and the application.
4. Appreciate the regulatory and commercial aspects of dietary supplements including health claims.