

Bachelor of Pharmacy

| COURSE | COURSE CODE | COURSE OUTCOMES |
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| HUMAN ANATOMY AND PHYSIOLOGY-I(Theory) | BP101T | 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. |
| PHARMACEUTICAL ANALYSIS (Theory) | BP102T | 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. |
| PHARMACEUTICS-I (Theory) | BP103T | 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 forms. |
| PHARMACEUTICAL INORGANIC CHEMISTRY (Theory) | BP104T | 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. |
| COMMUNICATION SKILLS (Theory) | BP105T | Upon completion of the course the student shall be able to |

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| | | <p>1. Understand the behavioral needs for a Pharmacist to function effectively in the areas of pharmaceutical operation</p> <p>2. Communicate effectively (Verbal and Non Verbal)</p> <p>3. Effectively manage the team as a team player</p> <p>4. Develop interview skills</p> <p>5. Develop Leadership qualities and essentials</p> |
| REMEDIAL BIOLOGY (Theory) | BP 106 RBT | <p>Upon completion of the course, the student shall be able to</p> <p>1. Know the classification and salient features of five kingdoms of life</p> <p>2. Understand the basic components of anatomy & physiology of plant</p> <p>3. Know understand the basic components of anatomy & physiology animal with special reference to human.</p> |
| REMEDIAL MATHEMATICS (Theory) | BP 106RMT | <p>Upon completion of the course the student shall be able to:-</p> <p>1. Know the theory and their application in Pharmacy.</p> <p>2. Solve the different types of problems by applying theory.</p> <p>3. Appreciate the important application of mathematics in Pharmacy.</p> |
| HUMAN ANATOMY AND PHYSIOLOGY (Practical) | BP107P | <p>Upon completion of this course the student should be able to</p> <p>1. Practical physiology is complimentary to the theoretical discussions in physiology.</p> <p>2. Practicals allow the verification of physiological processes discussed in theory classes through experiments on living tissue, intact animals or normal human beings.</p> <p>3. This is helpful for developing an insight on the subject.</p> |
| PHARMACEUTICAL ANALYSIS I | BP108P | <p>Upon completion of the course, the students will be able to –</p> <p>1. Distinguish and Calibrate various glasswares and Analytical Balance also demonstrate the electro chemical methods of titration.</p> <p>2. Prepare standardized solutions of 0.1N Hydrochloric acid, 0.1N Sulphuric acid, 0.1N Sodium hydroxide, 0.1N Perchloric acid, 0.1N Potassium permanganate and 0.1M Ceric ammonium sulphate.</p> |

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| | | 3. Perform the Assay of Ferrous sulphate, Copper sulphate, Hydrogen peroxide, Calcium gluconate and Sodium chloride. |
| PHARMACEUTICS I | BP109P | Upon completion of the course, the students will be able to – |
| | | 1. Refer and retrieve information from official books. |
| | | 2. Use various glassware, weighing and measuring operations used in compounding and dispensing of a variety of dosage forms. |
| | | 3. Define, differentiate and Formulate various dosage forms listed in official compendia. |
| | | 4. Explain the roles and examples of various additives used in dosage forms. |
| | | 5. Label the compounded formulation as per legal and patient requirements. |
| PHARMACEUTICAL INORGANIC CHEMISTRY | BP110P | Upon completion of the course, the students will be able to – |
| | | 1. Identify impurities present in salts by performing Limit-tests. |
| | | 2. Recognize Inorganic pharmaceuticals by performing Identification tests. |
| | | 3. Examine purity of various inorganic pharmaceuticals by performing purity tests. |
| | | 4. Prepare and calculate Theoretical, Practical and |
| | | 5. % yield of Inorganic pharmaceuticals. |
| COMMUNICATION SKILLS | BP111P | Upon completion of the course, the students will be able to – |
| | | 1. Perform better in their academic and professional scenario such as economic, environmental, social, political and ethical scenario |
| | | 2. Utilize phonetic dictionary symbols to continue to improve pronunciation |
| | | 3. Recognize, explain, and use the formal elements of specific genres of organizational communication: white papers, |
| | | 4. Recommend and analyze reports, proposals, memorandums, web pages, wikis, blogs, business letters, and promotional documents. |
| | | 5. Understand professional writing by studying management communication contexts and genres, researching contemporary business topics. |

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| REMEDIAL BIOLOGY | BP112RBP | Upon completion of the course, the students will be able to – |
| | | 1. Demonstrate various section cutting techniques and procedure for preparation of permanent slide. |
| | | 2. Describe different parts of a plant, their modifications and identification of various plant tissues. |
| | | 3. Determine blood groups, blood pressure and tidal Volume. |
| | | 4. Recognize various cell inclusions, bones and parts of frog using computer models. |
| COURSE | COURSE CODE | COURSE OUTCOMES |
| HUMAN ANATOMY AND PHYSIOLOGY-II(Theory) | BP 201T | 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. |
| PHARMACEUTICAL ORGANIC CHEMISTRY –I (Theory) | BP202T | 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. |
| BIOCHEMISTRY (Theory) | BP203 T | Upon completion of course student shell able to |
| | | 1. Understand the catalytic role of enzymes, importance of enzyme inhibitors in design of |

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| | | <p>new drugs, therapeutic and diagnostic applications of enzymes.</p> <p>2. Understand the metabolism of nutrient molecules in physiological and pathological conditions.</p> <p>3. Understand the genetic organization of mammalian genome and functions of DNA in the synthesis of RNAs and proteins.</p> |
| PATHOPHYSIOLOGY (THEORY) | BP 204T | <p>Upon completion of the subject student shall be able to –</p> <p>1. Describe the etiology and pathogenesis of the selected disease states;</p> <p>2. Name the signs and symptoms of the diseases; and</p> <p>3. Mention the complications of the diseases.</p> |
| COMPUTER APPLICATIONS IN PHARMACY (Theory) | BP205 T | <p>Upon completion of the course the student shall be able to</p> <p>1. Know the various types of application of computers in pharmacy.</p> <p>2. Know the various types of databases.</p> <p>3. Know the various applications of databases in pharmacy.</p> |
| ENVIRONMENTALSCIE NCES (Theory) | BP 206 T | <p>Upon completion of the course the student shall be able to:</p> <p>1. Create the awareness about environmental problems among learners.</p> <p>2. Impart basic knowledge about the environment and its allied problems.</p> <p>3. Develop an attitude of concern for the environment.</p> <p>4. Motivate learner to participate in environment protection and environment improvement.</p> <p>5. Acquire skills to help the concerned individuals in identifying and solving environmental problems.</p> <p>6. Strive to attain harmony with Nature.</p> |
| HUMAN ANATOMY AND PHYSIOLOGY II- PRACTICAL | BP207P | <p>Upon completion of the course, the students will be able to–</p> <p>1. Identify various body system and family planning devices with the help of charts & models.</p> <p>2. Record body mass index, body temperature, lungs volume & capacity & blood count.</p> <p>3. Demonstrate the various activities like visual acuity, reflex activity and general neurological</p> |

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| | | examination. |
| PHARMACEUTICAL ORGANIC CHEMISTRY I PRACTICAL | BP208P | Upon completion of the course, the students will be able to– |
| | | 1. Identify the unknown organic compounds by preliminary test (colour, odour, aliphatic/aromatic nature, saturation and unsaturation) and solubility tests. |
| | | 2. Detect the elements like Nitrogen, Sulphur and Halogen in organic compounds by Lassigne's Test. |
| | | 3. Analyze functional groups (Phenols, Carboxylic Acids, Carbohydrates, Aldehydes/Ketones, Nitro Compounds, Amines, Amides, Alcohol) by performing various qualitative tests. |
| | | 4. Determine the melting and boiling point of given compound and confirm the synthesized derivatives by melting / boiling point methods. |
| | | 5. Construct a molecular model of some organic compounds using molecular model Kit. |
| BIOCHEMISTRY PRACTICAL | BP209P | Upon completion of the course, the students will be able to– |
| | | 1. Identify various body system and family planning devices with the help of charts & models. |
| | | 2. Record body mass index, body temperature, lungs volume & capacity & blood count. |
| | | 3. Demonstrate the various activities like visual acuity, reflex activity and general neurological examination. |
| COMPUTER APPLICATIONS IN PHARMACY PRACTICAL | BP210P | Upon completion of the course, the students will be able to– |
| | | 1. Design a questionnaire using a word processing package to gather information about a particular disease. Retrieve the information of a drug and its adverse effects using online tools Create a HTML web page to show personal information |
| | | 2. Creating mailing labels Using Label Wizard, generating label in MS WORD. |
| | | 3. Create a database in MS Access to store the patient information with the required fields using access. Design a form in MS Access to view, add, delete and modify the patient record in the database. |

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| | | 4. Generating report and printing the report from patient database, Creating invoice table Drug information storage and retrieval using MS Access. |
| | | 5. Exporting Tables, Queries, Forms , XML pages , and Reports to web pages |
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| PHARMACEUTICAL ORGANIC CHEMISTRY –II (Theory) | BP301T | 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. |
| PHYSICAL PHARMACEUTICS-I (Theory) | BP302T | 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 and determination of expiry date of formulations. |
| | | 3. Demonstrate use of physicochemical properties in the formulation development and evaluation of dosage forms. |
| PHARMACEUTICAL MICROBIOLOGY (Theory) | BP303T | 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 sterilization 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. |
| PHARMACEUTICAL ENGINEERING (Theory) | BP 304 T | Upon completion of the course student shall be able: |
| | | 1. To know various unit operations used in Pharmaceutical industries. 2. To understand the |

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| | | 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. |
| Pharmaceutical Organic Chemistry II | BP305P | Upon completion of the course, the students will be able to – 1. Perform experiments involving laboratory techniques (Recrystallization and Steam distillation). 2. Determine different oil values like Acid value, Saponification value and Iodine value. 3. Prepare organic compounds by acylation, halogenation (Bromination), nitration, oxidation, hydrolysis, diazotization, Claisen Schmidt and Perkin reaction. |
| Physical Pharmaceutics I | BP306P | Upon completion of the course, the students will be able to – 1. Determine the solubility of drug, pKa value, Partition co- efficient. 2.Determine surface tension, HLB number of a surfactant and critical micellar concentration of surfactants 3.Determine stability constant |
| PHARMACEUTICAL MICROBIOLOGY | BP307P | Upon completion of the course, the students will be able to – 1. Identify glassware, equipments and instruments used in various experiments of microbiology. 2. Prepare various types of culture media for identification, isolation and sub-culturing of microbes. 3. Perform sterilization, evaluation of disinfectants/antibiotics and staining techniques for identification and differentiation of microorganisms. |
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| PHARMACEUTICAL | BP401T | At the end of the course, the student shall be able |

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| ORGANIC CHEMISTRY –III (Theory) | | 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. |
| MEDICINAL CHEMISTRY – I (Theory) | BP402T | 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. |
| PHYSICAL PHARMACEUTICS-II (Theory) | BP 403 T | 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 and determination of expiry date of formulations |
| | | 3. Demonstrate use of physicochemical properties in the formulation development and evaluation of dosage forms. |
| PHARMACOLOGY-I (Theory) | BP 404 T | 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 |
| PHARMACOGNOSY AND PHYTOCHEMISTRY-I (Theory) | BP 405 T | 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. |

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| | | 3. Know the evaluation techniques for the herbal drugs. |
| | | 4. To carry out the microscopic and morphological evaluation of crude drugs. |
| MEDICINAL CHEMISTRY I – PRACTICAL | BP406P | Upon completion of the course, the students will be able to – |
| | | 1. Synthesize selected medicinal agents by one OR multiple steps in laboratory. |
| | | 2. Perform the pharmacopoeial standard of selected medicinal agents in laboratory. |
| | | 3. Analyze physical properties like color, odor, and nature of synthesized medicinal agents. |
| | | 4. Analyze chemical properties like boiling point or melting point of synthesized medicinal agents. |
| PHYSICAL PHARMACEUTICS II – PRACTICAL | BP407P | Upon completion of the course, the students will be able to – |
| | | 1. Determine particle size distribution for powders using different methods |
| | | 2. Determine derived properties of powders like density, porosity, compressibility and angle of repose. |
| | | 3. Determine Sedimentation volume for a variety of Suspensions. |
| | | 4. Determine Viscosity for Newtonian and Non Newtonian Fluids. |
| | | 5. Apply the concepts of Chemical Kinetics on Drug product stability. |
| Pharmacology I – Practical | BP408P | Upon completion of the course, the students will be able to – |
| | | 1. Understand the general principles of experimental pharmacology. |
| | | 2. Perform Screening of drugs on animals by simulated experiments. |
| | | 3. Work cooperatively in a small group setting, consider ethical issues while using animals and demonstrate the drug profile of clinically important drugs. |
| Pharmacognosy I – Practical | BP409P | Upon completion of the course, the students will be able to – |
| | | 1. Analyse the crude drugs by performing chemical tests for them. |
| | | 2. Differentiate between crude drugs powders by determining the size of their microscopic characters like calcium oxalate crystals, length of fibers and leaf constants using camera lucida. |
| | | 3. Report the size of starch grains of crude drugs |

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| | | using camera lucida and lycopodium spore method. |
| | | 4. Evaluate the physical standards for crude drugs like extractive values, ash values, moisture content, swelling index and foaming index. |
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| MEDICINAL CHEMISTRY-II (Theory) | BP501T | 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. |
| INDUSTRIAL PHARMACY-I (THEORY) | BP502T | 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. |
| PHARMACOLOGY-II (Theory) | BP503T | 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 |
| PHARMACOGNOSY AND PHYTOCHEMISTRY II (Theory) | BP504T | 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. |

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| <p>PHARMACEUTICAL JURISPRUDENCE (Theory)</p> | <p>BP505T</p> | <p>Upon completion of the course, the student shall be able to understand:</p> <ol style="list-style-type: none"> 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. |
| <p>INDUSTRIAL PHARMACY-I</p> | <p>BP506 P</p> | <p>Upon completion of the course, the student will be able to –</p> <ol style="list-style-type: none"> 1. Perform the preformulation study for different characteristics like dissolution, solubility, flow properties, etc. 2. Develop the formulation of different dosage form like tablets, capsules cream, ointment, etc., using different excipients. 3. Prepare and evaluate the parenteral preparations and perform the pull sealing method of ampoules. Perform the evaluation of glass container (ampoules) as per I.P. |
| <p>Pharmacology II</p> | <p>BP507P</p> | <p>Upon completion of the course, the student will be able to –</p> <ol style="list-style-type: none"> 1. Perform isolation of tissue and to analyze drug concentration/dose-response relationships using in-vitro models and animal simulated software 2. Evaluate the action of drugs in whole organisms, living tissues or model systems using a variety of pharmacological techniques (eg. Bioassays, animal models of disease). 3. Work cooperatively in a small group setting ,consider ethical issues using animals and write drug profiles of clinically important drugs |
| <p>Pharmacognosy II</p> | <p>BP508P</p> | <p>Upon completion of the course, the students will be able to –</p> <ol style="list-style-type: none"> 1. Identify various crude drugs by their morphological and microscopic characters. 2. Perform isolation and detection (Chromatographic or chemical method) of active constituents like Caffeine. Sennosides, Diosgenin and Atropine. 3. Identify active chemical constituents of crude drugs by paper chromatography or TLC. 4. Analyse the specific crude drugs by |

| | | performing their individual chemical tests. |
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| MEDICINAL CHEMISTRY–III (Theory) | BP601T | 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. |
| PHARMACOLOGY-III (Theory) | BP602T | 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 poisonings and |
| | | 3. Appreciate correlation of pharmacology with related medical sciences. |
| HERBAL DRUG TECHNOLOGY (Theory) | BP603T | 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, and nutraceuticals. |
| | | 4. Appreciate patenting of herbal drugs, GMP. |
| BIOPHARMACEUTICS AND PHARMACOKINETICS (Theory) | BP604T | 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. |
| PHARMACEUTICAL | BP605T | Upon completion of the subject student shall be |

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| BIOTECHNOLOGY (Theory) | | 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 |
| PHARMACEUTICAL QUALITY ASSURANCE (Theory) | BP606T | 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. |
| | | 4. Industries understand the responsibilities of QA & QC departments. |
| MEDICINAL CHEMISTRY III – PRACTICAL | BP607P | Upon completion of the course student shall be able to: |
| | | 1. Synthesize selected medicinal agents by one OR multiple steps in laboratory |
| | | 2. Perform the pharmacopoeial standard of selected medicinal agents in laboratory |
| | | 3. Analyze physical and chemical properties of synthesized medicinal agents. |
| PHARMACOLOGY III – PRACTICAL | BP608P | Upon completion of the course student shall be able to: |
| | | 1. Perform isolation of tissue and to analyze drug concentration/dose response relationships using in-vitro models and animal simulated software. |
| | | 2. Evaluate the action of drugs in whole organisms, living tissues, or model systems using a variety of pharmacological techniques (e.g. bioassays, receptor binding, animal models of disease) and toxicology of drugs. |
| | | 3. Work cooperatively in a small group setting, consider ethical issues while using animals and write drug profiles of clinically important drug. |
| Herbal Drug Technology – Practical | BP609P | Upon completion of the course student shall be able to: |
| | | 1. Demonstrate the preliminary phytochemical screening of crude drugs. |

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| | | 2. Outline various standards for crude drugs and herbal formulations and prepare some herbal cosmetics. |
| | | 3. Perform monograph analysis of herbal drugs from recent Pharmacopoeias. |
| | | 4. Estimate the amount of fixed oils in crude drugs by carrying out their analysis. |
| COURSE | COURSE CODE | COURSE OUTCOMES |
| INSTRUMENTAL METHODS OF ANALYSIS (Theory) | BP701T | 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. |
| INDUSTRIAL PHARMACY II (Theory) | BP702T | 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. |
| PHARMACY PRACTICE (Theory) | BP703T | 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. |

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| | | 8. Know pharmaceutical care services. |
| | | 9. Do patient counseling in community pharmacy. |
| | | 10. Appreciate the concept of rational drug therapy. |
| NOVEL DRUG DELIVERY SYSTEMS (NDDS) (Theory) | BP704T | 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. |
| PRACTICE SCHOOL | BP706PS | Upon completion of the course, the student shall be able to: |
| | | 1. Understand the advanced instruments used and their applications in drug analysis. |
| | | 2. Understand the concepts and applications of alternative medicine. |
| | | 3. Learn to execute and utilize software of pharmaceutical importance. |
| | | 4. Understand the calibration of various analytical instruments. Know analysis of drugs using various analytical instruments. |
| COURSE | COURSE CODE | COURSE OUTCOMES |
| BIOSTATISTICS AND RESEARCH METHODOLOGY (Theory) | BP801T | 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. |
| SOCIAL AND PREVENTIVE PHARMACY (Theory) | BP802T | After the successful completion of this course, the student shall be able to: |
| | | 1. Acquire high consciousness/realization of current issues related 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 to health and pharmaceutical |

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| | | issues. |
| PHARMA MARKETING MANAGEMENT (Theory) | BP803ET | The course aims to provide an understanding of marketing concepts and techniques and their applications in the pharmaceutical industry. |
| PHARMACEUTICAL REGULATORY SCIENCE (Theory) | BP804ET | 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. |
| PHARMACOVIGILANCE (Theory) | BP805ET | 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. | | |
| QUALITY CONTROL AND STANDARDIZATION OF | BP806ET | Upon completion of the subject student shall be able to: |
| | | 1. Know WHO guidelines for quality control of |

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| HERBALS (Theory) | | <p>herbal drugs.</p> <p>2. Know Quality assurance in herbal drug industry.</p> <p>3. Know the regulatory approval process and their registration in Indian and international markets.</p> <p>4. Appreciate EU and ICH guidelines for quality control of herbal drugs.</p> |
| COMPUTER AIDED DRUG DESIGN (Theory) | BP807ET | <p>Upon completion of the course, the student shall be able to understand:</p> <p>1. Design and discovery of lead molecules.</p> <p>2. The role of drug design in drug discovery process.</p> <p>3. The concept of QSAR and docking.</p> <p>4. Various strategies to develop new drug like molecules.</p> <p>5. The design of new drug molecules using molecular modeling software.</p> |
| CELL AND MOLECULAR BIOLOGY (Theory) | BP808ET | <p>Upon completion of the subject student shall be able to:</p> <p>1. Summarize cell and molecular biology history.</p> <p>2. Summarize cellular functioning and composition.</p> <p>3. Describe the chemical foundations of cell biology.</p> <p>4. Summarize the DNA properties of cell biology.</p> <p>5. Describe protein structure and function.</p> <p>6. Describe cellular membrane structure and function.</p> <p>7. Describe basic molecular genetics mechanisms.</p> <p>8. Summarize the Cell Cycle.</p> |
| PHARMACOLOGICAL SCREENING METHODS (Theory) | BP810ET | <p>Upon completion of the course the student shall be able to:</p> <p>1. Appreciate the applications of various commonly used laboratory animals.</p> <p>2. Appreciate and demonstrate the various screening methods used in preclinical research.</p> <p>3. Appreciate and demonstrate the importance of biostatistics and research methodology.</p> <p>4. Design and execute a research hypothesis independently.</p> |
| ADVANCED | BP811ET | <p>Upon completion of the course the student shall</p> |

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| INSTRUMENTATION TECHNIQUES (Theory) | | 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 |
| DIETARY SUPPLEMENTS AND NUTRACEUTICALS (Theory) | BP812ET | 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. |

| COURSE | COURSE CODE | COURSE OUTCOMES |
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| MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES | (MPH 101T) | After completion of course student is able to know- 1. Chemicals and excipients. 2. The analysis of various drugs in single and combination dosage forms. 3. Theoretical and practical skills of the instruments. |
| DRUG DELIVERY SYSTEMS | (MPH 102T) | Upon completion of the course, student shall be able to understand 1. The various approaches for development of novel drug delivery systems. 2. The criteria for selection of drugs and polymers for the development of delivering system. 3. The formulation and evaluation of novel drug delivery systems. |
| MODERN PHARMACEUTICS | (MPH 103T) | Upon completion of the course, student shall be able to understand 1. The elements of pre-formulation studies. 2. The active pharmaceutical ingredients and |

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| | | generic drug product development. |
| | | 3. Industrial management and GMP considerations. |
| | | 4. Optimization techniques & pilot plant scale up techniques. |
| | | 5. Stability testing, sterilization process & packaging of dosage forms. |
| REGULATORY AFFAIRS | (MPH 104T) | Upon completion of the course, it is expected that the students will be able to understand |
| | | • The concepts of innovator and generic drugs, drug development process. |
| | | • The regulatory guidance's and guidelines for filing and approval process |
| | | • Preparation of dossiers and their submission to regulatory agencies in different countries. |
| | | • Post approval regulatory requirements for actives and drug products. |
| | | • Submission of global documents in CTD/ eCTD formats. |
| | | • Clinical trials requirements for approvals for conducting clinical trials. |
| | | • Pharmacovigilance and process of monitoring in clinical trials. |
| PHARMACEUTICS PRACTICALS – I | (MPH 105P) | 1. Analysis of Pharmacopoeial compounds and their formulations by UV Vis spectrophotometer. |
| | | 2. Simultaneous estimation of multi component containing formulations by UV spectrophotometry. |
| | | 3. Experiments based on HPLC |
| | | 4. Estimation of sodium/potassium by flame photometry. |
| | | 5. Formulation and evaluation of transdermal patches. |
| COURSE | COURSE CODE | COURSE OUTCOMES |
| MOLECULAR PHARMACEUTICS (NANO TECHNOLOGY & TARGETED DDS) (NTDS) | (MPH 201T) | Upon completion of the course student shall be able to understand |
| | | • The various approaches for development of novel drug delivery systems. |
| | | • The criteria for selection of drugs and polymers for the development of NTDS. |
| | | • The formulation and evaluation of novel drug delivery systems. |
| ADVANCED BIOPHARMACEUTICS & | (MPH 202T) | Upon completion of this course it is expected that students will be able understand, |

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| PHARMACOKINETICS | | <ul style="list-style-type: none"> • The basic concepts in biopharmaceutics and pharmacokinetics. • The use raw data and derive the pharmacokinetic models and parameters the best describe the process of drug absorption, distribution, metabolism and elimination. • The critical evaluation of biopharmaceutical studies involving drug product equivalency • The design and evaluation of dosage regimens of the drugs using pharmacokinetic and biopharmaceutical parameters. • The potential clinical pharmacokinetic problems and application of basics of pharmacokinetic |
| COMPUTER AIDED DRUG DEVELOPMENT | (MPH 203T) | <p>Upon completion of this course it is expected that students will be able to understand</p> <ul style="list-style-type: none"> • History of computers in pharmaceutical research and development. • Computational modeling of drug disposition. • Computers in preclinical development. • Optimization techniques in pharmaceutical formulation. <p>Computers in market analysis.</p> <ul style="list-style-type: none"> • Computers in clinical development. • Artificial intelligence (AI) and robotics. • Computational fluid dynamics (CFD). |
| COSMETICS AND COSMECEUTICALS | (MPH 204T) | <p>Upon completion of the course, the students shall be able to understand</p> <ul style="list-style-type: none"> • Key ingredients used in cosmetics and cosmeceuticals. • Key building blocks for various formulations. • Current technologies in the market. • Various key ingredients and basic science to develop cosmetics and cosmeceuticals • Scientific knowledge to develop cosmetics and cosmeceuticals with desired safety, stability, and efficacy. |
| PHARMACEUTICS PRACTICALS - II | (MPH 205P) | <ol style="list-style-type: none"> 1. To study the effect of temperature change, non solvent addition, incompatible polymer addition in microcapsules preparation. 2. Preparation and evaluation of alginate beads. 3. Improvement of dissolution characteristics of slightly soluble drug by Solid dispersion technique |

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| | 4. Formulation and evaluation of liposomes/niosomes. |
| | 5 Bioavailability studies of Paracetamol in animals |
| | 6. In vitro cell studies for permeability and metabolism. |

| COURSE | COURSE CODE | COURSE OUTCOMES |
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| MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES | (MPC 101T) | After completion of course student is able to know about chemicals and excipients- |
| | | <ul style="list-style-type: none"> • The analysis of various drugs in single and combination dosage forms. • Theoretical and practical skills of the instruments |
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| ADVANCED ORGANIC CHEMISTRY - I | (MPC 102T) | Upon completion of course, the student shall be to understand |
| | | <ul style="list-style-type: none"> • The principles and applications of retro-synthesis. • The mechanism & applications of various named reactions. • The concept of disconnection to develop synthetic routes for small target molecule. • The various catalysts used in organic reactions. • The chemistry of heterocyclic compounds. |
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| ADVANCED MEDICINAL CHEMISTRY | (MPC 103T) | At completion of this course it is expected that students will be able to understand- |
| | | <ul style="list-style-type: none"> • Different stages of drug discovery. • Role of medicinal chemistry in drug research. • Different techniques for drug discovery. • Various strategies to design and develop new drug like molecules for biological targets. • Peptidomimetics. |
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| CHEMISTRY OF NATURAL PRODUCTS | (MPC 104T) | At completion of this course it is expected that students will be able to understand- |
| | | <ul style="list-style-type: none"> • Different types of natural compounds and their chemistry and medicinal importance • The importance of natural compounds as lead molecules for new drug discovery. • The concept of rDNA technology tool for new drug discovery General methods of structural elucidation of compounds of natural origin. • Isolation, purification and characterization of |
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| | | simple chemical constituents from natural source |
| Pharmaceutical Chemistry Practical I | (MPC 105P) | 1. Analysis of Pharmacopoeial compounds and their formulations by UV Vis spectrophotometer, RNA & DNA estimation. |
| | | 2. Simultaneous estimation of multi component containing formulations by UV spectrophotometry. |
| | | 3. Experiments based on Column chromatography. |
| | | 4. Experiments based on HPLC. |
| | | 5. Estimation of riboflavin/quinine sulphate by fluorimetry. |
| COURSE | COURSE CODE | COURSE OUTCOMES |
| ADVANCED SPECTRAL ANALYSIS | (MPC 201T) | At completion of this course it is expected that students will be able to understand- |
| | | • Interpretation of the NMR, Mass and IR spectra of various organic compounds. |
| | | • Theoretical and practical skills of the hyphenated instruments |
| | | • Identification of organic compounds. |
| ADVANCED ORGANIC CHEMISTRY - II | (MPC 202T) | Upon completion of course, the student shall able to understand |
| | | • The principles and applications of green chemistry |
| | | • The concept of peptide chemistry. |
| | | • The various catalysts used in organic reactions. |
| | | • The concept of stereochemistry and asymmetric synthesis. |
| COMPUTER AIDED DRUG DESIGN | (MPC 203T) | At completion of this course it is expected that students will be able to understand |
| | | • Role of CADD in drug discovery. |
| | | • Different CADD techniques and their applications. |
| | | • Various strategies to design and develop new drug like molecules |
| | | • Working with molecular modeling softwares to design new drug molecules. |
| | | • The in silico virtual screening protocols. |
| PHARMACEUTICAL PROCESS CHEMISTRY | (MPC 204T) | At completion of this course it is expected that students will be able to understand |
| | | • The strategies of scale up process of apis and intermediates. |
| | | • The various unit operations and various |

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| | | reactions in process chemistry |
| PHARMACEUTICAL CHEMISTRY PRACTICALS – II | (MPC 205P) | 1. Synthesis of organic compounds by adapting different approaches involving (3 experiments) a) Oxidation. b) Reduction/hydrogenation. c) Nitration. |
| | | 2. Comparative study of synthesis of APIs/intermediates by different synthetic routes (2 experiments). |
| | | 3. Assignments on regulatory requirements in API |
| | | 4. Comparison of absorption spectra by UV and Wood ward – Fieser rule. |
| | | 5. Interpretation of organic compounds by FT-IR. |

| COURSE | COURSE CODE | COURSE OUTCOMES |
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| Biochemistry | 101 | Upon completion of this course the student should be able to |
| | | 1. Learn the classification, properties, Molecular structure and functions of biomolecules such as carbohydrates, Lipids, Proteins and DNA, RNA. |
| | | 2. Describe the various metabolic pathways occurring in cells such as Glycolysis, Citric Acid Cycle, Gluconeogenesis, Glycogen Metabolism, electron Transport System etc. |
| | | 3. Qualitative analysis of Lipids, proteins and carbohydrates. |
| | | 4. Describe the classification of enzymes, properties of enzymes, chemical nature of enzymes, enzyme catalyzed reactions including enzyme kinetics. isolation and purification of enzymes. |
| 5. Learn about the classification, chemical nature, role of vitamins and their deficiency diseases. | | |
| Biophysics | 102 | Upon completion of the course student shall be able to- |
| | | 1. Understand the role of biomolecules in living cells. Acid Base reactions. Role of Water as solvent in living cells. |
| | | 2. Physiological aspects of Biomolecules such as polymeric reactions, oxidative properties. pH. pKa and buffer solutions. Nature of High energy molecules (ATP, GTP and Creatine Phosphate |

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| | | 3.Principles of Bioenergetics including first and second law.Electrochemical properties of biological compartments. |
| Cell Biology | 103 | 4.Qualitative and quantitative analysis of biomolecules through spectrophotometry and colorimetry. |
| | | Upon completion of this course the student should be able to: |
| | | 1.Learn the basics of cell biology,pre cellular evolution,artificial cell synthesis. |
| | | 2. Understand the classification of different cell types.Level of organizations in living beings. |
| | | 3. Understand the ultrastructure and functions different cell organelles. |
| | | 4.Learn the structure and function including membrane transport. Degradation of cellular components.Programmned cell death,Cell adhesion and properties of cancer cells. |
| | | 5.Learn the cell division cycle and cell cycle regulation in plants and animals cells. |
| Microbiology | 104 | 6.Describe the cell cell signalling in living cells and different signal transduction pathways. |
| | | Upon completion of course student shall be able to |
| | | 1. Learn the different catogroies of microorganisms which includess bacteria, virus, fungi, algae etc. |
| | | 2.It includes fundamental research on the biochemistry, physiology, cell biology,ecology,evolution and clinical aspects of microorganisms. |
| | | 3.Understand the benefits and harmful effects of microorganisms. |
| | | 4.Learn different techniques for isolation of microorganisms |
| Genetics | 105 | Upon completion of the course the student shall be able to |
| | | 1. To understand the conceptual knowledge of genes and chromosomes |
| | | 2. To have an idea about the knowledge about various types of Genetic Defects |
| | | 3.To learn the basic concept of formulation and Testing of Genetic Hypothesis |
| | | 4. To have knowledge about Genetic Mutations |
| Instrumentation & Biophysical Techniques | 106 | Upon completion of the course, the student shall be able to |

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| | | <p>1. Understand the appropriate role of different analytical techniques in various areas of Biotechnology such as nanotechnology, cancer Biology, genetic engineering and many more.</p> <p>2. Analytical have its applications not only in research field but also at industry level.</p> <p>3. Learning fundamental principles, generalization and theories.</p> <p>4. Develop analytical skills.</p> <p>5 know the correct sample preparation and characterisation prior to analysis by the chosen technique and instrument.</p> <p>6. Understand the proper handling of different instruments like spectrophotometer, Electrophoretic unit, etc.</p> <p>7. know the methods of sample purification used in Biotechnology</p> <p>4. Learning fundamental principles, generalization and theories.</p> |
| Biostatistics & Biomathematics | 107 | <p>Upon completion of the course the student shall be able to:-</p> <p>1. To apply principles of Mathematics and statistics in Biotechnology</p> <p>2. To have an idea about different types of primary and secondary data</p> <p>3. To learn the principles of probability calculations</p> |
| Chemistry | 108 | <p>Upon completion of this course the student should be able to</p> <p>1. To learn basic knowledge of Chemistry and principles involved in Chemistry</p> <p>2. To know about various terms and definitions involved in Chemistry</p> <p>3. To have an idea about the atomic structure</p> <p>4. To have an idea about Chemical kinetics</p> |
| Biodiversity | 109 | <p>Upon completion of the course, the students will be able to –</p> <p>1. To understand the global patterns of Biodiversity</p> <p>2. To learn how to conserve and control International trade</p> <p>3. To have an idea about Environment conservation at global level</p> <p>4. To understand the basic concepts of Biodiversity</p> |

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| Practical 1 | 110P | Upon completion of the course, the students will be able to – |
| | | 1. To determine qualitative test for identification of carbohydrates. |
| | | 2. To determine qualitative test for identification of proteins. |
| | | 3. To determine qualitative test for identification of maltose. |
| | | 4. To determine qualitative test for identification of albumin. |
| COMMUNICATION SKILLS | BP111P | 5.To determine the specific gravity of different sample of soil. |
| | | 6.To carry out an isoelectric precipitate of milk protein casein. |
| | | 7.To perform iodine-starch diffusion by using plastic baggie. |
| | | 8.To determine the pH of given sample with the help of PH meter. |
| | | 9. To determine the coefficient of apparent expansion of a given liquid by specific gravity bottle method. |
| Practical 3 | 112 | 2. Recognize Inorganic pharmaceuticals by performing Identification tests. |
| | | 3. Examine purity of various inorganic pharmaceuticals by performing purity tests. |
| | | 4. Prepare and calculate Theoretical, Practical and |
| | | 5. % yield of Inorganic pharmaceuticals. |
| | | Upon completion of the course, the students will be able to – |
| COMMUNICATION SKILLS | BP111P | 1. Perform better in their academic and professional scenario such as economic, environmental, social, political and ethical scenario |
| | | 2. Utilize phonetic dictionary symbols to continue to improve pronunciation |
| | | 3. Recognize, explain, and use the formal elements of specific genres of organizational communication: white papers, |
| | | 4. Recommend and analyze reports, proposals, memorandums, web pages, wikis, blogs, business letters, and promotional documents. |
| Practical 3 | 112 | 1. Understand professional writing by studying management communication contexts and genres, researching contemporary business topics. |

| COURSE | COURSE CODE | COURSE OUTCOMES |
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| Fundamental of Computers & Bioinformatics | 201 | Upon completion of this course the student should be able to: |
| | | 1. Learn the basic knowledge about computer. As a discipline, computer science spans a range of topics from theoretical studies of algorithms, computation and information to the practical issues of implementing computational systems in hardware and software. |
| | | 2. Informatics harnesses the power and possibility of digital technology to transform data and information into knowledge that people use every day. This strong focus on the human use of computing helps people to interact with technology in the best and most efficient way possible. |
| | | 3. Informatics is about understanding how people will “live” in the digital space, with an elegance of design that makes sense to those who use a particular technology. |
| Bioenergetics | 202 | Upon completion of the course the student shall be able to |
| | | 1. Learn about the process of energy production in cell. |
| | | 2. Understand the structure and transportation of ions across the membrane. |
| | | 3. Understand about the regulation of metabolic activities in cell. |
| | | 4. Know about the synthesis and degradation of biomolecules such as fatty acids, glucose. |
| | | 5. Learn about kinetics of ions transportation by active and passive transport. |
| Molecular Biology | 203 | Upon completion of course student shall be able to |
| | | 1. To know about the Molecular basis of life and the importance of DNA and RNA |
| | | 2. To have an idea about the organization and structure of genetic material |
| | | 3. To learn the basic principles of regulation and expression of genes. |
| Molecular Genetics and Cytogenetics | 204 | Upon completion of the subject student shall be able to – |
| | | 1. To understand the structural and numerical changes in chromosomes |

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| | | 2.To learn the principles involved in Chromosome Mapping |
| | | 3. Methods and techniques involved in plant breeding |
| Immunology and Immunotechnology | 205 | Upon completion of this course the student should be able to: |
| | | 1. Demonstrate the adequate knowledge of Immunological processes at a cellular and molecular level. |
| | | 2. Define the Immunological principles and concepts. |
| | | 3. Describe the reasons for immunization and aware of different vaccination. |
| | | 4. Understand and explain the role of various Immunological techniques which are helpful in determining different diseases diagnosis. |
| Recombinant DNA Technology | 206 | Upon completion of the course the student shall be able to: |
| | | 1. To have conceptual knowledge about Gene Cloning |
| | | 2. To learn about the purification and manipulation of DNA |
| | | 3. Basic techniques involved in the isolation and characterization of genes. |
| | | 4. Principle and working of PCR |
| Animal Physiology | 207 | Upon completion of the course, the students will be able to– |
| | | 1.Learn the anatomy and physiology of Human circulatory system.Blood clotting mechanism and basics of blood tyransfusion. |
| | | 2.Describe the structure anfd functions of excretory system.Students also learn the physiology of excretory system and the formation of urine in kidney. |
| | | 3.Students learn the anatomy and physiology of digestive system.Absorption of lipids,proteins and carbvohydrates. |
| | | 4.Students learn about different endocrine glnads and their secretions called hormones and their diseaes. |
| | | 5.Describe the anatomy and physiology of nervous system of human benungs. |
| | | 6.Students also learn anatomy and physiology of reproductive system and animal behaviour. |
| Plant Physiology | 208 | Upon completion of the course, the students will be able to– |

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| | | <p>1.Revealing the independence of the life processes on environmental conditions.</p> <p>2.Serves as the theoretical basis for increasing the total productivity of plants.</p> <p>3.Study of biological and chemical processes of plant cells.</p> <p>4.Deals with different plant structures and their functioning.</p> | |
| Enzymes and Enzyme Technology | 209 | <p>Upon completion of the course, the students will be able to–</p> <p>1.Students learn the general properties ,classification and nomenclature of enzymes.</p> <p>2.Students learn the principles of enzyme actions,enzyme kinetics and regulation of enzyme activities.</p> <p>3.Students also learn the production of enzymes through genetic engineering approaches.</p> <p>4.Students also learn applicatiopn of immobilized enzymes in pharmaceutical and food industries.</p> | |
| | | <p>Upon completion of the course, the students will be able to–</p> <p>1.Learn to isolate DNA from different living cells like human blood,plant leaves,fruits &prokaryotes .</p> <p>2.To understand isolated DNA fragment functions to study further in research.</p> <p>3.Learn to determine the length and molecular weight of DNA fragments</p> <p>4.Learn basic knowledge about computer like Ms Office which include excel,word, powerpoint etc.</p> <p>5.Learn various functions to understand arithmetic process.</p> | |
| | | <p>Upon completion of the course, the students will be able to–</p> <p>1. To identify the different Blood Groups.</p> <p>2. To study and demonstrate the single Radial Diffusion.</p> <p>3. To study and demonstrate the Ouchterlony Double Diffusion.</p> <p>4. To demonstrate and perform the Enzyme Linked Immunosorbent Assay.</p> <p>5. To study and demonstrate the Immunoelectrophoresis.</p> <p>6. To study and demonstrate the immuno precipitation technique.</p> <p>7. To analyse the protein sample with the help of</p> | |
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| | | western Blotting. |
| | | 8.To isolate the DNA from banana samples. |
| | | 9.To isolate the DNA from blood samples. |
| | | 10.To isolate the proteins from plant extract. |
| | | 11..To isolate the DNA from blood samples. |
| | | 12...To isolate the DNA from bacteria. |
| | | 13. Agarose gelelectrophoresis of DNA. |
| Animal Biotechnology | 302 | Upon the completion of the course student shall be able to |
| | | 1.Learn various molecular biology techniques are used to genetically engineer (i.e. modify the genome of) animals in order to improve their suitability for agriculture, industrial, or pharmaceutical applications. |
| | | 2.It provides new tools for improving human health and animal health and welfare and increasing livestock productivity. Biotechnology improves the food we eat - meat, milk and eggs. |
| | | 3.It assisted reproduction techniques such as artificial insemination, embryo transfer and in vitro fertilization, livestock cloning improves animal breeding programs allowing farmers and ranchers to produce healthier offspring, and therefore producer healthier, safer and higher quality foods more consistently. |
| Molecular Virology | 303 | 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 sterilization 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. |
| Nanobiotechnology | 304 | Upon completion of the course student shall be able: |
| | | 1- Considerable improvements in technological and industrial sectors. |
| | | 2- Study of controlling and manipulating matter on an atomic and molecular scale. |

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| | | 3- Study of structures and materials on an ultra small scale. |
| | | 4- Improves existing industrial processes, materials and application by scaling them down to the nanoscale. |
| Environmental Biotechnology | 305 | Upon completion of the course, the students will be able to – |
| | | 1. To know about the impact of environment on the Biotechnology |
| | | 2. To learn about Biofertilizers and its application in the agriculture. |
| | | 3. Conceptual knowledge of Plant Petroleum Industry |
| Industrial Biotechnology | 306 | Upon completion of the course, the students will be able to – |
| | | 1. To understand of basic concepts of fermentation techniques and microbial growth techniques. |
| | | 2. To learn the basic design of bioreactors their types and applications in industries. |
| | | 3. To learn the commercial production of organic acids like acetic acids, lactic acids, citric acids etc. Production of vitamins and antibiotics like penicillin, streptomycin and their derivatives. |
| | | 4. Students learn the basics of protein engineering and metabolic engineering. |
| Genomics & Proteomics | 307 | Upon completion of the course, the students will be able to – |
| | | 1. Know about the gene mapping techniques such as restriction mapping, FISH, STS. |
| | | 2. Learn the techniques such as 2D PAGE, 2DE, Mass spectrometry. |
| | | 3. Learn the various approaches and current issues regarding drug discovery. |
| | | 4. Learn the various types of cancer and techniques used in cancer research. |
| | | 5. Understand about human evolution. |
| Biosafety. Intellectual Property rights and entrepreneurship | 308 | Upon completion of the course, the students will be able to – |
| | | 1- Ability to have a competitive edge over other similar businesses. |
| | | 2- To achieve this, the law gives people and businesses property rights to the information and intellectual goods they create, usually for a limited period of time. |

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| | | <p>3- Ensure that you and your team are properly handling infectious organisms and hazardous biological materials.</p> <p>4- Use of specific practices, training safety equipment, specially designed building to protect the worker, community and environment from an accidental exposure or unintentional release of infectious agents and toxins.</p> |
| Recent Trends in Biotechnology | 309 | <p>Upon completion of the course, the student shall be able</p> |
| | | <p>1. Understand the role of Human Genome Project and its importance in developing personalized medicine and treating genetic disorders.</p> |
| | | <p>2. Demonstrate the process of different Recent ongoing researches like antisense technology, RNAi, etc.</p> |
| | | <p>3. Describe the importance of recent research in agricultural field, bioremediation, etc.</p> |
| Practical 1 | 310 | <p>Upon completion of the course the student shall be able to</p> |
| | | <p>1.To learn the sterilization techniques in plant tissue culture.</p> |
| | | <p>2.To perform the different types of tissue culture techniques.</p> |
| | | <p>3.To prepare stocks solutions for plant tissue culture media preparation.</p> |
| | | <p>4.To prepare plant tissue culture media for in vitro culture.</p> |
| Practical 2 | 311P | <p>Upon the completion of the course student shall be able to</p> |
| | | <p>1.To determine the the milk quality by methylene blue reduction.</p> |
| | | <p>2.To perform the antibiotic sensitivity test.</p> |
| | | <p>3.Preparation of potato dextrose agar(PDA) media.</p> |
| | | <p>4.To study the design and structure of fermenters.</p> |
| | | <p>5.To isolate and screen tannase producing microorganismmfrom soil.</p> |
| | | <p>6.Tannase quantitative assay by paper chromatography.</p> |
| Practical 3 | 312P | <p>Upon completion of this course the student should be able to</p> |
| | | <p>1. To determine the total solids present in wastewater.</p> |
| | | <p>2. To determine total dissolved and suspended solids</p> |

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| | in the given wastewater sample. |
| | 3. To determine the alkalinity of given water. |
| | 4. To determine the total hardness of given water. |
| | 5. To determine the dissolved oxygen of water. |
| | 6. To find out the similarity of giving query sequence as protein sequence by using NCBA nucleotide BLAST(BLASTx). |