## COURSE OUT COMES FOR B.PHARMACY

| Course Code /Course Name | Course Outcome |
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| **FIRST YEAR B. PHARMACY SEMESTER I** | |
| **BP101T Human Anatomy and Physiology-I** | **Students should be able to learn**<br>**CO1:** Explain the gross morphology, structure and functions of various organs of the human body. |
| | **CO2:** Describe the various homeostatic mechanisms and their imbalances. |
| | **CO3:** Identify the various tissues and organs of different systems of human body. |
| | **CO4:** Perform the various experiments related to special senses and nervous system. |
| | **CO5:** Appreciate coordinated working pattern of different organs of each system. |
| | **CO6:** Be able to understand path-physiology of disease. |
| **BP102T Pharmaceutical Analysis** | **Students should be able to learn**<br>**CO1:** Learning this subject content will develop the ideas with the fundamental of analytical chemistry among the pupil. |
| | **CO2:** It constructs the fundamental methodology to prepare different strength of solutions. |
| | **CO3:** It facilitates the fellow pupil to predict the sources of mistakes and errors. |
| | **CO4:** It helps to develop the fundamentals of volumetric analytical skills. |
| | **CO5:** It percolates the basic knowledge in the principles of electrochemical analytical techniques. |
| | **CO6:** The student interpretation skills will be improve by the course content in terms of choice of analytical techniques to perform the estimation of different category drugs. |
| **BP103T Pharmaceutics-I** | **Students should be able to learn**<br>**CO1:** Prescription writing, concepts such as dispensing, compounding, patient counseling and to know the pharmacist role as a heath care provider. |
| | **CO2:** Basic concepts of formulation method, labeling of different types of pharmaceutical dosage forms like emulsion and suspensions, dry powders, gels, pastes, and suppositories. |
| | **CO3:** Appropriate dose calculation for child and adult patient. |
| | **CO4:** Understand physical and therapeutic incompabilities and methods to overcome that. |
| | **CO5:** Study powders, monophasic and biphasic dosage forms, suspensions, emulsions. |
| | **Students should be able to learn**<br>**CO1:** Gives basic introduction to inorganic chemistry. |
| | **CO2:** know the sources of impurities and methods to determine the |

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| **BP104T Pharmaceutical Inorganic Chemistry** | impurities in inorganic drugs and pharmaceuticals. |
| | **CO3:** understand the medicinal and pharmaceutical importance of inorganic compounds. |
| | **CO4:** Acid base buffer, major extra & intracellular fluids. |
| | **CO5:** Dental products, Gastrointestinal agents (Acidifiers, Antacid, Cathartics). |
| **BP 105T Communication Skill** | **Students should be able to learn**<br>**CO1:** Understand the behavioral needs for a pharmacist to function effectively in the areas of pharmaceutical operation. |
| | **CO2:** Communicate effectively (Verbal and Non Verbal). |
| | **CO3:** Effectively manage the team as a team player. |
| | **CO4:** Develop interview skills. |
| | **CO5:** Develop Leadership qualities and essentials. |
| | **CO6:** Improve Presentation Skill. |
| **BP106T Remedial Biology** | **Students should be able to learn**<br>**CO1:** know the classification and salient features of five kingdoms of life. |
| | **CO2:** Understand the basic components of anatomy & physiology of plant. |
| | **CO3:** Know understand the basic components of anatomy & physiology animal with special reference to human. |
| | **CO4:** Body fluids and circulation, Digestion and Absorption, Breathing and respiration. |
| | **CO5:** Excretory products and their elimination, Neural control and coordination. |
| | **CO6:** Human reproduction. |
| **BP106T RMP Remedial Mathematics** | **Students should be able to learn**<br>**CO1:** Know the theory and their application in Pharmacy. |
| | **CO2:** Solve the different types of problems by applying theory. |
| | **CO3:** Appreciate the important application of mathematics in Pharmacy. |
| | **CO4:** Partial fraction, Logarithms, Limits and continuity. |
| | **CO5:** Matrices and Determinant, Calculus Differentiation. |
| | **CO6:** Analytical Geometry, Differential Equations. |
| **BP107P Human Anatomy and Physiology** | **Students should be able to learn**<br>**CO1:** Investigate hematological functions/parameters by direct participation in laboratory experimentation, data collection, and analysis including homeostasis. |
| | **CO2:** Investigate physiologic functions by direct participation in laboratory experimentation, data collection, and analysis for clinical experiments. |
| | **CO3:** Compare and contrast the gross and microscopic anatomy of the cells, tissues, organs, sense organs and organ systems of the body. |
| | **CO4:** Compare and contrast the normal microanatomy of the basic tissue types (epithelia, connective, muscle, nervous) and their subtypes with attention to the details of cellular and intracellular |

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| | morphology, stratification, nature of the interstitial material and anatomic location in the organ systems under study. |
| | **CO5:** Compare and contrast the normal gross and microscopic anatomy of the body organs and organ systems (integumentary, skeletal, CVS and blood and body fluids and PNS) with emphasis on the size, shape, internal architecture, microanatomy, anatomic relationships, and locations. |
| **BP 108P Pharmaceutical Analysis** | **Students should be able to learn**<br>**CO1:** Perform the limit test of Chloride, Sulphate, Iron ,Arsenic. |
| | **CO2:** Prepare and standardized the Sodium hydroxide Sulphuric acid Sodium thiosulfate, Potassium permanganate, Ceric ammonium sulphate. |
| | **CO3:** To Performed The Assay Of Ammonium chloride by acid base titration, Ferrous sulphate by Cerimetry, Copper sulphate by Iodometry, Calcium gluconate by complexometry , Hydrogen peroxide by Permanganometry ,Sodium benzoate by non-aqueous titration , Sodium Chloride by precipitation titration. |
| | **CO4:** Determination of Normality OF Conductometric titration of strong acid against strong base , Conductometric titration of strong acid and weak acid against strong base ,Potentiometric titration of strong acid against strong base. |
| **BP109P Pharmaceutics-I** | **Students should be able to learn**<br>**CO1:** To demonstrate the skill of preparation of monophasic liquids. |
| | **CO2:** Explain principles of formulation of powder preparation. |
| | **CO3:** Perform the pharmaceutical calculation of dosage form for preparation of dosage form. |
| | **CO4:** Draw the label in prescribed manner including all components and parts. |
| | **CO5:** Demonstrate skill of preparation of biphasic dosage form. |
| | **CO6:** Demonstrate skill of preparation of semisolid dosage form. |
| **BP110P Pharmaceutical Inorganic Chemistry** | **Students should be able to learn**<br>**CO1:** Perform few limit tests and explain its significance. |
| | **CO2:** Perform identification tests for inorganic compounds. |
| | **CO3:** Prepare some inorganic pharmaceutical compounds. |
| | **CO4:** Determine swelling index, acid neutralizing property, presence of iodate and iodine in some inorganic compounds. |
| **BP111P Communication skill** | **Students should be able to learn**<br>**CO1:** To develop basic communication skills using English language lab software. |
| | **CO2:** To learn and practice different types of pronunciations. |
| | **CO3:** To improve advanced learning using English language lab software. |
| | **CO4:** To develop writing skills, interview handling skills, presentation skills and group discussion skills using English language lab software. |
| | **CO5:** To learn basic thing for starting conversation and effective |

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| | communication skill. |
| | **CO6:** To learn email composition and email etiquette. |
| **BP112RBP Remedial Biology** | **Students should be able to learn**<br>**CO1:** Demonstrate different techniques used in histology. |
| | **CO2:** Explain the structure of cell of animal and plants with its inclusions. |
| | **CO3:** Study of different physiological parameters of human. |
| | **CO4:** Illustrate study of frog using computer model. |
| **FIRST YEAR B. PHARMACY SEMESTER II** | |
| **BP 201T Human Anatomy and Physiology -II** | **Students should be able to learn**<br>**CO1:** Understand the gross morphology, structure and functions of various organs of the human body. |
| | **CO2:** Understand the physiology of endocrine, nervous, digestive, respiratory, urinary and reproductive system. |
| | **CO3:** Identify the various organs of different systems of human body. |
| | **CO4:** Appreciate coordinated working pattern of different organs of each system. |
| | **CO5:** Performed and learnt about the experiments like neurological reflex, body temperature measurement. |
| | **CO6:** Appreciate the interlinked mechanisms in the maintenance of normal functioning (Homeostasis) of human body. |
| **BP 202T Pharmaceutical Organic Chemistry-I** | **Students should be able to learn**<br>**CO1:** Write the structure, name and the type of isomerism of the organic compound. |
| | **CO2:** Write the reaction, name the reaction and orientation of reactions. |
| | **CO3:** Account for reactivity/stability of compounds. |
| | **CO4:** Identify / confirm the identification of organic compound. |
| | **CO5:** Carboxylic acids, Aliphatic amines. |
| | **CO6:** Carbonyl compounds. |
| **BP 203T Biochemistry** | **Students should be able to learn**<br>**CO1:** Understand the catalytic role of enzymes, importance of enzyme inhibitors in design of new drugs, therapeutic and diagnostic applications of enzymes. |
| | **CO2:** Understand the metabolism of nutrient molecules in physiological and pathological conditions. |
| | **CO3:** Understand the genetic organization of mammalian genome and functions of DNA in the synthesis of RNAs and proteins. |
| | **CO4:** Biomolecules, Bioenergetics. |
| | **CO5:** Carbohydrate metabolism, Biological oxidation. |
| | **CO6:** Lipid metabolism, Amino acid metabolism, Nucleic acid metabolism and genetic information transfer. |
| **BP204T Pathophysiology** | **Students should be able to learn**<br>**CO1:** Describe the etiology and pathogenesis of the selected disease states. |

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| | **CO2:** Knowledge of signs and symptoms of the diseases. |
| | **CO3:** Identify the complications of the diseases. |
| | **CO4:** Understand the basic mechanism involved in the process of inflammation and repair. |
| | **CO5:** Understand the Basic principles of Cell injury and Adaptation. |
| | **CO6:** Study the diseases related to various organs of different systems of human body. |
| **BP205T**<br>**Computer Application in Pharmacy** | **Students should be able to learn**<br>**CO1:** Know the various types of application of computers in pharmacy. |
| | **CO2:** Know the various types of databases. |
| | **CO3:** Know the various applications of databases in pharmacy. |
| | **CO4:** Web technologies, Application of computers in Pharmacy, Bioinformatics. |
| | **CO5:** Computers as data analysis in Preclinical development. |
| | **CO6:** Number system, Concept of Information Systems and Software. |
| **5555**<br>**Environmental Studies** | **Students should be able to learn**<br>**CO1:** Create the awareness about environmental problems among learners. |
| | **CO2:** Impart basic knowledge about the environment and its allied problems. |
| | **CO3:** Develop an attitude of concern for the environment. |
| | **CO4:** Motivate learner to participate in environment protection and environment improvement. |
| | **CO5:** Strive to attain harmony with Nature. |
| | **CO6:** Acquire skills to help the concerned individuals in identifying and solving. |
| **BP207P**<br>**Human Anatomy and Physiology II** | **Students should be able to learn**<br>**CO1:** Identify various tissues and organs of different system of human body. |
| | **CO2:** Explain construction and working of spirometer for the measurement of lungs volume and capacities. |
| | **CO3:** Study the integumentary and special senses using specimen, models. |
| | **CO4:** Demonstrate the general neurological examination. |
| **BP208P**<br>**Pharmaceutical Organic Chemistry-I** | **Students should be able to learn**<br>**CO1:** Perform the systematic qualitative analysis of organic compounds. |
| | **CO2:** Prepare the suitable solid derivatives from organic compounds & construction of molecular models. |
| | **CO3:** Functional group test like Phenols, Amides/ Urea. |
| | **CO4:** Melting point/Boiling point of organic compounds. |
| | **Students should be able to learn**<br>**CO1:** Identify and characterize carbohydrates, proteins by various qualitative test. |

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| **BP209P Biochemistry** | **CO2:** Determine blood containing sugar, total cholesterol, buffer solution off measurement of pH and action of salivary amylase. |
| | **CO3:** Determination of blood creatinine. |
| | **CO4:** Study of enzymatic hydrolysis of starch. |
| **BP210P Computer Applications in Pharmacy** | **Students should be able to learn**<br>**CO1:** Use MS Word MS access designing questionnaires, form to record patient information, creating patient database mailing labels, invoice table and generate report. |
| | **CO2:** Create HTML Web page. Export Tables. Queries. Forms and Report to web page. |
| | **CO3:** Drug information storage and retrieval using MS Access. |
| | **CO4:** Creating mailing labels Using Label Wizard , generating label in MS WORD. |
| **SECOND YEAR B. PHARMACY SEMESTER III** | |
| **BP301T Organic Chemistry** | **Students should be able to learn**<br>**CO1:** Write the structure, name and the type of isomerism of the organic compound. |
| | **CO2:** Write the reaction, name the reaction and orientation of reactions. |
| | **CO3:** Account for reactivity/stability of compounds. |
| | **CO4:** Prepare organic compounds. |
| | **CO5:** To emphasize on definition, types, classification, principles/mechanisms, applications, examples and differences. |
| | **CO6:** General methods of preparation and reactions of compounds. |
| **BP302T Physical Pharmaceutics-I** | **Students should be able to learn**<br>**CO1:** Student shall be able to understand various physicochemical properties of drug molecules in the designing the dosage forms. |
| | **CO2:** Student shall be able to know the principles of chemical kinetics & to use them for stability testing and determination of expiry date of formulations. |
| | **CO3:** Student shall be able to demonstrate use of physicochemical properties in the formulation development and evaluation of dosage forms. |
| | **CO4:** Student shall be able to state the physicochemical properties of drug molecules, pH, and solubility State the physicochemical properties of drug molecules, pH, and solubility. |
| | **CO5:** Student shall be able to explain the role of surfactants, interfacial phenomenon and thermodynamics. |
| | **CO6:** Student shall be able to describe the flow behavior of fluids and concept of Complexation. |
| | **CO7:** Student shall be able to analyze the chemical stability tests of various drug products. |
| | **CO8:** Student shall be able to understand the physical properties of solutions, buffers, Isotonicity. |
| | **Students should be able to learn** |

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| **BP303T Pharmaceutical Microbiology** | **CO1:** Describe types of microorganisms, identification of microorganism their uses and adverse effects on human health. |
| | **CO2:** Describe the methods of identification, cultivation and preservation of various microorganisms. |
| | **CO3:** Describe techniques of sterilization of pharmaceutical and food products. |
| | **CO4:** Study and describe equipment's, preparation and sterilization of culture media, aseptic transfer techniques, streak plate, pour plate, spread plate, plate count and direct microscopy methods. |
| | **CO5:** Understand and describe different microbiological methods for standardization of Pharmaceuticals. |
| | **CO6:** Understand the cell culture technology and its applications in pharmaceutical Industries. |
| **BP304T Pharmaceutical Engineering** | **Students should be able to learn**<br>**CO1:** To know various unit operations used in Pharmaceutical industries. |
| | **CO 2:** To understand the material handling techniques. |
| | **CO3:** To perform various processes involved in pharmaceutical manufacturing process. |
| | **CO4:** To carry out various test to prevent environmental pollution. |
| | **CO5:** To appreciate and comprehend significance of plant lay out design for optimum use of resources. |
| | **CO6:** To appreciate the various preventive methods used for corrosion control in Pharmaceutical industries. |
| **BP305P Pharmaceutical Organic Chemistry-II** | **Students should be able to learn**<br>**CO1:** Determine the physical constants like acid value, saponification value and Iodine value of organic compounds. |
| | **CO2:** Synthesize certain organic compounds through acetylation, halogenation nitration oxidation hydrolysis, hydrolysis, Perkins and clainsen condensation. |
| | **CO3:** Learn recrystallization techniques. |
| | **CO4:** Steam distillation techniques. |
| **BP3O6P Physical Pharmaceutics-I** | **Students should be able to learn**<br>**CO1:** To develop skills and techniques those are parts of pharmaceutical procedures through the actual use of equipment and instruments. |
| | **CO2:** Interpret scientific data, represent the data in a tabular and/or graphical form. |
| | **CO3:** To calculate critical solution temperature & effect of addition of electrolyte on CST of phenol-water system, solubility, partition coefficient, of solution of given compound. |
| | **CO4:** The effect of temperature, pH, solvent, co- solvent on solubility. |
| | **Students should be able to learn**<br>**CO1:** Understand techniques for the cultivation of microbes. |
| | **CO2:** Student will able to carry out the sterilization process and also |

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| **BP3O7P Pharmaceutical Microbiology** | able tom monitor the same. |
| | **CO3:** Learn the sterility testing of pharmaceuticals products and their microbial standardization. |
| | **CO4:** Students will acquire the knowledge and skill for isolation of and identification of microbes. |
| | **CO5:** Student will able to perform microbial assay of antibiotics, vitamins and amino acids. |
| | **CO6:** Students will acquire and demonstrate competency in laboratory safety and in routine and specialized microbiological laboratory skills applicable to microbiological research. |
| **BP3O8P Pharmaceutical Engineering** | **Students should be able to learn**<br>**CO1:** Perform various unit operation process involved in pharmaceutical manufacturing. |
| | **CO2:** Perform numerical, involved in calculating process related determinants. |
| | **CO3:** Create graphs and illustrate actions for data representation. |
| | **CO4:** Analyze and interpret the data generated from the experiments performed. |
| **SECOND YEAR B. PHARMACY SEMESTER IV** | |
| **BP401T Organic Chemistry-III** | **Students should be able to learn**<br>**CO1:** Understand the methods of preparation and properties of organic compounds. |
| | **CO2:** Explain the stereo chemical aspects of organic compounds and stereo chemical reactions. |
| | **CO3:** Know the structure and classification of Heterocyclic compounds. |
| | **CO4:** Know the medicinal uses and other applications of organic compounds. |
| | **CO5:** Know the reactions of synthetic importance. |
| | **CO6:** Know the reaction mechanism. |
| **BP402T Medicinal Chemistry** | **Students should be able to learn**<br>**CO1:** Understand basic concept of medicinal chemistry related to drug action. |
| | **CO2:** Explain the various reaction of phase I and phase II in drug metabolism. |
| | **CO3:** Classify the therapeutic agents, outline the synthetic route for the selective medicinal compounds of each category and acquire knowledge on the mechanism of action of pharmacodynamics agents. |
| | **CO4:** Acquire knowledge about the relationship between the biological activity and structure of therapeutic agents. |
| | **CO5:** Design and adopt the reaction schemes for the synthesis of diverse medicinal compounds. |
| | **CO6:** Understand the drug metabolic pathways, adverse effect and therapeutic value of drugs. |
| | **Students should be able to learn**<br>**CO1:** Students shall be able to illustrate fundamentals and |

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| **BP403T Physical Pharmaceutics-II** | pharmaceutical applications of Colloidal dispersions, Rheology, Coarse Dispersion, Micromeritics, Drug stability. |
| | **CO2:** Students shall be able to understand the various methods for the determination of properties of colloids, properties of powder, order of reactions and flow of fluids. |
| | **CO3:** Students shall be able to describe the rate of reactions, degradation and stability methods of drugs as well as principle and significance of accelerated stability testing. |
| | **CO4:** Students shall be able to relate the scientific concepts of viscosity, Micromeritics, kinetics and colloids in connection with preparation, characterization and evaluation of dosage forms. |
| | **CO5:** Students shall be able to explain the concepts of rheological sciences and flow properties of pharmaceutical preparations. |
| | **CO6:** Students shall be able to describe the factors leading to instability of dispersion systems. |
| **BP404T Pharmacology** | **Student should able to learn**<br>**CO1:** Understand the pharmacological actions of different categories of drugs. |
| | **CO2:** Explain the mechanism of drug action at organ system/sub cellular/Macro-molecular levels. |
| | **CO3:** Apply the basic pharmacological knowledge in the prevention and treatment of various diseases. |
| | **CO4:** Observe the effect of drugs on animals by simulated experiments. |
| | **CO5:** Appreciate correlation of pharmacology with other bio medical sciences. |
| | **CO6:** Pharmacology of drugs acting on central nervous system. |
| **BP405T Pharmacognosy and Phytochemistry** | **Student should able to learn**<br>**CO1:** Know the history and development of Pharmacognosy. |
| | **CO2:** Fundamentals of Pharmacognosy like scope, classification of crude drugs, their identification and evaluation, phytochemicals present in them and their medicinal properties. |
| | **CO3:** To know the techniques in the cultivation and production of crude drugs. |
| | **CO4:** To know the crude drugs, their uses and chemical nature. |
| | **CO5:** To know the evaluation techniques for the herbal drugs. |
| | **CO6:** To carry out the microscopic and morphological evaluation of crude drugs. |
| **BP4O6P Medicinal Chemistry-I** | **Students should be able to learn**<br>**CO1:** Synthesize and explain reaction mechanism of medicinally important compounds by using conventional methods. |
| | **CO2:** Perform quantitative analysis of drugs such as Chlorpromazine, Phenobarbitone, Atropine Ibuprofen, Aspirin and furosemide. |
| | **CO3:** Determination of Partition coefficient for drugs. |
| **BP4O7P Physical Pharmaceutical-II** | **Students should be able to Learn**<br>**CO1:** Evaluate viscosity, specific surface area, particle size distribution of given material. |

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| | **CO2:** Calculate Bulk density, true density, porosity of given excipient and Estimate various flow properties of powders. |
| | **CO3:** Calculate viscosity by Ostwald viscometer and Brookfield Viscometer. |
| | **CO4:** Understand the effect of suspending agents on sedimentation volume. |
| **BP4O8P Pharmacology-I** | **Students should be able to learn**<br>**CO1:** Introduction and Handle the laboratory equipment. |
| | **CO2:** Identify various laboratory animals and describe CPCSEA guidelines for care and handling of laboratory animals. |
| | **CO3:** Explain common laboratory techniques, like blood withdrawal, serum and plasma separation, anesthetics and euthanasia used for animal studies. |
| | **CO4:** Describe the different routes of drug administration in mice and rats. |
| | **CO5:** Demonstrate the effect of drugs on animals by simulated experiments. |
| **BP4O9P Pharmacognosy & Phytochemistry-I** | **Students should be able to learn**<br>**CO1:** Perform analysis of crude drugs by chemical tests. |
| | **CO2:** Determine and perform stomatal number, stomatal index, vein islet number vein islet determination and palisade ratio of leaf drug. |
| | **CO3:** Understand and determine size of starch grains, calcium oxalate crystals, length. and width of fiber by eye piece micrometer and number of starch grains by Lycopodium spore method. |
| | **CO4:** Perform Ash value Extractive values, moisture contort, swelling and foaming index of crude drug. |
| **THIRD YEAR B. PHARMACY SEMESTER V** | |
| **BP501T Medicinal Chemistry** | **Student should able to learn**<br>**CO1:** Understand the chemistry of drugs with respect to their pharmacological activity. |
| | **CO2:** Understand the drug metabolic pathways, adverse effect and therapeutic value of drug. |
| | **CO3:** Know the Structural Activity Relationship of different class of drugs. |
| | **CO4:** Study the chemical synthesis of selected drugs. |
| | **CO5:** Antihistaminic agents, H1–antagonists. |
| | **CO6:** Gastric Proton pump inhibitors, Anti-neoplastic agents, Anti-anginal. |
| **BP502T Industrial Pharmacy-I** | **Students should be able to learn**<br>**CO1:** Understand and describe various Preformulation concepts their influence on stability. |
| | **CO2:** Know and understand the need, application, formulation and evaluation of solid dosage form such as tablets, tablet coating and capsules. |
| | **CO3:** Understand the formulation aspects and evaluation of disperse |

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| | system- emulsion, suspension and pharmaceutical aerosols. |
| | **CO4:** Understand and describe formulation and evaluation aspects of parenterals dosage form and ophthalmic preparations. |
| | **CO5:** Know the formulation and method of preparation of cosmetic. |
| | **CO6:** Know the Packaging material sciences. |
| **BP 503T Pharmacology-II** | **Students should be able to learn**<br>**CO1:** Understand the mechanism of drug action and its relevance in the treatment of different diseases. |
| | **CO2:** Demonstrate isolation of different organs/tissues from the laboratory animals by simulated experiments. |
| | **CO3:** Demonstrate the various receptor actions using isolated tissue preparation. |
| | **CO4:** Appreciate correlation of pharmacology with related medical sciences. |
| | **CO5:** Pharmacology of drugs acting on cardio vascular system, Pharmacology of drugs acting on cardio vascular system. |
| | **CO6:** Autacoids and related drugs, Pharmacology of drugs acting on endocrine system. |
| **BP504T Pharmacognosy and Phytochemistry** | **Students should be able to learn**<br>**CO1:** Know the modern extraction techniques, characterization and identification of the herbal drugs and phytoconstituents. |
| | **CO2:**Understand the preparation and development of herbal formu1ation. |
| | **CO3:** Understand the herbal drug interactions. |
| | **CO4:** Carryout isolation and identification of phytoconstituents. |
| | **CO5:** Metabolic pathways in higher plants and their determination. |
| | **CO6:** Industrial production, estimation and uti1ization of the phytoconstituents. |
| **BP 505T Pharmaceutical Jurisprudence** | **Students should be able to learn**<br>**CO1:** Learn Pharmaceutical legislations and their implications in the development and marketing of pharmaceuticals. |
| | **CO2:** Understand various Indian pharmaceutical Acts and Laws. |
| | **CO3:** Learn the knowledge on schedules and functioning of various committees in drug and cosmetics act and rules. |
| | **CO4:** Know the regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals. |
| | **CO5:** Impart basic knowledge on important legislations related to the profession of pharmacy in India. |
| | **CO6:** Understand the code of ethics during the pharmaceutical practice. |
| **BP506P Industrial Pharmacy-I** | **Students should be able to learn**<br>**CO1:** Perform Preformulation studies on paracetamol/asparin/or any other drug. |
| | **CO2:** Correct use of various equipment's in pharmaceutical laboratory relevant to tablets, caspsules and tablet coating. |
| | **CO3:** Preparation and evaluation of tablet, capsule, injection. |
| | **CO4:** Quality control test of various marketed formulations. |

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| | **CO5:** Evaluation of glass container. |
| **BP507P Pharmacology-II** | **Students should be able to learn**<br>**CO1:** Introduction to in-vitro pharmacology and physiological salt solutions. |
| | **CO2:** Effect of drugs on isolated tissue. |
| | **CO3:** Perform bioassay of drug by various method by interpolation, matching, three point bioassay. |
| | **CO4:** Effect of spasmogens and spasmolytics using rabbit jejunum. |
| **BP508P Pharmacognosy and Phytochemistry-II** | **Students should be able to learn**<br>**CO1:** Morphology, histology and powder characteristics & extraction & detection of drug. |
| | **CO2:** Exercise involving isolation & detection of active constituent. |
| | **CO3:** Detection of phytoconstituents by using chromatographic technique. |
| | **CO4:** Analysis of crude drugs by chemical tests. |
| **THIRD YEAR B. PHARMACY SEMESTER VI** | |
| **BP601T Medicinal Chemistry-III** | **Students should be able to learn**<br>**CO1:** Understand the importance of drug design and different techniques of drug design. |
| | **CO2:** Understand the chemistry of drugs with respect to their biological activity. |
| | **CO3:** Know the metabolism, adverse effects and therapeutic value of drugs. |
| | **CO4:** Know the importance of SAR of drugs. |
| | **CO5:** Physicochemical parameters used in quantitative structure activity relationship (QSAR) such as partition coefficient, Hammet's electronic parameter, Tafts steric parameter and Hansch analysis. |
| | **CO6:** Combinatorial Chemistry Concept and applications of combinatorial chemistry: solid phase and solution phase synthesis. |
| **BP602T Pharmacology** | **Students should be able to learn**<br>**CO1:** Subject is intended to impart the fundamental knowledge on various aspects. |
| | **CO2:** Understand the mechanism of drug action and its relevance in the treatment of different infectious diseases. |
| | **CO3:** Comprehend the principles of toxicology and treatment of various poisoning. |
| | **CO4:** Appreciate correlation of pharmacology with related medical sciences. |
| | **CO5:** Classification, mechanism of action, therapeutic effects, clinical uses, side effects and contraindications of drugs. |
| | **CO6:** Skillful handling operating of instrument, software and animal. |
| **BP603T Herbal Drug** | **Students should be able to learn**<br>**CO1:** Understand raw material as source of herbal drugs from cultivation to herbal drug product. |
| | **CO2:** Know the WHO and ICH guidelines for evaluation of herbal |

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| **Technology** | drugs. |
| | **CO3:** Know the herbal cosmetics, natural sweeteners, nutraceuticals. |
| | **CO4:** Appreciate patenting of herbal drugs, GMP. |
| | **CO5:** Know Indian Systems of medicine. |
| | **CO6:** Herbal-Drug and herb-Food Interactions. |
| **BP 604T Biopharmaceutics & Pharmacokinetics** | **Students should be able to learn**<br>**CO1:** Understand the basic concepts in biopharmaceutics and pharmacokinetics. |
| | **CO2:** Use of plasma drug concentration-time data to calculate the pharmacokinetic parameters to describe the kinetics of drug absorption, distribution, metabolism, excretion, elimination. |
| | **CO3:** To understand the concepts of bioavailability and bioequivalence of drug product & their significance. |
| | **CO4:** Understand various pharmacokinetic parameters, their significance & applications. |
| | **CO5:** To design of dose and dosage regimen and in solving the problems arised therein. |
| | **CO6:** To study kinetics of drug absorption, distribution, metabolism, excretion, elimination. |
| **BP 605T Pharmaceutical Biotechnology** | **Students should be able to learn**<br>**CO1:** Understanding the importance of Immobilized enzymes in Pharmaceutical Industries. |
| | **CO2:** Understand Genetic engineering applications in relation to production of pharmaceuticals. |
| | **CO3:** To know Importance of Monoclonal antibodies in Industries. |
| | **CO4:** To appreciate the use of microorganisms in fermentation technology Unit. |
| | **CO5:** Understand scientific application of biotechnology in the field of genetic engineering, medicine and fermentation technology. |
| | **CO6:** To know role of biotechnology in disease cure, production of transgenic plant. |
| **BP 606T Pharmaceutical Quality Assurance** | **Students should be able to learn**<br>**CO1:** Understand the cGMP aspects in a pharmaceutical industry. |
| | **CO2:** Appreciate the importance of documentation. |
| | **CO3:** Understand the scope of quality certifications applicable to pharmaceutical industries. |
| | **CO4:** Understand the responsibilities of QA & QC departments. |
| | **CO5:** Summarize pharmaceutical legal regulatory bodies. |
| | **CO6:** Elaborate on the role of validation in assurance of quality in pharmaceutical industry. |
| **BP607P Medicinal Chemistry-** | **Students should be able to learn**<br>**CO1:** Preparation of drugs and intermediates Sulphanilamide, 7-Hydroxy, 4-methyl coumarin, Chlorobutanol etc. |
| | **CO2:** Assay of drugs As Isonicotinic acid hydrazide, Chloroquine Metronidazole, Dapsone etc. |

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| **III** | **CO3:** Preparation of medicinally important compounds or intermediates by Microwave irradiation technique. |
| | **CO4:** Determination of physicochemical properties such as logP, clogP, MR, Molecular weight. |
| **BP608P Pharmacology-III** | **Students should be able to learn**<br>**CO1:** Dose calculation in pharmacological experiments**.** |
| | **CO2:** Antiallergic activity by mast cell stabilization assay. |
| | **CO3:** Study of effect of drugs on gastrointestinal motility. |
| | **CO4:** Effect of agonist and antagonists on guinea pig ileum. |
| **BP609P Herbal Drug Technology** | **Students should be able to learn**<br>**CO1:** To perform preliminary phytochemical screening of crude drugs. |
| | **CO2:** Determination of the alcohol content of Asava and Arista**.** |
| | **CO3:** Evaluation of excipients of natural origin. |
| | **CO4:** Incorporation of prepared and standardized extract in cosmetic formulations. |
| | **CO5:** Determination of Aldehyde content, Phenol content, total alkaloids. |
| **FINAL YEAR B. PHARMACY SEMESTER VII** | |
| **BP701T Instrumental Method of Analysis** | **Students should be able to learn**<br>**CO1:** Understand the interaction of matter with electromagnetic radiations and its applications in drug analysis. |
| | **CO2:** Understand the chromatographic separation and analysis of drugs. |
| | **CO3:** Perform quantitative & qualitative analysis of drugs using various analytical instruments. |
| | **CO4:** UV Visible spectroscopy, Fluorimetry, IR spectroscopy. |
| | **CO5:** Introduction to chromatography, Thin layer chromatography, Paper chromatography. |
| | **CO6:** Gas chromatography, High performance liquid chromatography (HPLC). |
| **BP 702 T Industrial Pharmacy-II** | **Students should be able to learn**<br>**CO1:** Know the process of pilot plant and scale up of pharmaceutical dosage forms. |
| | **CO2:** Understand the process of technology transfer from lab scale to commercial batch. |
| | **CO3:** Know different Laws and Acts that regulate pharmaceutical industry. |
| | **CO4:** Understand the approval process and regulatory requirements for drug products. |
| | **CO5:** Know the quality management system in pharmacy. |
| | **CO6:** Understand the responsibilities of Central Drug Standard Control Organization (CDSCO). |
| **BP703T** | **Students should be able to learn**<br>**CO1:** Know various drug distribution methods in a hospital. |
| | **CO2:** Appreciate the pharmacy stores management and inventory control. |

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| **Pharmacy Practice** | **CO3:** Monitor drug therapy of patient through medication chart review and clinical review. |
| | **CO4:** Obtain medication history interview and counsel the patients. |
| | **CO5:** Identify drug related problems. |
| | **CO6:** Detect and assess adverse drug reactions. |
| **BP704T**<br>**Novel Drug Delivery Systems** | **Students should be able to learn**<br>**CO1:** Explain the various approaches for development of novel drug delivery Systems. |
| | **CO2:** To understand various approaches for development of novel drug delivery systems. |
| | **CO3:** To understand the criteria for selection of drugs and polymers for the development of Novel drug delivery systems, their formulation and evaluation. |
| | **CO4:** To understand the criteria for selection of drugs and polymers for the development of Novel drug delivery systems, their formulation and evaluation like microencapsulation's, mucosal and implantable drug delivery systems. |
| | **CO5:** To understand the criteria for selection of drugs and polymers for the development of Novel drug delivery systems, their formulation and evaluation like Transdermal and nasopulmonary systems. |
| | **CO6:** To understand the criteria for selection of drugs and polymers for the development of Novel drug delivery systems, their formulation and evaluation like targeted drug delivery concepts. |
| | **CO7:** To understand the criteria for selection of drugs and polymers for the development of Novel drug delivery systems, their formulation and evaluation like Ocular and intrauterine Drug Delivery Systems. |
| | **CO8:** Enumerate the application of Dosage Forms for Personalized Medicine, Pharmacogenetics, Customized drug delivery systems, Bioelectronic Medicines, 3D printing of pharmaceuticals, and Telepharmacy. |
| | **CO9:** Identify the criteria for selection of drugs and polymers for the development of delivering system. |
| **BP705P**<br>**Instrumental Methods of Analysis** | **Students should be able to learn**<br>**CO1:** Determination of absorption maxima and effect of solvents on absorption maxima of organic compounds. |
| | **CO2:** Estimation of compound by Colorimetry, UV Spectroscopy, Fluorimetry. |
| | **CO3:** Separation of various constituent by Thin Layer Chromatography. |
| | **CO4:** Demonstration experiment on HPLC, Gas chromatography**.** |
| **BP706PS**<br>**Practice School** | **Students should be able to learn**<br>**CO1:** To prepare industry/profession/society ready students. |
| | **CO2:** Sufficient skills that help to get job placements. |
| | **CO3:** Build future ready leaders. |
| | **CO4:** It facilitates and promotes partnership and intellectual exchange between academia and industry. |
| | **CO5:** Fully prepared with core skills and additional soft skills. |

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| | **CO6:** Enable students to acquire learning by applying the knowledge and skills they possess, in unfamiliar, open-ended real-life situations. |
| **FINAL YEAR B. PHARMACY SEMESTER VIII** | |
| **BP801T Biostate And Research Methodology** | **Students should be able to learn**<br>**CO1:** Know the operation of M.S. Excel, SPSS, R and MINITAB ®. |
| | **CO2:** Know the various statistical techniques to solve statistical problems. |
| | **CO3:** Appreciate statistical techniques in solving the problems. |
| | **CO4:** DoE (Design of Experiment). |
| | **CO5:** Non Parametric tests, Introduction to Research, plagiarism Graphs, Counter Plot graph Designing the methodology. |
| | **CO6:** Regression modeling, Introduction to Practical components of Industrial and Clinical Trials Problems. |
| **BP 802T Social And Preventive Pharmacy** | **Students should be able to learn**<br>**CO1:** To know the number of health issues and their challenges. |
| | **CO2:** To introduce a number of national health programs. |
| | **CO3:** Student shall be able to acquire high consciousness/realization of current issues related to health and pharmaceutical problems within the country and worldwide |
| | **CO4:** To develop the critical way of thinking based on current healthcare development. |
| | **CO5:** To know the roles of the pharmacist. |
| | **CO6:** To Evaluate alternative ways of solving problems related to health and Pharmaceutical issues. |
| **BP804ET Pharmaceutical Regulatory Science** | **Students should be able to learn**<br>**CO1:** Know about the process of drug discovery and development. |
| | **CO2:** Know the regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals. |
| | **CO3:** Know the regulatory approval process and their registration in Indian and international markets. |
| | **CO4:** Know the process of NDA and ANDA. |
| | **CO5:** Know how to prepare technical documentation. |
| | **CO6:** Know how to prepare clinical trial protocols. |
| **BP806ET Quality Control and Standardization of Herbals** | **Students should be able to learn**<br>**CO1:** Know WHO guidelines for quality control of herbal drugs. |
| | **CO2:** Know Quality assurance in herbal drug industry. |
| | **CO3:** Know the regulatory approval process and their registration in Indian and international markets. |
| | **CO4:** Appreciate EU and ICH guidelines for quality control of herbal drugs. |
| | **CO5:** Study Research Guidelines for Evaluating the Safety and Efficacy of Herbal Medicines. |
| | **CO6:** Preparation of documents for new drug application and export registration. |
| | **Students should be able to learn** |

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| **BP813PW**<br>**Project Work** | **CO1:** Study Research methodology. |
| | **CO2:** Design Plan of work and its implementations. |
| | **CO3:** Learn about Literature Survey. |
| | **CO4:** Study different Experimental methods. |
| | **CO5:** Learn different Referencing style. |
| | **CO6:** Learn about Technical report writing. |

**Course Outcome M. Pharm Pharmaceutics PCI Syllabus (2017)**

| Course Code /Course Name | Course Outcome |
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| **FIRST YEAR M. PHARMACY SEMESTER I** | |
| **MPH101T Instrumental Analysis** | **Students should be able to learn**<br>**CO1:** Chemical and excipient. |
| | **CO2:** The analysis of various drug in single or combination of dosage form. |
| | **CO3:** Theoretical and Practical skill of instrumentation |
| | **CO4:** Instrumental details of NMR, Mass spectroscopy, IR, HPLC, GC. |
| | **CO5:** Identification, characterization, and quantification of drug. |
| | **CO6:** Comparing various method of analysis and their outcomes such as RIA, ELISA, Bioluminescence assay. |
| **MPH102T Drug Delivery System** | **Students should be able to learn**<br>**CO1:** The various approaches for the development of novel drug delivery system**.** |
| | **CO2:** Criteria for selection of drug and polymers for development of delivering system. |
| | **CO3:** Formulation and evaluation of novel drug delivery system. |
| **MPH103T Modern Pharmaceutics** | **Students should be able to learn**<br>**CO1:** The elements of preformulation studies. |
| | **CO2:** The active pharmaceutical ingredient and genetic drug product development. |
| | **CO3:** Industrial management and GMP Consideration. |
| | **CO4:** Optimization technique and pilot plant scale up techniques. |
| | **CO5:** Stability testing, sterilization process and packaging of dosage form. |
| **MPH104T Regulatory Affairs** | **Students should be able to learn**<br>**CO1:** The concept of innovators and generic drug development process. |
| | **CO2:** The regulatory guidelines for filling and approval process. |
| | **CO3:** Preparation of dossiers and their submission to regulatory agencies in different countries. |
| | **CO4:** Post approval of regulatory requirement for actives and drug product. |
| | **CO5:** Clinical trial requirement for approval for conducting clinical trails. |
| | **CO6:** Pharmacovigilence and process of monitoring in clinical trials. |
| **MPH 105P Pharmaceutics Practical** | **Students should be able to learn**<br>**CO1:** Perform in-vitro dissolution of CR/SR marketed formulation. |
| | **CO2:** Explain experiment base on gas chromatography. |
| | **CO3:** Understanding simultaneous estimation of multi-component containing formulation by UV spectrophotometer. |

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| | **CO4:** To study effect of particle size on dissolution of tablet. |
| | **CO5:** To study effect of tablet compression on tablet disintegration. |
| **FIRST YEAR M. PHARMACY SEMESTER II** | |
| **MPH 201T Molecular Pharmaceutics** | **Student should able to learn**<br>**CO1:** The various approaches for development of novel drug delivery systems. |
| | **CO2:** The criteria for selection of drugs and polymers for the development of NDDS. |
| | **CO3:** The formulation and evaluation of novel drug delivery systems. |
| **MPH 202T Advanced Biopharmaceutics & Pharmacokinetics** | **Students should be able to learn**<br>**CO1:** The basic concepts in biopharmaceutics and pharmacokinetics. |
| | **CO2:** The use raw data and derive the pharmacokinetic models and parameters the best describe the process of drug absorption, distribution, metabolism and elimination. |
| | **CO3:** The critical evaluation of biopharmaceutic studies involving drug product equivalency. |
| | **CO4:** The design and evaluation of dosage regimens of the drugs using pharmacokinetic and biopharmaceutic parameters. |
| | **CO5:** The potential clinical pharmacokinetic problems and application of basics of pharmacokinetic. |
| **MPH 203T Computer Aided Drug Development** | **Students should be able to learn**<br>**CO1:** History of Computers in Pharmaceutical Research and Development. |
| | **CO2:** Computational Modeling of Drug Disposition. |
| | **CO3:** Computers in Preclinical Development. |
| | **CO4:** Computers in Market Analysis. |
| | **CO5:** Computers in Clinical Development. |
| | **CO6:** Artificial Intelligence (AI) and Robotics. |
| | **CO7:** Computational fluid dynamics (CFD). |
| | **CO8:** Optimization Techniques in Pharmaceutical Formulation. |
| **MPH 204T Cosmetics and Cosmeceuticals** | **Students should be able to learn**<br>**CO1:** Key ingredients used in cosmetics and cosmeceutical's. |
| | **CO2:** Key building blocks for various formulations. |
| | **CO3:** Current technologies in the market. |
| | **CO4:** Various key ingredients and basic science to develop cosmetics and cosmeceuticals. |
| | **CO5:** Scientific knowledge to develop cosmetics and cosmeceuticals with desired Safety, stability, and efficacy. |
| **MPH 205P Pharmaceutics Practical II** | **Students should be able to learn**<br>**CO1:** To study the effect of tempreture change, non solvent addition incompatible polymer addition in microcapsule preparation. |
| | **CO2:** Understand the protein binding studies in highly protein bound drug and poorly bound protein drug. |
| | **CO3:** Develop a clinical data collection manual. |

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| | **CO4:** Explain computational modeling of drug deposition. |

**Course Outcome M. Pharm Pharmacognosy PCI Syllabus (2017)**

| Course Code /Course Name | Course Outcome |
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| **FIRST YEAR M. PHARMACY SEMESTER I** | |
| **MPG 101T Instrumental Analysis** | **Students should be able to learn**<br>**CO1:** Chemical and excipient. |
| | **CO2:** The analysis of various drug in single or combination of dosage form. |
| | **CO3:** Theoretical and Practical skill of Instrumentation. |
| | **CO4:** Instrumental details of NMR, Mass spectroscopy, IR, HPLC, GC. |
| | **CO5:** Identification, characterization, and quantification of drug. |
| **MPG 102T Advanced Pharmacognosy-I** | **Students should be able to learn**<br>**CO1:** Advances in the cultivation and production of drugs. |
| | **CO2:** Various phyto-pharmaceuticals and their source, its utilization and medicinal value. |
| | **CO3:** Various nutraceuticals/herbs and their health benefits. |
| | **CO4:** Drugs of marine origin. |
| | **CO5:** Pharmacovigilance of drugs of natural origin. |
| **MPG 103T Phytochemistry** | **Students should be able to learn**<br>**CO1:** Different classes of phytoconstituents, their biosynthetic pathways, their properties, extraction and general process of natural product drug discovery. |
| | **CO2:** Phytochemical fingerprinting and structure elucidation of phytoconstituents. |
| | **CO3:** Drug discovery and development herbs as source of drugs and drug discovery, structure development, clinical trails. |
| | **CO4:** Extraction and phytochemical studies and recent advances in this process. |
| **MPG 104T Industrial Pharmacognostical Technology** | **Students should be able to learn**<br>**CO1:** The requirements for setting up the herbal/natural drug industry. |
| | **CO2:** The guidelines for quality of herbal/natural medicines and regulatory issues. |
| | **CO3:** The patenting/IPR of herbals/natural drugs and trade of raw and finished materials. |
| **MPG 105P Pharmacognosy** | **Students should be able to learn**<br>**CO1:**Understand & explain the standardization of phytopharmaceuticals by various analytical techniques like UV spectroscopy, Gas chromatography, Flame photometry, etc. |
| | **CO2:** Elaborate development of fingerprint of plant extracts of industrial utility. |
| | **CO3:** Prepare & evaluate various herbal dosage forms including monograph analysis of clove & castor oil. |
| **FIRST YEAR M. PHARMACY SEMESTER II** | |

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| **MPG 201T Medicinal Plant Biotechnology** | **Students should be able to learn**<br>**CO1:** Know the process like genetic engineering in medicinal plants for higher yield of Phytopharmaceuticals. |
| | **CO2:** Use the biotechnological techniques for obtaining and improving the quality of natural products/medicinal plants. |
| | **CO3:** Fermentation technology. |
| | **CO4:** Biotransformation and Transgenesis. |
| **MPG 202T Advanced Pharmacognosy-II** | **Students should be able to learn**<br>**CO1:** Validation of herbal remedies. |
| | **CO2:** Methods of detection of adulteration and evaluation techniques for the herbal drug. |
| | **CO3:** Methods of screening of herbals for various biological properties. |
| | **CO4:** Ethnopharmacology and Ethnobotany in herbal drug evaluation. |
| | **CO5:** Analytical Profiles of herbal drugs. |
| **MPG 203T Indian Systems of Medicine** | **Students should be able to learn**<br>**CO1:** To understand the basic principles of various Indian systems of medicine. |
| | **CO2:** To know the clinical research of traditional medicines, Current Good Manufacturing Practice of Indian systems of medicine and their formulations. |
| | **CO3:** Formulation development of various systems of medicine. |
| | **CO4:** Schedule T – Good Manufacturing Practice of Indian systems of medicine. |
| | **CO5:** TKDL, Geographical indication Bill. |
| **MPG 204T Herbal Cosmetics** | **Students should be able to learn**<br>**CO1:** Understand the basic principles of various herbal/natural cosmetic preparations. |
| | **CO2:** Current Good Manufacturing Practices of herbal/natural cosmetics as per the regulatory authorities. |
| | **CO3:** Formulation and evaluation of Cosmeceuticals of herbal and natural origin. |
| | **CO4:** Preparation and standardization of Tonic, Bleaches, Dentifrices, and Mouthwashes & Tooth Pastes, Cosmetics for Nails. |
| **MPG 205P Herbal Cosmetics** | **Students should be able to learn**<br>**CO1:** Prepare & evaluate Ayurvedic, Siddha, Homeopathy, Unani, Herbal medicinal and cosmetic formulations. |
| | **CO2:** Conduct evaluation of crude drugs by physicochemical parameters. |
| | **CO3:** Discuss various plant tissue culture techniques. |
| | **CO4:** Able to handle various equipments as per SOPs & learnvarious demonstrations (of experiments). |

| SECOND YEAR M. PHARMACY SEMESTER III | |
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| **MRM 301T**<br>**Research Methodology & Biostatistics** | **Students should be able to learn**<br>**CO1:** General Research Methodology. |
| | **CO2:** Biostatistics: Definition, application, sample size, type of significance tests, parametric tests (students "t" test, ANOVA, Correlation coefficient, regression). |
| | **CO3:** Medical Research. |
| | **CO4:** CPCSEA guidelines for laboratory animal facility. |
| | **CO5:** Declaration of Helsinki. |