

1.1.1. CO-PO of all Programs
 ADDITIONAL INFORMATION

Programme Outcomes : UG Pharmacy		
PO	Key Concept	Explanation
PO1	Pharmacy Knowledge	Acquire knowledge and gain understanding of the fundamental concepts and information related to the field of pharmacy as well as pharmaceutical sciences along with biological sciences, behavioral, social, and administrative aspects of the field. And have a sound knowledge of manufacturing techniques in relation to pharmaceutical and biotechnological products.
PO2	Planning Abilities	Exhibit a strong organizational, time, and resource management skills, along with execution ability. Learn and develop proper planning of events in accordance to scheduled time frame to meet targets.
PO3	Problem analysis	Practice analytical, clear and critical thought as espoused by the scientific method, in all of day-to-day with problem-solving attitude and decision-making. Locate, assess, and use relevant data to create well-informed, defensible conclusions.
PO4	Modern tool usage	Acquire knowledge and skill with, a variety of contemporary computing tools relevant to the pharmacy profession; learn how to use these tools effectively; and do so while being aware of their limitations.
PO5	Leadership skills	Learn planning modifications necessary to fulfil practise, professional, and societal duties, taking into account the human reaction to change, motivation concerns, leadership, and team-building. Participate as responsible citizens and take up leadership responsibilities as needed to promote health and well-being
PO6	Professional Identity	Realize, assess and share the significance of their professional activities and works for the benefit of the community either as first line health care professionals, educators, managers, entrepreneur.
PO7	Pharmaceutical Ethics	Respect the core values and put ethics

		into practise in all spheres of life. Try to understand and respect differences in values, communication styles and ways of life as they exist across cultures. Leverage ethical principles and frameworks in decision-making and accept personal accountability for the results.
PO8	Communication	Exhibit strong verbal and nonverbal communication skills with patients, coworkers and the public including the ability to understand and write clear reports, create clear presentations and documentation while giving and receiving instructions.
PO9	The Pharmacist and society	Use rationale information by context knowledge in order to evaluate societal, health, safety, legal and professional pharmacy practise issues along with associated responsibilities.
PO10	Environment and sustainability	Learn how professional pharmacy practices will affect larger communities and ecosystems. And at the same time learn to value sustainable practices.
PO11	Life-long learning	Understand the importance of and be prepared for self and lifelong learning in the fullest sense of technological development. Use self-evaluation and other people's feedback for the advantage to pinpoint one's own learning needs and continually meet them.

B. Pharm Programme			
Course Outcomes			
<i>Course of the Study First Semester</i>			
Sl. No	Course code	Name of the Course	Course Outcomes
1	BP101T and BP107P	Human Anatomy and Physiology I (Theory)	1. The students will be able to learn the concepts of anatomy and physiology. 2. Able to identify and learn the techniques that will enable them to differentiate between the various organ and organ systems along with hands on training to the structure of each organ and organ system. 3. Know about the new terminologies about the physiological aspect of the functioning of the organ system and test to detect the same.

2	BP102T and BP108P	Pharmaceutical Analysis I (Theory)	<ol style="list-style-type: none"> 1. The students shall be able to understand the various analytical techniques and related concepts. 2. Students shall able to understand the principles of volumetric and electro chemical analysis. 3. To carryout various volumetric and electrochemical titrations. 4. Get hands on training with respect to standardization of various solutions and also calibration & validation of various apparatus, equipment. 5. To develop analytical skills, assay, standardization of titrants.
3	BP103T and BP109P	Pharmaceutics I (Theory)	<ol style="list-style-type: none"> 1. Historical background and development of profession of pharmacy 2. To gain fundamental knowledge on the preparatory pharmacy with arts and science of preparing the different conventional dosage forms. 3. Learn about the dispensing process in relation to health care system and management. 4. Learn about the procedures involved in formulation of dosage forms and their route of administration. 5. Understand the basics of different dosage forms, pharmaceutical incompatibilities and pharmaceutical calculations
4	BP104T and BP110P	Pharmaceutical Inorganic Chemistry (Theory)	<ol style="list-style-type: none"> 1. To know the sources of impurities and methods to determine the impurities in inorganic drugs and pharmaceuticals 2. To understand the medicinal and pharmaceutical importance of inorganic compounds. 3. To understand the uses and precautions of various radio active pharmaceuticals.
5	BP105T and BP111P	Communication skills – Theory *	<ol style="list-style-type: none"> 1. The student get acquainted with the sounds of English in a nutshell. 2. Obtain practical idea about usage of grammar in meaningful contexts. 3. Develop good calibre in spoken English. 4. Learn about writing applications,

			request letters etc. 5. Get hands on training for proper body language while delivering contents and presentation.
6	BP106RBT and BP112RBP	Remedial Biology - Theory*	1. Learn about the morphological and anatomical features of plants. 2. Able to identify various plants and animals with respect to their nomenclature. 3. Able to get knowledge about the arthropods and their useful and harmful association with the plants and animals. 4. Gain expertise about microscopic examination of the various plant parts.
7	BP106RMT	Remedial Mathematics - Theory*	1. Learn about algebraic, geometric and trigonometric calculations. 2. Get acquainted with the calculations of statistics and learn about the analytical aspect of the same. 3. Learn calculations to evaluate the raw data and analyze the same along with pharmaceutical applications.
Course of Study Second Semester			
8	BP201T and BP207P	Human Anatomy and Physiology II - Theory	1. The students will be able to learn the molecular concepts of anatomy and physiology. 2. Able to identify and learn the techniques that will enable them to differentiate between the various organ, organ systems along with hands on training to the structure of each organ and organ system including vascular systems. 3. Know about the new terminologies about the physiological aspect of the functioning of the organ system and test to detect the same.
9	BP202T and BP208P	Pharmaceutical Organic Chemistry I - Theory	1. Students will be able to explain the atomic molecular structure, chemical bonding and physicochemical properties of substance. 2. Hands on training about the concepts and results of laboratory experiments in relation to physicochemical properties of organic chemical substance can be gained. 3. Understand the various type of

			<p>organic reaction and their mechanism.</p> <p>4. Learn the techniques for the preparation and property of alkanes, cycloalkynes, alkenes, alkynes, haloalkanes, alcohol, ethers amine etc.</p> <p>5. Gain knowledge and expertise on determination of melting point and boiling point. of various chemical entities.</p>
10	BP203T and BP209P	Biochemistry Theory –	<p>1. Learn about the various biochemical pathways in relation to cellular transport and cellular mechanisms.</p> <p>2. Understand the working and function of enzyme & co-enzymes.</p> <p>3. Gain knowledge about the carbohydrate, lipid and protein along with their metabolism process.</p> <p>4. Learn about the signalling of synthesis of protein and nucleic acid.</p> <p>5. Learn about the various methods of preparation and evaluation of different biochemical and bio fluids.</p> <p>6. Learn about blood and blood products along with its composition and limits.</p> <p>7. Students shall get practical knowledge on qualitative and quantitative tests carbohydrates (glucose, fructose, maltose, sucrose and starch), proteins, creatinine, cholesterol and other biochemical tests.</p>
11	BP204T	Pathophysiology Theory –	<p>1. Get acquainted with the basic principles of Cell injury and adaptation.</p> <p>2. Learn about various chemical mediators and the mechanism involved in process of inflammation</p> <p>3. Gain knowledge about the pathophysiology of common diseases.</p>
12	BP205T and BP210P	Computer Applications in Pharmacy – Theory *	<p>1. Learn about the fundamentals of Computer's history, hardware, networking, numbering and</p>

			<p>software.</p> <ol style="list-style-type: none"> 2. Understand about the application of computer in pharmaceuticals research and development along with computational knowledge. 3. Gain hands on expertise about various operating system like dos, windows, Linux, file manipulations and maintenance. 4. Know programming language and data integrity process to be able to handle internet, email and search engine.
13	BP206T	Environmental sciences – Theory *	<ol style="list-style-type: none"> 1. Gain knowledge about the ecological concept and natural resource. 2. Learn about the water pollution and methods of waste water treatment. 3. Gain hands on expertise about the techniques involved in solid waste management, hazards management along with air pollution and noise pollution. 4. Gain expertise about the ways and techniques to minimize waste and also learn about the ways to dispose them off. 5. Learn about the methods of environment impact and its assessment.
<i>Course of Study Third Semester</i>			
14	BP301T and BP305P	Pharmaceutical Organic Chemistry II – Theory	<ol style="list-style-type: none"> 1. Students should able to explain basic concepts of Stereo- chemistry and its application. 2. To learn and practice general methods of preparation of organic compounds. 3. To understand the basic concepts of aromaticity, aromatic compounds, preparations and uses. 4. Learn about the nucleophilic aromatics substitution reactions. 5. Students shall acquire basic laboratory techniques for purification of organic compounds and preparation of organic compounds.
15	BP302T and BP306P	Physical Pharmaceutics I – Theory	<ol style="list-style-type: none"> 1. Learn about solubility of drugs and factors affecting solubility phenomena, the theories of matter

			<p>and its application in dosage forms design.</p> <ol style="list-style-type: none"> 2. Understand the phase diagrams and its implementation practically in various chemical reactions. Also learn about the thermodynamics and its application. 3. Gain experiential knowledge about preparation of buffers and various physiologic fluids needed for drug analysis in-vitro and in-vivo. 4. Learn to select about various complexation reactions and its pharmaceutical and toxicological applications and significance and kinetics of drug protein binding.
16	BP303T and BP307P	Pharmaceutical Microbiology Theory	<p>Students will learn about:</p> <ol style="list-style-type: none"> 1. The history and scope of microbiology as well as its influence on mankind in particular reference to medicine and pharmacy. 2. The classification and taxonomy of microbes. 3. The basics regarding bacteria, fungi and virus. 4. Various strains of microbes and its isolation, identification, preservation and culturing. 5. Growth, control of microbes by physical and chemical method. 6. Antibiotic action in minimal dose values on microbes through zone of inhibition studies. 7. Learn about the preparation of various nutrient media for microbial growth and sterilization method. 8. Antiseptics and disinfectants 9. The sterility test for microbes and microbial assay of antibiotic and vitamins. 10. Aseptic area and its design 11. Preservatives
17	BP304T and BP308P	Pharmaceutical Engineering Theory	<ol style="list-style-type: none"> 1. Understand the concept of fluid flow, measurement of flow, Newtonian and non Newtonian flow along with thixotrophy and pressure. 2. Learn the basic concept of

			<p>humidification and its control and their application in pharmaceutical manufacturing as well as pharmacy.</p> <p>3. Learn about the material handling system like liquid, solid & gas handling and differentiate them from hazard chemicals .</p> <p>4. Learn the concept and principles of centrifugation and how it affects the final product with special reference to transport.</p> <p>5. Gain hands on expertise on Crystallization method of super saturation theory, drying, filtration and limitations of each</p> <p>6. Learn about the fire and industrial hazards and safety precautions thereof.</p>
Course of Study Fourth Semester			
18	BP401T	Pharmaceutical Organic Chemistry III– Theory	<p>1. To learn rule for the nomenclature of hetero-cyclic compounds, methods of preparation and uses.</p> <p>2. To study important organic reaction and their mechanisms.</p>
19	BP402T and BP406P	Medicinal Chemistry I – Theory	<p>1. To understand the chemistry of drugs with respect to their pharmacological activity</p> <p>2. To understand the drug metabolic pathways, adverse effect and therapeutic value of Drugs</p> <p>3. To know the Structural Activity Relationship (SAR) of different class of drugs</p> <p>1.4. To write the chemical synthesis of some drugs</p>
20	BP403T and BP407P	Physical Pharmaceutics II – Theory	<p>1. Understand various physicochemical properties of drug molecules in the designing the dosage forms</p> <p>2. Know the principles of chemical kinetics & to use them for stability testing and determination of expiry date of formulations</p> <p>3. Demonstrate use of physicochemical properties in the formulation development and evaluation of dosage forms.</p> <p>4. Understand the concept of the colloidal dispersion systems and biphasic liquid systems.</p>

			<p>5. Learn about the process for determination of half-life and rate of reactions.</p> <p>6. Students will be enabled with experiential learning about the method of solubility expression and determination.</p> <p>1. Understand the concepts associated with complexes, their method of preparations, analysis and application.</p>
21	BP404T and BP408P	Pharmacology I – Theory	<p>1. Learn about the basic concepts of about the route of administration, mechanism of action and combined effect of drugs.</p> <p>2. Understand the pharmacokinetic and pharmacodynamic behaviour of the drugs.</p> <p>3. Classify the drugs according to their class, category & action of drugs acting on nervous system.</p> <p>4. Gain hands on training for the preparation of different solution for in-vivo study.</p> <p>5. Gain hands on training about the screening methods and procedures thereof for different drugs in animal model.</p>
22	BP405T and BP409P	Pharmacognosy and Phytochemistry I – Theory	<p>Students will learn about:</p> <p>1. Crude drugs their source and classification.</p> <p>2. Process of extraction, isolation and chemical test of alkaloids.</p> <p>3. The holistic concept of traditional medicine.</p> <p>4. Get idea about adulteration of crude drugs.</p> <p>5. Learn the importance of few phytochemical constituents their utility and limitations along with the general steps for evaluation and standardization.</p> <p>6. Biological source cultivation, collection, chemical constituents, macro and microscopic features of various crude drugs containing carbohydrates, lipids, proteins and enzymes.</p> <p>7. Introduction, classification, identification, chemistry including</p>

			<p>pharmacological properties of some secondary metabolites.</p> <p>8. Factors influencing production of medicinal plants and secondary metabolites.</p> <p>9. Tissue culture and its application in production of natural medicinal compounds.</p> <p>10. Conservation of medicinal plants</p> <p>11. Plant teratogens</p> <p>12. Edible vaccines</p> <p>13. Natural fibers</p> <p>14. Plant hallucinogenic agents.</p>
Course of Study Fifth Semester			
23	BP501T	Medicinal Chemistry II – Theory	<p>1.To understand the chemistry of drugs with respect to their pharmacological activity.</p> <p>2. To understand the chemistry of chemotherapeutic agents, uses mechanism of action and adverse reactions of anticancer agents.</p> <p>3. To understand the drug metabolic pathways, adverse effect and therapeutic value of drugs</p> <p>4. To know the Structural Activity Relationship of different class of drugs</p> <p>1. 5. To study the chemical synthesis of selected drugs</p>
24	BP502T and BP506P	Industrial Pharmacy I– Theory	<p>1. Know the various pharmaceutical dosage forms and their manufacturing techniques.</p> <p>2. Understand the concept of preformulation studies and its practical implementation in dosage form design.</p> <p>3. Gain hands on training for manufacturing of various pharmaceutical dosage forms like tablets, capsules, ointments, syrups, suspension, emulsion, parenterals, ophthalmics etc.</p> <p>4. Learn about the quality control of various pharmaceutical dosage forms.</p> <p>5. Learn about the usage, utility and application of aerosol products along with their advantages and</p>

			limitations.
25	BP503T and BP507P	Pharmacology II – Theory	<p>Students will learn about:</p> <ol style="list-style-type: none"> 1. Study of biogenetic pathways for phytoconstituents. 2. Investigation technique of the biogenetic pathways through various methods. 3. Industrial production and utilisation of some important phytoconstituents. 4. Extraction, isolation and analysis of phytoconstituents by modern analytical techniques. 5. Biological sources, chemical constituents including phytochemistry and uses of various secondary phytoconstituents.
26	BP504T and BP508P	Pharmacognosy and Phytochemistry II– Theory	<ol style="list-style-type: none"> 1. The contents of this course deals with the recent advances related to Herbal Medicines where a student will gain experiential learning about the herbs and their use as medicinal products . 2. Students will be able to classify Medicinal Plants in relation to phyto constituents. 3. Students will be accustomed and gain expertise on identification of carbs, lipids, terpenes, polyphenols, alkaloidal drugs isolated from plant sources. 4. They will learn about the ways how a herb influence the body physiology in humans and how these agents will be helpful against several disorders. 5. Learn about the relation between phyto constituents and their effects on the physiology of geriatrics, pediatrics along with designing products for these category of patients. 6. Read and understand the concepts described in Materia Medica. 7. Gain expert ideas on drug adulteration and methods to avoid the same. 8. Learn about the DNA finger

			printing as well as relation between Ethnobotany and Ethnopharmacology in drug discovery process.
27	BP505T	Pharmaceutical Jurisprudence Theory	<ol style="list-style-type: none"> 1. Understand the concepts and functioning of various statutory bodies and their recommendations along with pharmaceutical legislation. 2. Learn and work according to the code of Pharmaceutical ethics as a professional 3. Know various acts, schedules and rules used to control the manufacturing distribution, uses of pharmaceutical product. 4. Learn about the special acts like Drug and Cosmetics Act, MTP Act, Narcotics Act, DPCO, Prevention of Cruelty to Animals Act/Rules 1960, Drugs and Magic Remedies Act/Rules, Medicinal and Toilet preparation Act 1955, Factories Act etc. Along with the influence of these acts in professional execution. 5. Have an idea about the various act that control pharmaceutical education and regulation.
<i>Course of Study Sixth Semester</i>			
28	BP601T and BP607P	Medicinal Chemistry III – Theory	<ol style="list-style-type: none"> 1. To understand the importance of antibiotics, antimicrobial agents, anti fungal, antiviral etc, uses, adverse reactions and spectrum of activities. 2. To know the importance of SAR of drugs. 3. To know the metabolism, adverse effects and therapeutic value of drugs. 4. To understand the importance of drug design and different techniques of drug design.
29	BP602T and BP608P	Pharmacology III – Theory	<ol style="list-style-type: none"> 1. Students will be able to learn about the drugs acting on the GIT, endocrine system. 2. They will get idea about drugs and their influence on the endocrine system 3. Learn about the general concept of carcinoma, related chemotherapy and limitation of chemo administration.

			<p>4. Learn to check and screen the toxicological effect of chemicals.</p> <p>5. Know about Chrono-pharmacology.</p>
30	BP603T and BP609P	Herbal Drug Technology – Theory	<p>Students will learn about:</p> <ol style="list-style-type: none"> 1. Herbal drugs. 2. Techniques on standardization of herbal drug. 3. Experiential knowledge about process to formulation and standardisation of new herbal formulation as per ayurvedic pharmacopoeia. 4. Learn about the quality control test for herbal drugs. 5. Biodynamic Agriculture: Good agricultural practices in cultivation of medicinal plants including Organic farming, pest and pest management in medicinal plants 6. Nutraceuticals
31	BP604T	Biopharmaceutics and Pharmacokinetics – Theory	<ol style="list-style-type: none"> 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.
32	BP605T	Pharmaceutical Biotechnology – Theory	<p>Students will learn about:</p> <ol style="list-style-type: none"> 1. Basic concepts, history of evolution of pharmaceutical biotechnology 2. Antigen-anti body reactions and their influence on human immune system. 3. Preparation and standardisation of immunological preparation, their storage and distribution procedure. 4. Blood products: production and

			<p>applications.</p> <ol style="list-style-type: none"> 5. The basic concepts and chemistry of nucleic acids, DNA, RNA, protein synthesis. 6. Recombinant DNA technology 7. RTPCR: Principle and applications. 8. Immobilised enzyme technology: Production and applications. 9. Monoclonal anti-bodies: production and their applications. 10. Fermentation technique and method for industrial production of some pharmaceutically important compounds through fermentation. 11. Biochemical conversion and methods including applications in production of some pharmaceutically important compounds. 12. Herbal-Drug and Herb-Food Interactions 13. Herbal cosmetics 14. Herbal excipients
33	BP606T	Quality Assurance – Theory	<ol style="list-style-type: none"> 1. Learn about the various concepts of quality assurance. 2. Gain knowledge about various regulatory aspects of GMP, cGMP etc. 3. Learn about various validation techniques, calibration and adherence to quality assurance. 4. Learn about the concepts of TQM. IPR. ISO, SOP and other regulations. 5. Design and develop the stability testing protocol for drugs.
<i>Course of Study Seventh Semester</i>			
34	BP701T and BP705P	Instrumental Methods of Analysis – Theory	<ol style="list-style-type: none"> 1. To study interaction of matter with electromagnetic radiations and its applications in drug analysis, interpretation thereof. 2. To gain basic knowledge about the chromatographic separation techniques and analysis of drugs. 3. To obtain hands on training for quantitative & qualitative analysis of drugs using various analytical instruments.

35	BP702T	Industrial PharmacyII – Theory	<ol style="list-style-type: none"> 1.Focus based learning on the advance concepts the various pharmaceutical dosage forms design and development. 2.Learn about real time industrial functionalities.
36	BP703T	Pharmacy Practice – Theory	<ol style="list-style-type: none"> 1.Learn about the rational use of drugs. 2.Understand and gain idea about pharmacoeconomics and its influence in health care management. 3.Obtain idea about drug information center and its working. 4.Understand the health policies that are to be adhered. 5. Learn computational analysis about patient history and therapeutic management.
37	BP704T	Novel Drug Delivery System – Theory	<ol style="list-style-type: none"> 1.Understand ddevelopment of novel drug delivery systems. 2.To learn about the criteria for selection of drugs, polymers and additives for the development of Novel drug delivery systems and its evaluation thereof.
38	BP706PS	Practice School*	<ol style="list-style-type: none"> 1. The students will be able to acquire knowledge and advance terminologies based on their choice of school. 2. Gain hands on training on the practical aspects of various schools of choice like (in school of OSD, TDDS, micro encapsulation, novel drug delivery system etc., they will learn all aspects of in relation to respective schools including its formulation and evaluation similarly in school of Validation, phytochemicals etc they will learn the practical applicability of each school. Under school of herbal drugs they will learn the aspects of advancement related to herbal drug,under school of pharmacological screening methods learn about practicals aspects of the drug screening and therapeutic benefit establishment process etc. Same way under school of chemistry they learn about over all synthetic

			procedures involved in synthesis of drug products etc., there are other schools that contribute to the practical learning and hands on training that will benefit a student to face the challenging aspects of any professional work outs.
Course of Study Eighth Semester			
38	BP801T	Biostatistics and Research Methodology	<ol style="list-style-type: none"> 1. Students shall able to know the operation of M.S. Excel, SPSS, R and MINITAB®, DoE (Design of Experiment). 2. To know the various statistical techniques to solve statistical problems. 3. To learn statistical techniques in solving the research problems.
39	BP802T	Social and Preventive Pharmacy	<ol style="list-style-type: none"> 1. Develop a strong awareness of current issues surrounding medical and pharmaceutical difficulties in the nation and around the world. 2. Develop ability to think critically based on recent advancements in healthcare. 3. Develop approaches to resolving concerns with health and pharmaceuticals.
40	BP803T	Pharma Marketing Management	<ol style="list-style-type: none"> 1. Gain knowledge about requirement of planning, organizing, staffing and controlling. 2. Learn about concepts of management in accordance to various areas. 3. Develop leadership skills. 4. Learn the basic concepts of accounting and process to enter details in ledger posting, book entry & preparation of balance sheets etc. 5. Learn how economics is influenced with market demand and supply. 6. Know the various modes of marketing with adherence to salesmanship and its ethics also develop plans to carry out market research. 7. Learn about budget preparation and the process of inventory control and maintenance.

41	BP804T	Pharmaceutical Regulatory Science	<ol style="list-style-type: none"> 1. Gain knowledge of the process used in drug development and discovery. 2. Get familiar with the regulatory bodies and organizations that oversee the production and distribution of medications, cosmetics and pharmaceuticals . 3. Learn how to register for both Indian and international markets and the regulatory clearance process.
42	BP806T	Quality Control and Standardization of Herbals	<p>Students will learn about:</p> <ol style="list-style-type: none"> 1. Various aspects of WHO guideline for quality analysis of herbal drugs. 2. Regulations and quality assurance of herbal products. 3. Regulatory approval process and their registration in both Indian and international markets in accordance with EU and ICH guidelines for quality control of herbal drugs. 4. Research guidelines for Evaluating the Safety and Efficacy of Herbal Medicines. 5. Evaluation of commercial crude drugs intended for use 6. Quality assurance in herbal drug industry of cGMP, GAP, GMP and GLP in traditional system of medicine. 7. Stability testing of herbal medicines. 8. Application of various chromatographic techniques in standardization of herbal products. 9. Preparation of documents for new drug application and export registration. 10. Role of chemical and biological markers in standardization of herbal products.
43	BP809T	Cosmetic Science	<ol style="list-style-type: none"> 1. Gain idea about cosmetic formulations and adherence to regulations while formulating such products 2. Differentiate between

			<p>pharmaceuticals and cosmetics as well as learn about the products that can be part of Indian market and the one that cannot be.</p> <p>3. Learn about the quality control tests for cosmetic products.</p> <p>4. Gain expertise in developing new and advance cosmetic products.</p>
44	BP811T	Advanced Instrumentation Techniques	<p>1. Gain expertise in studying about interaction of matter with electromagnetic radiations and its applications in drug analysis, interpretation thereof.</p> <p>2. Gain basics about the chromatography separation techniques and analysis of drugs.</p> <p>3. Obtain hands on training for quantitative & qualitative analysis of drugs using various analytical instruments.</p>
45	BP813PW	Project Work	<p>1. Ability to develop leadership quality and team work.</p> <p>2. Learn how to collect literature and develop road map for project.</p> <p>3. To design the new research projects.</p> <p>4. Learn to evaluate the obtained experimental data and draw conclusions.</p>

Programme Outcomes (PO)		
M. Pharm (Pharmaceutics and Pharmaceutical Technology)		
PO1	Research Ability	The capacity to conduct original research and development, make use of cutting-edge resources and apply one's own planning, problem-solving, and analytical skills to real-world issues.
PO2	Technical Communication	Develop a strong communication skills and the ability to write and present technical documents / reports based on scientific aspects.
PO3	Expertise Demonstration	Gain expertise in one's area of pharmaceutical study, as well as in related fields such as education, industry, medicine and other related fields such as manufacturing, healthcare and administration.
PO4	Professional Leadership	A capacity to lead in terms of

		team building, planning, inspiring, and morally carrying out professional tasks, as well as establishing a professional identity within the community.
PO5	Environment & Sustainability	An understanding to create awareness and adopt to procedures in order to reduce, reuse and recycle waste to minimize the load on non-renewable resources.
Programme specific outcomes (PSO)		
PSO	Key Concept	Explanation
PSO1	Formulation and Development	Design safe, effective pharmaceutical dosage forms, including novel drug delivery systems and cosmetics, using drug delivery system principles.
PSO2	Unit Operations	Take up leadership, develop proper planning, manage and execute unit operations for environmentally sustainable pharmaceutical and cosmetic manufacturing.
PSO3	Regulatory Compliance	Obtain ability to adhere to regulatory requirements and fulfill the same while developing the formulations.
PSO4	Use of modern tools	Formulation development and pharmacokinetic investigation using modern scientific instruments and computational analysis. The students can also learn about usage of simulation models to enable them to precise work out.
PSO5	Research Methodology	Be able to communicate with a scientific audience through reports, thesis or presentations that have been written with proper understanding, planning and with application of the concepts of research technique in pharmaceutical product development.
Programme Outcomes (PO)		
M.Pharm (Pharmaceutical Analysis and Quality Assurance)		
PO1	Research Ability	The capacity to conduct original research and development, make use of cutting-edge resources and

		apply one's own planning, problem-solving, and analytical skills to real-world issues.
PO2	Technical Communication	Develop a strong communication skills and the ability to write and present technical documents / reports based on scientific aspects.
PO3	Expertise Demonstration	Develop expertise in one's area of pharmaceutical study, as well as in related fields such as education, industry, medicine and other related fields such as manufacturing, healthcare and administration.
PO4	Professional Leadership	A capacity to lead in terms of team building, planning, inspiring, and morally carrying out professional tasks, as well as establishing a professional identity within the community.
PO5	Environment & Sustainability	An understanding to create awareness and adopt to procedures in order to reduce, reuse and recycle waste to minimize the load on non-renewable resources.
Programme specific outcomes (PSO)		
PSO	Key Concept	Explanation
PSO1	Analytical and Development	Design safe, effective pharmaceutical method validation for determination of drugs and drug products, analyze errors if any and develop a risk management approach using PAT tools for better quality control.
PSO2	Data interpretation of analytical samples	Take up leadership, develop proper planning, manage and execute unit operations for environmentally sustainable pharmaceutical analysis.
PSO3	Bio fluid analysis and Compliance	Obtain ability to adhere to regulatory requirements and fulfil the same while developing the analytical method validation of biological products or bio fluid based systems.
PSO4	Use of modern tools	Develop ideas to critically analyze the drug, drug products

		and detect potential interactions using modern scientific instruments and computational analysis.
PSO5	Research Methodology	Be able to communicate with a scientific audience through reports, thesis or presentations that have been written with proper understanding, planning and with application of the concepts of research technique in pharmaceutical product analysis.
Programme Outcomes (PO)		
M.Pharm (Pharmacology)		
PO1	Research Ability	The capacity to conduct original research and development, make use of cutting-edge resources and apply one's own planning, problem-solving, and analytical skills to real-world issues.
PO2	Technical Communication	Develop a strong communication skills and the ability to write and present technical documents / reports based on scientific aspects.
PO3	Expertise Demonstration	Gain expertise in one's area of pharmaceutical study, as well as in related fields such as education, industry, medicine and other related fields such as manufacturing, healthcare and administration.
PO4	Professional Leadership	A capacity to lead in terms of team building, planning, inspiring, and morally carrying out professional tasks, as well as establishing a professional identity within the community.
PO5	Environment & Sustainability	An understanding to create awareness and adopt to procedures in order to reduce, reuse and recycle waste to minimize the load on non-renewable resources.
Programme specific outcomes (PSO)		
PSO	Key Concept	Explanation
PSO1	Drug discovery	Using a deep knowledge of cells and molecules, students can construct fundamental ideas about drug mechanisms, toxicity

		and evaluation using pharmacological and toxicological models. They can develop treatment regimen based on pharmacology that can be used in the research and development of new medicines.
PSO2	Data interpretation	Learn how to optimise the quantification of targets and leads using state-of-the-art instruments, computational, and informatics tools and techniques.
PSO3	Regulatory compliance and Pharmacovigilance	Utilize and evaluate regulatory and ethical ideas in pre-clinical and clinical research for the pharmaceutical and healthcare industries in the context of community.
PSO4	Research methods	In pre-clinical and clinical research, it is important to be able to comprehend, implement and evaluate the ideas of research methodology and bio-statistics, in addition to being able to interpret data based on computational and information.
PSO5	Scientific communication	Ability to build an inquiring mind through journal evaluation and technical communication and communicate same.

M.Pharm Program			
Course Outcomes for M. Pharm. (Pharmaceutics and Pharmaceutical Technology) Semester-I			
Sl.No.	Course code	Name of the course	Course Outcomes
1	MPH101 T	Modern Pharmaceutical Analytical Techniques	<ol style="list-style-type: none"> 1. The students gain knowledge about the quality of potentially active principles and excipients uses in Pharmaceuticals. 2. They learn to detect the impurities as well as analysis of various drugs in bulk and dosage forms. 3. They learn to design the experiments related to analysis of drugs using various analytical tools and instruments as well as interpret the data obtained.
2	MPH102 T	Drug Delivery System	<ol style="list-style-type: none"> 1. Students learn about the various methods used for development of the

			<p>novel drug delivery systems.</p> <p>2. They learn about the selection process for drug and polymers along with other formulation additives for formulating the delivery devices or carrier systems.</p> <p>3. Learn as well as gain hands on training on the formulation aspects and evaluation of the designed novel drug delivery systems.</p>
3	MPH103 T	Modern Pharmaceutics	<p>1. Learn and gain knowledge about the pre-formulation studies and its significance in dosage form development.</p> <p>2. Learn about generic drugs, tablet manufacturing and challenges involved. They also gain hands on training about the challenges faced during tablet compression.</p> <p>3. Learn about the cGMP and its significance in dosage form design along with meeting the regulatory criteria.</p> <p>4. Gain knowledge about the Optimization Techniques & Pilot Plant Scale Up process involved in real time manufacturing unit.</p> <p>5. Learn about the design of stability testing and its protocol, sterilization techniques and methods of sterilization.</p> <p>6. Learn about the advance techniques of packaging and its science in packing formulated dosage forms.</p>
4	MPH104 T	Regulatory Affair	<p>1. Learn the concepts of drug regulation as per India, USA-FDA, EU and other regulatory bodies across the globe.</p> <p>2. Learn the concepts of innovator and generic drugs design and drug development process.</p> <p>3. Learn about the guidance's and guidelines for filing and approval process of NDA or ANDA.</p> <p>4. Acquaint self in the preparation of dossiers and their submission to regulatory agencies in different countries for approvals.</p> <p>5. Learn about the post approval</p>

			<p>regulatory requirements for active principles and finished drug products.</p> <p>6. Critically analyze the process for submission of global documents in CTD/ eCTD formats along with approval of same.</p> <p>7. Gain knowledge about clinical trials requirements for approvals to conduct clinical trials and monitor the same along with being vigilant post marketing of the products.</p>
5	MPH105 P	Pharmaceutics Practical I	<p>1. Understand development of novel drug delivery systems.</p> <p>2. To learn about the criteria for selection of drugs, polymers and additives for the development of Novel drug delivery systems and its evaluation thereof.</p>
6	MPH106 P	Seminar / Assignments	Learn about the collecting information regarding to active principles, collect literature and prepare road maps for projects, develop communication skills.

Course Outcomes for M. Pharm. (Pharmaceutics and Pharmaceutical Technology) Semester-II

Sl. No.	Course code	Name of the course	Course Outcomes
1	MPH201 T	Molecular Pharmaceutics (Nano Tech and Targeted DDS)	<p>1. Learn the different methods for creating new carrier for delivery of drugs.</p> <p>2. Learn about the selection criteria for pharmaceuticals and polymers for the creation of NTDS.</p> <p>3. The creation and assessment of innovative drug delivery methods.</p>
2	MPH202 T	Advanced Bio pharmaceutics & Pharmacokinetics	<p>1. Analyze the basic and fundamental ideas of pharmacokinetics and bio pharmaceutics.</p> <p>2. Learn to develop pharmacokinetic models from raw data and analyze the same for BA and BE studies.</p>
3	MPH203 T	Computer Aided Drug Delivery System	<p>1. Students will be able to learn various aspect related to evolution of Computers in Drug Research and Development.</p> <p>2. Learn and design drug disposition computational modelling, optimization of new drug delivery system or new drug formulation.</p> <p>3. Learn about applications of the computer application in analysis of the</p>

			drug products, clinical data development. 4. Learn about the Robotics and artificial intelligence (AI) and their aid in drug design, calculation of fluid dynamics etc.
4	MPH204 T	Cosmetic and Cosmeceuticals	1. Learn to differentiate between pharmaceutical and cosmetic products along with basic ideas about the various active ingredients used in cosmetics and Cosmeceuticals formulations. 2. Learn about the building blocks for design of various formulations. 3. Analyze the current technologies in the market to develop cosmetic products 4. Gain scientific knowledge to develop cosmetics and cosmeceuticals keeping at par with the desired criteria like safety, stability and efficacy.
5	MPH205 P	Pharmaceutics Practical II	Learn about designing encapsulated products based on polymeric carrier device system, interpret the pharmacokinetic aspects of newly formulated drug products.
6	MPH206 P	Seminar / Assignment	Learn presentation skills, search various drug databases and carry out plans for topic of research and preparation of schemes thereof.

M.Pharm

Course Outcomes for M. Pharm. ((Pharmaceutical Analysis) Semester-I

Sl. No.	Course code	Name of the course	Course Outcomes
1	MPA101 T	Modern Pharmaceutical Analytical Techniques	1. The students gain knowledge about the quality of potentially active principles and excipients used in Pharmaceuticals. 2. They learn to detect the impurities as well as analysis of various drugs in bulk and dosage forms. 3. They learn to design the experiments related to analysis of drugs using various analytical tools and instruments as well as interpret the data obtained.
2	MPA102	Advanced	1. Students shall be able to acquire

	T	Pharmaceutical Analysis	<p>appropriate analytical skills required for the analytical method development.</p> <p>2. Students shall able to know principles of various reagents used in functional group analysis that renders necessary support in research methodology and demonstrates its application in the practical related problems.</p> <p>3. Students shall able to know analysis of impurities in drugs, residual solvents and stability studies of drugs and biological products.</p>
3	MPA103 T	Pharmaceutical Validation	Understand the aspects of validation, develop validated methods for manufacturing of dosage forms.
4	MPA104 T	Food Analysis	Gain knowledge about food supplements, additives, analyze the effects of the agricultural chemicals on human system. Learn about food legislation and
5	MPA105 P	Pharmaceutical Analysis Practical I	Learn techniques for interpretation of purity of the drugs and additives, handle spectroscopic instruments and interpret data generated for the same.
6	MPA106 P	Seminar / Assignments	Learn about the collecting information regarding to active principles, collect literature and prepare road maps for projects, develop communication skills.

M.Pharm

Course Outcomes for M. Pharm. ((Pharmaceutical Analysis) Semester-II

Sl. No.	Course code	Name of the course	Course Outcomes
1	MPA201 T	Advanced Instrumental Analysis	<p>1. Learn about the interpretation of various organic compounds using spectroscopic techniques like NMR, mass and IR spectra.</p> <p>2. Develop abilities to learn the practical aspects of various instruments and their use in analysis of drugs.</p> <p>3. Learn the ability to identify organic substances.</p>
2	MPA202 T	Modern Bio-Analytical Techniques	<p>1. Learn the techniques for extraction of drugs from biological samples.</p> <p>2. Gain knowledge about the separation of drugs from</p>

			biological samples using different approaches 3. Design BA and BE studies in accordance to the regulatory guidelines
3	MPA203 T	Quality Control and Quality Assurance	1. Understand the principles of cGMP and its applicability in a pharmaceutical unit. 2. Learn various aspects of documentation and auditing process. 3. To analyze and understand the importance of quality certifications and its need in industries. 4. Learn to take responsibilities of QA & QC departments for future endeavour
4	MPA204 T	Herbal and Cosmetic Analysis	1. Establishing regulations for herbal treatments based on respective monographs and studies of natural goods 2. Analyzing herbal drug-drug interactions principles for evaluating the performance of cosmetics
5	MPA205 P	Pharmaceutical Analysis Practical II	Learn about various instruments used in pharmaceutical analysis, generate data about detection of active principles as well as impurities using the same and interpret the data to identify any deviations both in bulk, dosage form and combination formulas.
6	MPA206 P	Seminar/ journal Club	Learn presentation skills, search various drug databases and carry out plans for topic of research and preparation of schemes thereof.

M.Pharm

Course Outcomes for M. Pharm. ((Pharmacology) Semester-I

Sl. No.	Course code	Name of the course	Course Outcomes
1	MPL101T	Modern Pharmaceutical Analytical Techniques	<ol style="list-style-type: none"> 1. The students gain knowledge about the quality of potentially active principles and excipients uses in Pharmaceuticals. 2. They learn to detect the impurities as well as analysis of various drugs in bulk and dosage forms. 3. They learn to design the experiments related to analysis of drugs using various analytical

			tools and instruments as well as interpret the data obtained.
2	MPL102T	Advanced Pharmacology-I	<ol style="list-style-type: none"> 1. Gain knowledge about the pharmacodynamics and pharmacokinetics of a drug and the correlation of the same. 2. Learn to recommend drug for management of pathologic conditions. 3. Learn about the various adverse effects, contraindication and clinical uses of drugs used in treatment of diseases.
3	MPL103T	Pharmacological screening and toxicological methods I	<ol style="list-style-type: none"> 1. Learn about regulation, ethical requirements and maintenance & handling of experimental animals. 2. Know about the GLP used in Drug discovery process. 3. Analyse the various screening models for evaluating efficacy of the drugs. 4. Learn about the development of animal models and use the same for determination of both therapeutic and toxicological aspects.
4	MPL104T	Cellular and Molecular Pharmacology	<ol style="list-style-type: none"> 1. Gain knowledge about the receptor signal transduction aspects and molecular pathways. 2. Learn the applicability of molecular pharmacology and biomarkers in drug discovery process. 3. Learn molecular biology techniques as applicable for pharmacology.
5	MPL105P	Pharmacology Practical I	Learn about the basic approaches to design in vivo studies, handle animals for pre-clinical trials, and design and develop in-vivo assay procedures.
6	MPL106P	Seminar/ journal Club	Learn about the collecting information regarding to active principles, collect literature and prepare road maps for projects, develop communication skills.
Course Outcomes for M. Pharm. ((Pharmacology) Semester-II			
Sl. No.	Course code	Name of the course	Course Outcomes
1	MPL201T	Pharmacological and Toxicological Screening Methods – II	<ol style="list-style-type: none"> 1. Learn the mechanism of drug actions at cellular and molecular level. 2. Gain the knowledge of the Pathophysiology and pharmacotherapy of different diseases. 3. Learn about the various adverse effects, contraindication and clinical

			uses of drugs used in treatment of diseases.
2	MPL202T	Pharmacological and Toxicological Screening Methods – II	<ol style="list-style-type: none"> 1. Know about the various types of toxicity studies. 2. Learn about regulation, ethical requirements and maintenance & handling of experimental animals. 3. Know about the GLP used in Drug discovery process. 4. Gain practical skills required to conduct the preclinical toxicity studies
3	MPL203T	Principles of Drug Discovery	Learn about the processes involved in drug discovery, from the identification of a target to the validation of that target and the identification and optimization of lead compounds. Realize how important genomics, proteomics, and bioinformatics are to the drug discovery process. Take advantage of computer-assisted drug design software when looking for new medicines.
4	MPL204T	Clinical Research and Pharmacovigilance	Learn about various types of regulatory guidelines for conducting clinical trials. Know about the principles of Pharmacovigilance and Monitor the therapeutic effect of the drug as well as report ADRs if any.
5	MPL205P	Pharmacology Practical II	Learn about principles of bioassays, carry out toxicological studies in accordance to regulatory guidelines. Reprt the ADRs. Know about different in-silico pharmacophore based screening.
6	MPL506P	Seminar/ journal Club	Learn presentation skills, search various drug databases and carry out plans for topic of research and preparation of schemes thereof.
M. Pharm 3rd All Branches Course Outcomes			
1		JOURNAL CLUB	Learn to search and collect articles from various scientific databases, design presentation with scientific approaches.
2		RESEARCH METHODOLOGY & BIOSTATISTICS	Learn basic concepts of statistics and statistical analysis. Learn the technical aspects of various computational operations like Excel, Matlab, SPSS, MINITAB, DoE (Design of Experiment), JMP etc. Gain expert hand in calculus with problem solving approach.
3		DISCUSSION/	Students will gain knowledge to

		PRESENTATION (PROPOSAL)	segregate the information collected and categorize the collected literature for presentation, design road map for the proposed research.
M.Pharm 4th semester All Branches Course Outcomes			
1		RESEARCH WORK	Plan and execute the proposed road map for experiments.
2		JOURNAL CLUB	Learn to search and collect articles from various scientific databases, design presentation with scientific approaches in a more detailed manner.
3		FINAL PRESENTATION	Summarize all data generated from the experiments as well as interpret the data and conclude the research works.