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Course Outcomes (COs)

Course Outcomes B. Pharm CGPA Pattern & PCI Pattern

Course Code	Course Outcome
First Year B Pharmacy (Semester I) CGPA Pattern	
T.1.1.1 Pharmaceutics I (Dispensing Pharmacy)	Students should be able to **CO:1** Understand and explain the role of pharmacy practice in health care delivery. **CO:2** Understand the basics of different dosage forms, pharmaceutical incompatibilities and pharmaceutical calculations. **CO:3** Impart knowledge of prescription and its parts, good compounding and dispensing practices. **CO:4** Develop competency in the extemporaneous compounding of pharmaceutical products and dispensing.
T.1.1.2 Pharmacognosy I	Students should be able to **CO:1** Understand the basics related to Pharmacognosy and its role in therapeutics, various sources of pharmacognostic drugs and their way to study. **CO:2** Become acquainted with carbohydrates and their applications and uses as pharmaceutical excipients. **CO:3** Understand the role of lipids for the plants and humans and different sources of fixed oil, fats and waxes. **CO:4** Acquire acquainted with significance of cultivation to improve quality and quantity of crude drugs and factors influencing productivity of crude drugs. **CO:5** Know the importance of quality control, its need and way to find out adulteration of crude drugs. **CO:6** Understand basics related to Pharmacognosy and its role in therapeutics, various sources of pharmacognostic drugs and their way to study

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T.1.1.3 Pharmaceutical Chemistry - I	Students should be able to **CO:1** Explain Purity of pharmaceuticals, sources of impurities, tests for purity, identity and limit tests. **CO:2** Define Acids, Bases and Buffers, understand theories of acid and base, types of pharmaceutical buffers. **CO:3** Acquire knowledge of isotonicity, measurement of tonicity, calculations and methods of adjusting isotonicity. **CO:4** Learn the use of gastrointestinal agents like acidifying agents, Antacids, Protective and Adsorbents, Saline Cathartics. **CO:5** Learn the use of Electrolytes for replacement therapy, acid-base balance and combination therapy. **CO:6** Know the Essential and Trace Elements, Transition Elements and their compounds of pharmaceutical importance and Anaesthetics and Respiratory stimulants.
T.1.1.4. Applied Biostatistics and Computer Application in Pharmacy.	Students should be able to **CO:1** Understand detail about statistics. **CO:2** Learn detailed study of calculations based on measure of central tendency ANOVA, probability and testing of hypothesis. **CO:3** Study the history, generation and application computer (in pharmacy) **CO:4** Study anatomy and peripheral devices of computer **CO:5** Study of operating systems and MS Office **CO:6** Study basics of internet and networking.
T.1.1.5 Communication Skills & Soft Skills Development.	Students should be able to **CO: 1** Communicate effectively (Verbal and Non-Verbal) **CO: 2** Develop interpersonal skills, problem solving, critical thinking, negotiation skills. **CO: 3** Develop Leadership qualities and essentials. **CO: 4** Demonstrate appropriate and professional ethical behaviour.
First Year B Pharmacy (Semester II) CGPA Pattern	
T.1.2.1 Pharmaceutics II (Unit Operation)	Students should be able to **CO: 1** Know various unit operations used in pharmaceutical industries. **CO: 2** Perform various processes involved in pharmaceutical manufacturing process. **CO: 3** Appreciate the various preventive methods used for corrosion control in pharmaceutical industries.

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T 1.2.2 Pharmaceutical Chemistry -II	Students should be able to **CO: 1** Understand basics related to Topical Agents as Protectives, Astringents and Anti-infective agents, Dental products like Dentifrices, Anti-caries agents. **CO: 2** Acquire knowledge of Complexing and chelating agents used in pharmacy and application of complex formation in Pharmacy. **CO: 3** To gain knowledge of Inorganic radiopharmaceuticals and contrast media radiation dosimetry, biological effects of radiations, Radiopaque contrast media and applications radiopharmaceuticals. **CO: 4** Get acquainted with various inorganic pharmaceutical agents such as sclerosing agents, Expectorants, Emetics, Poison and Antidotes, Sedatives, Antioxidants, Pharmaceutical aids used in pharmaceutical industry. **CO: 5** Learn the basics related to Physical Pharmacy; Behaviour of Gases principle of Kinetic theory of Gases, Gas law, equation, Chemical Kinetics, catalysis, characteristics of homogeneous and heterogeneous catalysis. **CO: 6** Get acquainted with Quantum Mechanics and Photochemistry.
T.1.2.3 Pharmaceutical Chemistry - III	Students should be able to **CO: 1** Understand organic chemistry, importance and properties of carbon, hybridization of elements, atomic structure, atomic orbitals, molecular orbital theory, types of bonding. **CO: 2** Know reaction intermediates: carbocations, carbanions, carbenes, reagents: electrophiles and nucleophiles. **CO: 3** Define stereochemistry: isomerism, stereo-isomerism, geometric isomerism, optical isomerism, projections of molecules, enantiomers, diastereomers, racemic modifications, meso- compounds, elements of symmetry. **CO: 4** Assign absolute configuration and names. **CO: 5** Explain Structure; Nomenclature; Preparation and Reactions of several functional groups like hydrocarbon, amines, alcohols carboxylic acids etc. **CO: 6** Explain Structure; Nomenclature; Preparation and Reactions of Polynuclear aromatic compounds.

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T. 1.2.4 APHE - I	Students should be able to **CO: 1** Understand the scope of the course and develop a basic working vocabulary applicable to the study of anatomy and physiology. **CO: 2** Understand fundamental tissue groups that combine to form the human body, to understand how tissues are classified as membranes, and to understand the formation of endocrine and exocrine glands. **CO: 3** Develop an understanding of skeletal and muscular system of body with their physiology. **CO: 4** Understand major systems of body such as nervous and endocrine system relating to structure, number and physiology of their organs. **CO: 5** Understand the structure and functions of all sense organs like skin, eye, ear, nose etc. **CO: 6** Understand basics of haemopoietic and lymphatic system along with their anatomy and physiology and acquire knowledge about how blood play's vital role in body.
T.1.2.5 Industrial Psychology	Students should be able to **CO: 1** Understand concept of industrial psychology and its various applications in pharmaceutical industry. **CO: 2** Understand the concept & applications of personnel selection and personal development to pharmaceutical industry. **CO: 3** Know more about accident prevention and safety measures in industry. **CO: 4** Know about sociology, industrial democracy, various problems of industrial disputes and methods to resolve those problems. **CO: 5** Understand impact of science & technology on industry and society, role of industry in national development, cottage, and small- & large-scale industries.
5555 Environmental Science	Students should be able to **CO: 1** Understand importance of environment and get knowledge about environmental conditions. **CO: 2** Learn resources, its types and impact on environment. **CO: 3** Get knowledge about pollution, its types and impact on environment. **CO: 4** Learn about global issues related to climate and environment. **CO: 5** Learn about problems faced by human if sudden changes occur in environment. **CO: 6** Learn about his role in society to overcome such issues related to environment and ways to overcome.
Second Year B Pharmacy (Semester III) CGPA Pattern	

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T.2.3.1 Pharmaceutics III (Physical Pharmacy I)	Students should be able to **CO: 1** Understand basic principles related to importance of physical properties and their influence on drug delivery. **CO: 2** Learn basic properties of matter and its phases utilized in drug delivery. **CO: 3** Learn thermodynamics and various energy related concepts. **CO: 4** Learn diffusion and dissolution like mass transfer processes. **CO: 5** Get knowledge about complexes and their importance in pharmaceutical sciences. **CO: 6** Get knowledge about solutions, types and various properties associated with solutions etc
T.2.3.2 Pharmaceutical Chemistry-IV (Organic Chemistry-II)	Students should be able to **CO:1** Acquire knowledge of basics related to organic chemistry, classes of reaction, concept of tautomerism, resonance and electronegativity. **CO:2** Understand the chemistry of carbohydrates, Kiliani Fischer synthesis and Ruffs degradation. **CO:3** Understand chemistry of proteins, peptides, classification of proteins and Zwitterion formation. **CO:4** Understand concept of racemic mixture, its formation and resolution of racemic mixture. **CO:5** Know the principle and mechanism of rearrangement reactions and various types of rearrangement reactions. **CO:6** Understand importance and knowledge of various heterocyclic compounds.
T.2.3.3 Pharmacognosy II	Students should be able to **CO: 1** Know the types of fibres, their pharmaceutical and commercial applications. **CO: 2** Study the physical and chemical properties of volatile oils and terpenoids, their industrial and laboratory methods of isolation, characterization along with commercial pharmaceutical and pharmacological applications. **CO: 3** Acquire knowledge of uses of tannins for plants and tannins used for human being for therapeutic and commercial applications. **CO: 4** Understand concept of extraction with different traditional and advanced methods of extraction of natural products. **CO: 5** Get acquainted with screening of crude drugs by chemical tests for different primary and secondary metabolites. **CO: 6** Understand physical and chemical nature of resins, their pharmaceutical, pharmacological applications along with their properties and identification.

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T.2.3.4 Pharmaceutical Analysis–I	Students should be able to **CO: 1** Understand basics of pharmaceutical analysis as various types of errors, significance of quantitative analysis in quality control, fundamentals of volumetric analysis, methods of expressing concentrations, and applications of Microsoft excel in pharmacy. **CO: 2** Understand aqueous acid base titrations, law of mass action, neutralization curves, theories of acid base indicators, applications in assay of benzoic acid, boric acid, aspirin, to know principle of non-aqueous titrations, types of solvents, endpoint detection, and application in assay of sodium acetate, sodium benzoate, norfloxacin tablet. **CO: 3** Get with enough information on redox titrations Theory of redox titration, measurement of electrode potential, cerium (IV) sulfate, Iodine (Iodimetry and Iodometry), Applications in assay of Ferrous sulfate, Ascorbic acid, Isoniazid, Hydrogen peroxide. **CO: 4** Get knowledge of Argentometric titrations as Theory, factors affecting solubility of a precipitate, titration methods-Mohr's, Volhard's, Gay lussac, and Fajan's method, indicators. **CO: 5** Get knowledge of Complexometric Reactions and Titrations, as Theory, formation of complex and its stability, titration curves Application in assay of Magnesium sulfate, Lead nitrate and calcium gluconate **CO: 6** Acquire knowledge of Gravimetric analysis Precipitation techniques, solubility products, Application in assay of Alum by oxime reagent, Calcium as calcium oxalate and magnesium as magnesium pyrophosphate.
T.2.3.5 APHE-II	Students should be able to **CO: 1** Identify the anatomical and physiological components of the human cardiovascular system. **CO: 2** Understand components of urinary system, physiology of urine formation and importance of normal and abnormal constituents of urine. **CO: 3** Understand what first aid majors to be followed in heart attack, poisoning, burning, shocks and snake bite. They also will learn causative organisms, signs, symptoms and effective majors or treatment given in various communicable diseases. **CO: 4** Understand components of respiratory system, mechanism of respiration and importance of lung volume and lung capacities. **CO: 5** Understand components of digestive system, mechanism of digestion and its function. **CO: 6** Understand components of reproductive system and physiology of both the male and female reproductive system.

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T.2.3.6 Pathophysiology of Common Diseases-I	Students should be able to **CO: 1** Understand how number of diseases advances in body, what changes occurred and how they diagnosed. **CO: 2** Understand basics of cell injury and inflammation which is integral part of array of diseases. **CO: 3** To get acquainted with immune system, its role during transplantation & hypersensitivity **CO: 4** Understand the pain syndromes and various ions related diseases due to its level alteration. **CO: 5** Understand diseases affects central nervous system and how they cause changes in levels of neurotransmitters. **CO: 6** Understand importance of Alimentary tract and get knowledgeable about liver diseases with their characteristics.
Second Year B Pharmacy (Semester IV) CGPA Pattern	
T.2.4.1 Pharmaceutics IV (Physical Pharmacy II)	Students should be able to **CO: 1** Understand about approaches involved in characterizing physical properties of drug molecules. **CO: 2** Understand the chemical kinetics and stability related concepts useful in drug delivery. **CO: 3** Understand the interfacial and surface properties of various phases in drug delivery. **CO: 4** Understand Physical properties of substances which influences drug delivery. **CO: 5** Understand Colloids and their applicability in formulation and development. **CO: 6** Understand micromeritics as a science of small molecules its importance.
T.2.4.2. Pharmaceutical microbiology	Students should be able to **CO: 1** Understand in detail about scope and application of microbiology in pharmacy. **CO: 2** Grow knowledge about microscopy and sterilization and their application in pharmacy. **CO: 3** Study in detail about bacteria and viruses. **CO: 4** Understand concepts of immunology and defence mechanism of body. **CO: 5** Learn about Vaccines, types of vaccines, production and application. **CO: 6** Learn various microbiological tests that has important application in pharmacy. Also detail study of cultures.

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T.2.4.3. Pharmacognosy–III	**CO: 1** Study different natural pesticides and their significance over synthetic pesticides and to understand the concept of allergy and plant toxins, their types and significance. **CO: 2** Study synthetic role of glycosides, their significance for plants and human being. **CO: 3** Understand potential of marine biodiversity for the therapeutics its classification. **CO: 4** Acquire knowledge of traditional drugs and their uses to treat diseases of human being. **CO: 5** Understand the ayurvedic formulations and their standardization parameters with marketed formulations. **CO: 6** Acquire knowledge of traditional system of medicine for the therapeutics based on natural resources, principles and mode of therapy and concept of chemotaxonomy, significance and case study.
T.2.4.4 Pharmaceutics V (Hospital Pharmacy)	Students should be able to **CO: 1** Understand hospital and its organization, hospital pharmacy and its organization. **CO: 2** Know various drug distribution methods in a hospital, pharmacy stores management and inventory control. **CO: 3** Identify drug related problems, detect and assess adverse drug reactions. **CO: 4** Appreciate the concept of rational drug therapy and obtain medication history interview and counsel the patients.
T.2.4.5 Pharmaceutical Chemistry-V (Biochemistry)	Students should be able to **CO: 1** Learn theoretical aspects of animal cell, biomembrane, vitamins, nucleic acids and biomolecules. **CO: 2** Achieve knowledge about need, classification, examples, applications and biochemical functions of proteins, vitamins, carbohydrates, lipids and amino acids. **CO: 3** Learn how the metabolism of biomolecules i.e proteins, carbohydrates, lipids nucleic acids and amino acids occurs in living organisms. **CO: 4** Get information on various enzymes, their kinetics, mechanism, applications in pharmacy and in diagnosis of diseases etc. **CO: 5** Get knowledge of vitamins chemistry, dietary sources, classification, biochemical functions and deficiency symptoms. **CO: 6** Learn, develop and practice the experimental biochemistry and acquire new knowledge using conventional and modern learning methods.

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T.2.4.6 Pathophysiology of Common Diseases-II	Students should be able to **CO: 1** Understand important aspects about life threatening diseases such as cancer and HIV. **CO: 2** Know about various glands, its hormones and diseases related to it with their characteristics. **CO: 3** Get aware about most prevailing CVS, Respiratory system, urinary system related diseases. **CO: 4** Understand what metabolism is & what happen when improper metabolism of protein, carbohydrate and lipids. **CO: 5** Get knowledge about ways to check out functioning of major organs like kidney, liver, gastric system. **CO: 6** Theoretical aspects of diseases with practical aspects.
Third Year B Pharmacy (Semester V) CGPA Pattern	
T.3.5.1 Pharmaceutical Chemistry - VI	Students should be able to **CO:1** Describe the definition, objectives, importance as well as broad applications of Medicinal Chemistry **CO:2** Explain theoretical Aspects of Drug Action, the Ferguson Principal, Physicochemical Parameters, and Pharmacological **CO:3** Explain the concept of Receptor and Metabolism of Xenobiotics **CO:4** Predict structure-activity relationship, Mode of action, Pharmacokinetics (especially metabolism), therapeutic uses of chemotherapeutic agents **CO:5** Define the cholinergic Nervous System and list drugs Acting on Adrenergic Nervous System, Local Anaesthetics, Drugs Acting on Cardiovascular System
T.3.5.2 Pharmaceutics- VI (Pharmaceutical technology-I)	Students should be able to **CO:1** Explain the principles involved in pharmaceutics and expand their knowledge in this subject. **CO:2** Describe various pre-formulation concepts in dosage form development. **CO:3** Select appropriate excipients in the development of dosage form. **CO:4** Develop new dosage forms through preformulation studies **CO:5** Design pilot plant studies for solid and liquid dosage forms **CO:6** Understand the concept of pharmaceutical formulation and evaluation as per the requirement of regulatory authorities and their problem along with remedies.

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T.3.5.3 Pharmacology-I	Students should be able to **CO:1** Offer the learners a firm grounding in fundamental ideas and scientific keystones of pharmacology. **CO:2** Convey data of basic scientific concepts and principles that can serve as the foundation for understanding the pharmacology of specific drugs. **CO:3** Inform about new drug discovery along with preclinical and clinical phases of drug development. **CO:4** Understanding the basics of pharmacokinetics that underlie the absorption, distribution, metabolism, and elimination (ADME) of drugs in the biological system and thus affect drug efficacy. **CO:5** Introduction to pharmacotherapy of drugs acting on body systems, details of biochemical reactions, combined drug effects and to clear rationale behind varying dosing regimens. **CO:6** Highlight the importance of knowledge pharmacotherapeutics to preclinical, clinical, and hospital pharmacologists
T 3.5.4 Pharmacognosy –IV	Students should be able to **CO:1** On completion of the course the candidate shall be able to acquire the knowledge of alkaloids in details **CO:2** Importance of the various enzymes, their isolation, and therapeutic application **CO:3** Learn plant tissue culture techniques and their industrial applications. **CO:4** Know the details of natural plant bitters and sweeteners. **CO:5** Practices the writing of Biosynthetic pathways of important secondary metabolites understanding details of nutraceuticals and natural colorants
T.3.5.5 Pharmaceutical Analysis-II	Students should be able to **CO:1** Explain the principle of refraction, theory of refraction, Snell's law, and significance of Refractive index determination. **CO:2** Describe the concept of polarisation of light, dextrorotatory and laevorotatory, chirality, and Optical activity. **CO:3** Describe the principle of extraction, various extraction techniques are solid and liquid phase extraction. **CO:4** Explain Thermal methods of Analysis like Thermogravimetry, Differential Thermal Analysis, and Differential Scanning Calorimetry **CO:5** Explain topics related to Electrochemical Analysis as conductometry, potentiometry, polarography, Amperometry, and Coulometry. **CO:6** Describe the principle of Karl Fischer analysis for the determination of moisture content in pharmaceutical formulations
Third Year B Pharmacy (Semester VI) CGPA Pattern	

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T.3.6.1 Pharmaceutical Chemistry - VII	Students should be able to **CO:1** List theoretical aspects of chemotherapy and chemotherapeutic agents. **CO:2** Explain SAR useful for the rationale design of the drugs and its implication. **CO:3** Classify, and list examples, applications, and disadvantages of design of antifungal agent **CO:4** Explain antiamoebics, anthelmintics, antimalarial agents. Their classification, SAR, MOA, uses metabolism, side effects. **CO:5** Define antineoplastics, antitubercular agents, and antibiotics and list them.
T 3.6.2. Pharmaceutics-VII (Biopharmaceutics & Pharmacokinetics)	Student should be able to **CO:1** Understand detailed knowledge about approaches involved in pharmacokinetics process and expand their knowledge in this subject. **CO:2** Understand concept of bioavailability and bioequivalence, dosage regimen and non-linearity pharmacokinetic **CO:3** Interfacial and surface properties of various phases in drug delivery **CO:4** Understand compartment modelling and able to solve the pharmacokinetic problems. **CO:5** Discuss the concepts of bioavailability and bioequivalence with the methods of measurement. **CO:6** Highlight the importance of knowledge about the bioavailability and bioequivalence, protein drug binding, and determination of AUC
T. 3.6.3 Pharmacology-II	Students should be able to **CO:1** Learn how the basic information of pharmacology applies to the drug treatment of certain selected diseases. **CO:2** Assist students in understanding of therapeutic and adverse effects of drugs especially those effective in CNS related disorders. **CO:3** Enable students to use learning experience to form and enlarge their knowledge of pharmacology in a specific area during subsequent specialized education and training. **CO:4** Provide opportunities for students to learn, develop and practice experimental and therapeutic pharmacology. **CO:5** Motivate students to reinforce existing and gain new knowledge through the use of conventional and modern learning methods. **CO:6** Understand various alternatives to conventional bioassay methods and encourage them to use alternative methods with the intention of animal welfare.
T 3.6.4 Pharmacognosy –V	The students should be able to: **CO:1** Understand the importance of modern analytical tools (UV, IR, NMR, and Mass) and Spectral characterization of Simple Natural Origin Molecules **CO:2** Importance of Stereoisomerism in Natural Products **CO:3** Establish the structure of natural molecules like a Glycosides, Alkaloids, Carotenoids etc **CO:4** Describe qualitative and quantitative methods for the identification of natural compounds – Alkaloids, Glycosides.

T.3.6.5 Pharmaceutical Jurisprudence & Ethics	The students should be able to: **CO:1** Know in details about D and C Act 1940 along with the licensing process for import and manufacturing. **CO:2** Understand details of the D and C Act 1940 along with the licensing process for sales, functions of drug inspector, government analyst, etc. **CO:3** Learn about Pharmacy act 1948, Medical and Toilet Preparations act 1955 and Narcotics and Psychotropic substances act 1985. **CO:4** Know the importance of Drugs and Magic Remedies Act, Drug price control order etc. **CO:5** Know Pharmaceutical legislations and their implications in the development and marketing of pharmaceuticals.
Final Year B Pharmacy (Semester VII) CGPA Pattern	
T.4.7.1 Pharmaceutical Technology-II (Pharmaceutics VIII)	Student should be able to **CO:1** Know about sterile formulations. **CO:2** Obtain knowledge about sustained and controlled drug delivery system. **CO:3** Know about optimization in Pharmacy. **CO:4** Know formulation and packing for parenteral preparation. **CO:5** Study the novel drug delivery system.
4.7.2 Pharmaceutical Chemistry- VIII	Students should be able to **CO:1** Understand of structure activity relationship (SAR), metabolism and therapeutic as well adverse effects of drugs acting on CNS disorders. **CO:2** Know of types of viruses, life cycle of viruses, classification, SAR, MOA, side effects, synthesis of antiviral agents including anti-retroviral agents. **CO:3** Attain in-depth chemical, pharmaceutical, biochemical and pharmacological training required for the design and development of new biologically active molecules. **CO:4** Learn how the SAR of pharmacophore is related with its therapeutic properties and ADME. **CO:5** Attain the in-depth knowledge about classification, chemical structure, biochemical functions, deficiency of vitamins.
T. 4.7.3 Pharmacology-III	Student should be able to **CO:1** Provide opportunity to learn theoretical aspects of drugs acting on cardiovascular system, and endocrine system. **CO:2** Provide an opportunity to learn theoretical aspects of drugs acting on the gastrointestinal system. **CO:3** Enable the students to gain sufficient knowledge about autacoids, their effects and how to antagonise their actions. **CO:4** Provide opportunity to learn theoretical aspects of drugs acting on hematopoietic and renal systems. **CO:5** To provide the students with enough information on various drugs which can serve as a basis for rational drug use. **CO:6** Understanding of pharmacology, clinical uses and adverse effects of major classes of clinically important drugs

T 4.7.4 Pharmaceutical Analysis III	Student should be able to **CO:1** Discuss basics of spectroscopy **CO:2** Explain molecular spectroscopy techniques like UV-Visible spectroscopy, fluorescence spectroscopy with principle, factors affecting, instrumentation and applications **CO:3** Discuss atomic spectroscopy techniques like atomic emission i.e. flame photometry, atomic absorption spectroscopy with principle, instrumentation, applications and limitations. **CO:4** Discuss basics of chromatography which includes definition and classification etc. **CO:5** Explain planar chromatography techniques includes paper chromatography, thin layer chromatography, high performance thin layer chromatography (HPTLC) with principle, theory, development, applications, limitations etc. **CO:6** Describe principle, instrumentation, applications of electrophoresis and radioimmunoassay techniques.
T.4.7.5 Pharmaceutical Biotechnology	Student should be able to **CO:1** Understand basics biotechnology, enzyme technology, biosensors and protein engineering along with the production of various enzymes. **CO:2** Study the principle involved in recombinant DNA technology and applications like production of Insulin, Interferon and Vaccines. **CO:3** Learn about immunity, immunoglobulins, hybridoma technology and blood products along with plasma substitutes. **CO:4** Know the importance of ELISA, Southern blotting, Western blotting, microbial genetics, microbial transformation and mutation. **CO:5** Understand various fermentation methods in the manufacturing of Penicillin, Citric acid, Vitamin B12, Glutamic acid and Griseofulvin.
T.4.7.6 Pharmaceutical Industrial Management	Student should be able to **CO:1** Introduce the concept of management, management process, its types and levels with its social responsibilities and functions **CO:2** Provide information about forecasting, planning, management by objectives, organization to the students **CO:3** Make awareness about importance of communication, leadership and motivation and theories of motivation **CO:4** Educate learners about General Agreement on Tariff and Trade (GATT), World Trade Organization and Trade Related Intellectual Property Rights (TRIPS) **CO:5** Discuss the significance of quality assurance, its documentation and validation along with importance of statistical study in industries **CO:6** Convey information about various standard institutions and regulatory authorities working nationally and internationally
Final Year B Pharmacy (Semester VIII) CGPA Pattern	
T- 4.8.1 Pharmaceutics IX	Student should be able to **CO:1** Know about targeted drug delivery system **CO:2** Identify the goal of novel drug delivery system **CO:3** Solve problems of conventional delivery process **CO:4** Know role of polymers **CO:5** Know about nanoparticles, microspheres.

T 4.8.2 Pharmaceutical Analysis IV	Student should be able to **CO:1** Know the basics about column chromatography. They have knowledge of ion exchange, gel permeation chromatography with its apparatus, techniques and applications. **CO:2** Understand the principle, instrumentation and applications of HPLC, GC along with LC MS and GC-MS. **CO:3** Understand requirement, range, and modes of vibration, instrumentation, applications and limitations of IR, interpretation of IR spectra. **CO:4** Understand the principle, instrumentation and applications of NMR, mass spectrometry. **CO:5** Solve structure elucidation problems based on IR, NMR and mass spectrometry. **CO:6** Know the principle, theory, instrumentation and applications of X-ray diffraction.
T 4.8.3 Pharmaceutical Chemistry- IX	Students should be able to **CO:1** Provide opportunity to learn theoretical aspects of narcotic analgesics, steroids and NSAD's. **CO:2** Train the learner how the QSAR useful for rationale design of the drugs and its implication in predicting its therapeutic properties and ADME. **CO:3** Provide the in-depth knowledge about need, classification, examples, applications and disadvantages of design of prodrug. **CO:4** Provide the students with enough information on various antihistamines and antiemetic drugs i. e. classification, SAR, MOA, uses metabolism, side effects, etc. **CO:5** Provide knowledge of types of steroids, classification, SAR, MOA, side effects, synthesis, uses, etc. **CO:6** Provide opportunities for students to learn, develop and practice the experimental medicinal chemistry and motivate students to strengthen existing and acquire new knowledge using conventional and modern learning methods.
T.4.8.4 Pharmacognosy-VI	The students should be able to: **CO:1** Know the world-wide trade in medicinal & aromatic plants and their derived products. **CO:2** Understand the production of phytoconstituents at laboratory & industrial scale **CO:3** Develop cosmetics formulation using different herbs and know the industrial significance. **CO:4** Get practical hands-on Quality control & standardization of herbal drugs
T. 4.8.5 Pharmacology-IV (Clinical Pharmacy and Drug Interactions)	Students should be able to **CO:1** Acquire the facts and principles necessary for rational and effective drug therapy. **CO:2** Think critically regarding therapeutic strategies during the study of advanced pharmacology. **CO:3** Understand patient care and motivate them to strive for betterment of quality of life in severely ill patients. **CO:4** Aware about their role and responsibilities as a pharmacist in various areas including pharmacotherapy, education, research and overall healthcare. **CO:5** Learn on safety and efficacy of new and existing drugs along with ethical and regulatory issues such as ADR reporting. **CO:6** Utilize basic knowledge and patient education resources to complete the pharmacist's responsibilities desirable to deliver safe patient care.

First Year B Pharmacy (Semester I) PCI Pattern	
BP101T Human Anatomy and Physiology I	Student should be able to **CO:1** Get basic knowledge about various cells and tissues and how they communicate as well as maintain homeostasis of the body. **CO:2** Learn and understand anatomy, physiology of skin, joints and human skeleton with complexity. **CO:3** Get sufficient knowledge about the importance of haemopoietic and lymphatic systems with their organization in the body. **CO:4** Aware regarding peripheral nervous system and significance of special senses. **CO:5** Gain sufficient knowledge about complexity, anatomy and physiology of the cardiovascular system of the body
BP102T Pharmaceutical Analysis-I	Student should be able to **CO:1** Learning this subject content will develop the ideas with the fundamentals of analytical chemistry among the pupils. **CO:2** Constructs the fundamental methodology to prepare different strength of solutions. **CO:3** Facilitates the fellow pupil to predict the sources of mistakes and errors. **CO:4** Helps to develop the fundamentals of volumetric analytical skills. **CO:5** Peculates the basic knowledge in the principles of electrochemical analytical techniques. **CO:6** Interpretation of skills will be improved by the course content in terms of choice of analytical techniques to perform the estimation of different category drugs
BP103T Pharmaceutics I	Student should be able to **CO:1** Upon completion of this course the student will be able to Know the history of the profession of pharmacy **CO:2** Understand the basics of different dosage forms, pharmaceutical incompatibilities and pharmaceutical calculations. **CO:3** Understand the professional way of handling the prescription. **CO:4** Preparation of various conventional dosage forms
BP104T Pharmaceutical Inorganic Chemistry	Student should be able to **CO:1** Explain Purity of pharmaceuticals, sources of impurities, tests for purity, identity and limit tests **CO:2** To define Acids, Bases and Buffers, isotonicity, intra-cellular and extra-cellular electrolytes and their functions **CO:3** Define gastrointestinal agents like acidifying agents, Antacids, Protective and Adsorbents, Saline Cathartics **CO:4** Explain electrolytes used for replacement therapy, acid-base balance and combination therapy. They would know the antimicrobial agents. **CO:5** Describe radiopharmaceuticals and use
BP105T Communication skills	Student should be able to **CO:1** Understand the behavioural needs for a pharmacist to function effectively in the areas of pharmaceutical operation **CO:2** Students should be able to communicate effectively (Verbal and Non-Verbal) **CO:3** Students should be able to effectively manage the team as a team player.

	CO:4 Students should be able to develop interview skills. **CO:5** Students should be able to develop Leadership qualities and essentials
BP106RBT Remedial Biology/ Remedial Mathematics	Student should be able to **CO:1** Upon completion of course student shall be able to understand diversity, nomenclature and five kingdom of living world and morphology of flowering plants. **CO:2** Learn basic concepts of body fluid circulation, digestion, absorption, breathing and respiration. **CO:3** Understand the excretory product and their elimination, neural control and their coordination. **CO:4** Learn chemical co-ordination and regulation, Human reproduction. **CO:5** Understand the importance of plants, minerals and photosynthesis in plants. **CO:6** Understand the basic concepts of plant respiration, growth, development, plant cells and different tissues
First Year B Pharmacy (Semester II) PCI Pattern	
BP201T Human Anatomy and Physiology II	Student should be able to **CO:1** Understand morphology, anatomy and functioning of nervous system of the body. **CO:2** Know the importance of the digestive system in the body and understand how digestion occurs with aid of digestive organs. They also understand the role of energetics in the body. **CO:3** Understand the working of the respiratory as well as urinary system and know their contribution in maintaining the body's homeostasis. **CO:4** Get knowledgeable about hormones, its origin and their importance in controlling various functions of the body. **CO:5** Acquire knowledge about structure and working of reproductive systems of both sexes and understand how reproduction occurs. They also understand the importance of genetics.
BP202T Pharmaceutical Organic Chemistry I	Student should be able to **CO:1** Write the structure, assign common and IUPAC name to the organic compound. **CO:2** Describe concepts in hybridization and uses of various organic molecules. **CO:3** Explain preparation of organic molecules and their reaction, name the reaction and orientation of reactions. **CO:4** Account for reactivity, stability of compounds, stereochemical aspects of various reactions **CO:5** Able to draw structure, preparation, physical properties and uses of various organic molecules.

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BP203T Biochemistry	Student should be able to **CO:1** Get in depth knowledge about need, chemical nature, biological role, classification, examples of carbohydrates, lipids, nucleic acids, amino acids, proteins etc. **CO:2** Provide brief information of bioenergetics, energy rich compounds, biological oxidation, electron transport chain, and transcription of genetic information. **CO:3** Get an opportunity to learn how to metabolise biomolecules like metabolism of carbohydrates, lipids, amino acids, and nucleic acid occurs in living organisms. **CO:4** Get details on various enzymes, their kinetics, mechanism, applications in pharmacy and in diagnosis of diseases etc. **CO:5** Learn, develop and practise experimental biochemistry and motivate using conventional and modern learning methods. to strengthen existing knowledge and acquire new knowledge.
BP204T Pathophysiology	Students should be able to **CO:1** clarify its theoretical concepts related to the cell and its injuries and understand its morphological changes. **CO:2** know how our body carried out the healing process after injury by any cause. **CO:3** Get knowledgeable about common disease of CVS, Urinary and respiratory system. **CO:4** Learner will acquire knowledge about diseases of haematological, endocrine and other systems. **CO:5** know the etiology diseases related joint and cancer. **CO:6** Get knowledge about infectious diseases and its etiology.
BP205T Computer Applications in Pharmacy	Student should be able to **CO:1** Describe the various types of application of computers in pharmacy. **CO:2** Explain the various types of databases. **CO:3** Enumerate the various applications of databases in pharmacy. **CO:4** Know web technology **CO:5** Identify role of Computers in data analysis in Preclinical development
BP206T Environmental sciences	Students should be able to **CO:1** Students get aware about environmental problems. **CO:2** Learner will develop an attitude of concern about the environmental benefits. **CO:3** Student will motivate towards environmental improvements. **CO:4** Learner will acquire some skills to identify the environmental problems and ways to avoid those problems. **CO:5** Student understands his role in society and impact of his knowledge on environment. **CO:6** Acquire knowledge related to importance of environmental components.
Second Year B Pharmacy (Semester III) PCI Pattern	
BP301T Pharmaceutical Organic Chemistry II	Student should be able to **CO:1** Define; write structure, classification of organic compounds. **CO:2** Distinguish between aliphatic and aromatic compounds by using Huckel's rule. **CO:3** Describe preparation of organic molecules and their reaction, name the reaction and orientation of reactions. **CO:4** Discuss reactivity, stability of compounds, stereochemical aspects of various reactions. **CO:5** Explain structure and medicinal uses of various aromatic organic compounds

BP302T Physical Pharmaceutics I	Student should be able to **CO:1** Understand basic principles related to importance of physical properties and their influence on dosage form designing. **CO:2** Study solubility of drugs, solubility expressions and mechanisms of solute solvent interactions **CO:3** Basics properties of matter and its phases utilized in drug delivery. **CO:4** Interfacial and surface properties of various phases in drug delivery **CO:5** Complexes and their importance in pharmaceutical sciences **CO:6** Solutions, types and various properties associated with solutions etc
BP303T Pharmaceutical Microbiology	Student should be able to **CO:1** Understand methods of identification, cultivation and preservation of various microorganisms **CO:2** Know importance of sterilization in microbiology and pharmaceutical industry **CO:3** Learn sterility testing of pharmaceutical products. **CO:4** Study microbiological standardization of Pharmaceuticals. **CO:5** Understand the cell culture technology and its applications in pharmaceutical industries.
BP304T Pharmaceutical Engineering	Student should be able to **CO:1** Understand basics of flow of fluids and importance of size reduction and size separation in pharmaceutical operations. **CO:2** Study the principle involved in heat transfer, evaporation and distillation and their pharmaceutical applications. **CO:3** Learn about construction and working of various equipment involved in the process of drying and mixing. **CO:4** Know the importance of centrifugation and filtration processes. **CO:5** Understand various material handling techniques, causes of corrosion and methods to control the corrosion.
5555 Environmental Science	Student should be able to **CO:1** Understand importance of environment and get knowledge about environmental conditions. **CO:2** Learn resources, its types and impact on environment. **CO:3** Get knowledge about pollution, its types and impact on environment. **CO:4** Learn about global issues related to climate and environment. **CO:5** Learn about problems faced by human if sudden changes occur in environment. **CO:6** Learn about his role in society to overcome such issues related to environment and ways to overcome.
Second Year B Pharmacy (Semester IV) PCI Pattern	
BP401T Pharmaceutical Organic Chemistry III	Student should be able to **CO:1** Describe the methods of preparation and properties of organic compounds. **CO:2** Explain the stereo chemical aspects of organic compounds and stereo chemical reactions **CO:3** Describe enantiomers, diastereomers, racemic mixture and modification. **CO:4** Explain chemistry and nomenclature of heterocyclic organic compounds.

	CO:5 Write the medicinal uses and other applications of organic compounds.
BP402T Medicinal Chemistry I	Student shall be able to understand. **CO:1** Definition, Objectives, Importance as well as broad applications of Medicinal Chemistry. **CO:2** Chemistry, theoretical aspects of drug action, Physicochemical parameters, Metabolism and Pharmacological actions. **CO:3** Classification, Elaborative Structure Activity Relationship, Mode of action, Pharmacokinetics (especially metabolism) of Drugs **CO:4** Synthesis of some Drug molecules
BP403T Physical Pharmaceutics II	Student shall be able to **CO:1** Understand detail knowledge about approaches involved in characterizing physical properties of drug molecules. **CO:2** Colloids and their applicability in formulation and development **CO:3** Study concept of viscosity and deformation of solids **CO:4** Study disperse systems as a pharmaceutical dosage form **CO:5** Micromeritics as a science of small molecules its importance **CO:6** Chemical kinetics and stability related concepts useful in drug delivery
BP404T Pharmacology I	Student should be able to **CO:1** Understand the general pharmacology of drugs and the concept of pharmacokinetics. **CO:2** Understand every aspect of pharmacodynamics of drugs and drug discovery. **CO:3** Explain classification, pharmacological actions, mechanism of action, side effects and therapeutic effects of several categories of drugs acting on the peripheral nervous system. **CO:4** Understand the whole pharmacology of drugs acting on CNS such as anaesthetics, sedatives, antiepileptics and alcohol. **CO:5** Explain the whole pharmacology of other drugs acting on CNS such as psychopharmacological agents, antiparkinsonians, anti-Alzheimer's, CNS stimulants, nootropics, opioid analgesics and concepts of drug addiction, dependence, drug tolerance and abuse.
BP405T Pharmacognosy and Phytochemistry I	Student should be able to **CO:1** Know the techniques in the cultivation and production of crude drugs **CO:2** Know the crude drugs, their uses and chemical nature **CO:3** Know the evaluation techniques for the herbal drugs **CO:4** Carry out the microscopic and morphological evaluation of crude drugs

Third Year B Pharmacy (Semester V) PCI Pattern	
BP501T Medicinal Chemistry II	Student should be able to **CO:1** Describe the SAR and therapeutic uses of Antihistaminic agents, Gastric Proton pump inhibitors, Anti-neoplastic agents. **CO:2** Explain therapeutic properties of Anti-anginal, Anti-hypertensive Agents. **CO:3** Define need, classification, examples, applications and disadvantages of design of Anti-arrhythmic Drugs, Anti-hyperlipidaemic agents, Coagulant & Anticoagulants. **CO:4** List drugs acting on the endocrine system. Their classification, SAR, MOA, uses metabolism, side effects, etc. **CO:5** Describe the types of Antidiabetic agents and Local Anaesthetics.
BP502T Industrial PharmacyI	Student should be able to **CO:1** Understand the various preformulation parameters required in manufacturing of dosage forms. **CO:2** Understand the formulation of tablet and liquid oral dosage form manufacturing and their techniques **CO:3** Understand the formulation development of soft gelatin and hard gelatin capsules and pellets manufacturing and their techniques **CO:4** Understand the formulation development of injectable dosage form manufacturing and their techniques **CO:5** Understand the manufacturing of Pharmaceutical Aerosol and cosmetics formulation and Materials used for packaging of pharmaceutical products
BP503T Pharmacology II	Student should be able to **CO:1** Understand pharmacology of all drugs which are acting on cardiovascular system. **CO:2** Know the pharmacology of all drugs which are acting on urinary system. **CO:3** Understand pharmacology of autocoids and drugs which antagonized their activity. **CO:4** Explain the mechanism, classification, side effects, dose and clinical uses of drug acting on endocrine gland. **CO:5** Understand and explain the basics of bioassay of various drugs. Apply this theoretical knowledge practically in his/her life for prevention of diseases
BP504T Pharmacognosy and Phytochemistry II	Student should be able to **CO:1** Upon completion of course student shall be able to understand how secondary metabolite produced in plant. **CO:2** Know therapeutic effect various secondary metabolite **CO:3** Isolate, identify and analyse phytoconstituents. **CO:4** Understand industrial production and utilization of phytoconstituents **CO:5** Learn modern extraction techniques, **CO:6** Characterize and identify phytoconstituents by modern methods.

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BP505T Pharmaceutical Jurisprudence	Student should be able to **CO:1** The details of the D and C Act 1940 along with the licensing process for import and manufacturing. **CO:2** Understand details of the D and C Act 1940 along with the licensing process for sales, functions of drug inspector, government analyst, etc. **CO:3** Learn about Pharmacy act 1948, Medical and Toilet Preparations act 1955 and Narcotics and Psychotropic substances act 1985. **CO:4** Know the importance of Drugs and Magic Remedies Act, Drug price control order etc. **CO:5** Know Pharmaceutical legislations and their implications in the development and marketing of pharmaceuticals.
Third Year B Pharmacy (Semester VI) PCI Pattern	
BP601T Medicinal Chemistry III	Student should be able to **CO:1** Explain theoretical aspects of chemotherapy and chemotherapeutic agents. **CO:2** Describe SAR useful for rationale design of the drugs and its implication. **CO:3** List classification, examples, applications and disadvantages of design of antifungal agent **CO:4** Define and list antiamoebics, anthelmintics, antimalarial agents. Their classification, SAR, MOA, uses metabolism, side effects. **CO:5** Define and list antineoplastics, antitubercular agents and antibiotics
BP602T Pharmacology III	Student should be able to **CO:1** Understand pharmacology of all drugs which are acting on respiratory system and gastrointestinal system. **CO:2** Understand and explain the mechanism of drug action and its relevance in the treatment of different infectious diseases. **CO:3** Know the pharmacology of all drugs which are used in the treatment of infectious diseases. **CO:4** Explain the mechanism, classification, side effects, dose and clinical uses of drugs acting on the immune system. **CO:5** Understand and explain basics of toxicology and treatment of various poisonings and appreciate correlation of pharmacology with related medical sciences.
BP603T Herbal Drug Technology	Student should be able to **CO:1** Upon completion of course student shall be able to understand fundamentals of alternative medicine, nutraceuticals, herbal cosmetic, excipient, formulation. **CO:2** Learn legal issue related to herbs. **CO:3** Understand current status of herbal industry. **CO:4** Learn GMP of herbal industry. **CO:5** Know the current global status of herbal products. **CO:6** Understand future prospect of herbal products.

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BP604T Biopharmaceutics and Pharmacokinetics	Student should be able to **CO:1** Understand the principles of biopharmaceutics and pharmacokinetics with relevance to clinical development **CO:2** Determine factors affecting drug absorption, bioavailability and bioequivalence **CO:3** Understand the concepts disposition kinetic models with applications **CO:4** Understand various pharmacokinetic parameters, their significance & applications. **CO:5** Understand clinical pharmacokinetics, dose adjustment and therapeutic drug monitoring
BP605T Pharmaceutical Biotechnology	Student should be able to **CO:1** Understand basics biotechnology, enzyme technology, biosensors and protein engineering along with the production of various enzymes. **CO:2** Study the principle involved in recombinant DNA technology and applications like production of Insulin, Interferon and Vaccines. **CO:3** Learn about immunity, immunoglobulins, hybridoma technology and blood products along with plasma substitutes. **CO:4** Know the importance of ELISA, Southern blotting, Western blotting, microbial genetics, microbial transformation and mutation. **CO:5** Understand various fermentation methods in the manufacturing of Penicillin, Citric acid, Vitamin B12, Glutamic acid and Griseofulvin.
BP606T Quality Assurance	Student should be able to **CO:1** Understand the importance of quality in pharmaceutical products. **CO:2** Explored into the importance of good practices such as GMP, GLP etc. **CO:3** Know factors affecting the quality of pharmaceutical **CO:4** Understands the regulatory aspects of pharmaceuticals taught to the student. **CO:5** Understands process involved in manufacturing of pharmaceuticals in different section/department and activity is learnt. **CO:6** Understands various documentation process is highlighted to the student
Final Year B Pharmacy (Semester VII) PCI Pattern	
BP701T Instrumental Methods of Analysis	Student should be able to **CO:1** Understand the interaction of matter with electromagnetic radiations (spectroscopy) and its types, applications in drug analysis. **CO:2** Explain molecular spectroscopy techniques like UV-Visible spectroscopy, fluorescence spectroscopy, IR spectroscopy, nepheloturbidimetry with principle, factors affecting, instrumentation and application. **CO:3** Discuss atomic spectroscopy techniques like atomic emission i.e., flame photometry and atomic absorption spectroscopy with principle, instrumentation, applications and limitations. **CO:4** Understand basics of chromatography which includes terms/concepts, definition and classification etc. along with chromatography techniques which includes adsorption and partition chromatography like paper chromatography, thin layer chromatography. **CO:5** Understand electrophoresis, factors affecting electrophoretic mobility, electrophoresis techniques (paper, gel, electrophoresis), and applications.

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	CO:6 Understand Gas chromatography (GC), High Performance Liquid Chromatography (HPLC), Ion exchange chromatography, Gel chromatography, Affinity chromatography with principle, theory, development, applications, limitations etc.
BP702T Industrial Pharmacy-II	Student should be able to **CO:1** Know the process of pilot plant and scale up of pharmaceutical dosage forms **CO:2** Understand the process of technology transfer from lab scale to commercial batch **CO:3** Know different Laws and Acts that regulate pharmaceutical industry **CO:4** Understand the approval process **CO:5** understand regulatory requirements for drug products
BP703T Pharmacy Practice	Student should be able to **CO:1** Understand the basic requirements and planning to set up a hospital and pharmacy with associated services. They also understand detection and assessment of ADR. **CO:2** Know several drug distribution methods, hospital formulary, medication adherence, TDM, and drug history interviews with applications. **CO:3** Acquire knowledge about PTC, drug information services, importance of training and education in hospital and counselling in patient care area. **CO:4** Understand budget requirements for setup of hospital, clinical pharmacy and concept of OTC and its rational use. **CO:5** Get themselves knowledgeable about drug store management and inventory control in pharmacy and in short about interpretation of clinical tests and the concept of investigational drugs.
BP704T Novel Drug Delivery System	Student should be able to **CO:1** Study formulation and evaluation of various controlled drug delivery systems for oral and parenteral. **CO:2** Understand the criteria for selection of drugs and polymers for the development of Novel drug delivery systems, their formulation and evaluation **CO:3** Learn transdermal, gastroprotective and nasopulmunory drug delivery **CO:4** Learn about site specific drug delivery **CO:5** Study ocular and intrauterine drug delivery its issues and challenges, drug selection
Final Year B Pharmacy (Semester VIII) PCI Pattern	
BP801T Biostatistics and Research Methodology	Student should be able to **CO:1** Know about statistics, biostatistics, measure of central tendency, measure of dispersion and correlation. **CO:2** Know various statistical techniques to solve statistical problems. **CO:3** Know about Research, plagiarism. **CO:4** Know about designing the methodology for research. **CO:5** Know the statistical analysis operation of M. S. Excel, SPSS, R and MINITAB, DoE (Design of Experiment) **CO:6** Know and understand Design and Analysis of experiments which includes factorial design and response surface methodology.

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BP802T Social and Preventive Pharmacy	Student should be able to **CO:1** Understand concepts of health and disease, social and health education, sociology and health and hygiene and health. **CO:2** Understand and explain general principles of prevention and control of various diseases. **CO:3** Know national health programs, its objectives, functioning and outcome of various diseases. **CO:4** Explain the various national health intervention programmes and national programmes to control life threatening diseases. **CO:5** Understand and explain basics of community services in rural, urban and school health.
BP804ET Pharmaceutical Regulatory Science	Student should be able to **CO:1** Impart the fundamental knowledge on the regulatory requirements for approval of new drugs **CO:2** Know the regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals **CO:3** Learn in detail on the regulatory requirements, documentation requirements, and registration procedures for marketing the drug products **CO:4** Know the regulatory approval process and their registration in Indian and international markets **CO:5** Understand orange book, Federal Register
BP806ET Quality Control and Standardization of Herbals	Student should be able to **CO:1** Upon completion of course student shall be able to understand WHO guidelines for quality control of herbal drugs. **CO:2** learn Quality assurance in herbal drug industry. **CO:3** learn GMP and c-GMP of herbal industry. **CO:4** learn GACP, GLP of herbal industry. **CO:5** Appreciate EU and ICH guidelines for quality control of herbal drugs. **CO:6** understand the current global status of herbal products.
BP813PW Project Work	Students should be able to **CO:1** Demonstrate a sound technical knowledge of their selected project topic. **CO:2** Undertake problem identification, formulation and solution. **CO:3** Design solutions to complex problems utilising a systems approach. **CO:4** Conduct pharmaceutical project. **CO:5** Communicate with engineers and the community at large in written an oral form.
Third Year B Pharmacy Practical (Semester V) CGPA Pattern	

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BP.3.5.1 Pharmaceutical Chemistry - VI	Student should be able to **CO:1** Describe purification techniques for organic compounds. **CO:2** Explain the reaction monitoring by thin layer chromatography. **CO:3** Describe the synthesis of organic compounds as well as few drug molecules and the reactions mechanisms involved. **CO:4** Elaborate the working of microwave oven and their use in synthesis of organic compounds as well as few drug molecules and the reactions mechanisms involved
BP.3.5.2 Pharmaceutics- VI (Pharmaceutical technology-I)	Student should be able to **CO:1** Prepare granules by different methods and compress the tablets by different methods. **CO:2** Describe the compression machine and compression of tablets **CO:3** Prepare hard gelatine capsules using hand operated capsule filling machine **CO:4** Prepare disperse systems **CO:5** Perform formulation of emulsion, suspensions ointments and quality control testing of pharmaceutical products.
BP.3.5.3 Pharmacology-I	Student should be able to **CO:1** Understand the experimental animals and ethical issues related with their use. **CO:2** Enable students to learn about fundamental techniques of experimental pharmacology. **CO:3** Acquire the types and functioning of various equipment used in experimental pharmacology. **CO:4** Training of learners in recording the DRC of agonists, calculation of PD2 value etc. **CO:5** Planning and execution of wet lab experiments using various isolated tissues and *in-vivo* experiments. **CO:6** Demonstrations of pharmacology simulations and effect of drugs on various organs or body systems.
BP 3.5.4 Pharmacognosy –IV	Student should be able to **CO:1** The students should be able to **CO:2** Understanding the process behind extraction and isolation of alkaloids. **CO:3** Describe morphological, microscopical and powder characteristics of crude drugs. **CO:4** Significance of estimation of alkaloids **CO:5** Importance of isolation and identification of papain
BP 3.5.5 Pharmaceutical Analysis-II	Student should be able to **CO:1** Describe construction, working and calibration Abbe Refractometer and to determine refractive indices of unknown samples. **CO:2** Know method of calibration of Polarimeter/pH meter with Potentiometric titration using strong acid vs. strong base. **CO:3** Determine dissociation constant (pKa) of phosphoric acid and boric acid by pH meter. **CO:4** Perform calibration of Polarimeter with determination of specific rotation of sample using Polarimeter. **CO:5** Study method calibration of Conductometer, and to measure conductance of distilled water.

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	CO:6 Perform calibration of Nepheloturbidimetry.
Third Year B Pharmacy Practical (Semester VI) CGPA Pattern	
BP.3.6.1 Pharmaceutical Chemistry - VII	Student should be able to **CO:1** Describe information of reduction and nitration through the synthesis of compounds and mechanism involved. **CO:2** Analyse physical constants **CO:3** Describe the reaction and mechanism of synthesized compounds. **CO:4** Design and execute the reaction schemes for the synthesis of various medicinal compounds of diverse chemical categories
BP.3.6.2 Pharmaceutics –VII (Biopharmaceutics & Pharmacokinetics)	Student should be able to **CO:1** Determine disintegration time of dosage forms **CO:2** Determine factors affecting drug dissolution **CO:3** Dissolution of different dosage forms **CO:4** Determine the diffusion of drug through different membrane **CO:5** Determine the effect different membrane on diffusion of drug **CO:6** Determine pharmacokinetics parameters from plasma concentration time profile.
BP 3.6.3 Pharmacology-II	Student should be able to **CO:1** Planning and execution of various types of bioassays **CO:2** Enable students to learn about pharmacological screening of drugs for various activities like analgesic, locomotor, anti-convulsant, antidepressant activity etc. **CO:3** Demonstration of effects of various drugs on DRC of agonists. **CO:4** Simulated experiments with the use of software's to determine the PA2 value & effect of various drugs. **CO:5** Determination of phases of estrous cycle in rat by microscopic examination. **CO:6** Demonstration of differences in pharmacokinetics of drug administered by oral and intravenous route.
BP 3.6.4 Pharmacognosy –V	The students should be able to: **CO:1** Understand various extraction and isolation process of different alkaloids. **CO:2** Significance of TLC and Spectral Characterization of natural molecules **CO:3** Understand principle behind estimation of total flavonoids. **CO:4** Importance of isolation of eugenol
BP 3.6.6 Project Report	Students should be able to **CO:1** Demonstrate a sound technical knowledge of their selected project topic. **CO:2** Undertake problem identification, formulation and solution. **CO:3** Design solutions to complex problems utilising a systems approach. **CO:4** Conduct pharmaceutical project. **CO:5** Communicate with engineers and the community at large in written an oral form.

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Final Year B Pharmacy Practical (Semester VII) CGPA Pattern	
BP 4.7.1. Pharmaceutical Technology-II (Pharmaceutics VIII)	Student should be able to **CO:1** Receive the knowledge about procedure, principles in formulation of different dosage forms **CO:2** Gain idea about basic principles involved in preparation & evaluation of Parenteral formulation. **CO:3** Formulation and evaluation-controlled release/sustained release formulation **CO:4** Formulation of novel formulation **CO:5** Know about preformulation
BP.4.7.2 Pharmaceutical Chemistry- VIII	Students should be able to **CO:1** Discuss purification techniques. **CO:2** Plan and adopt the reaction schemes for the synthesis of various medicinal compounds of diverse chemical categories. **CO:3** Describe the principle, reaction and applications of synthesized compounds. **CO:4** Analyse physical constant and functional groups present in drugs through IR if applicable. **CO:5** Provide the students with enough information of reduction, oxidation, cyclization and esterification through the synthesis of compounds.
P. 4.7.3 Pharmacology-III	Student should be able to **CO:1** Planning and execution of bioassays using antagonists. **CO:2** Practically trained the learners in recording the DRC of agonists, effects of antagonists on DRC and calculation of PA2 value. **CO:3** Demonstrations of pharmacology simulations and effect of drugs on various organs or body systems. **CO:4** Enable students to handle sophisticated instruments and learn their advantages and know the hurdles while handling such instruments. **CO:5** Provide the opportunity to theoretically learn the practical approach for anti-inflammatory activity of any NSAID in animals. **CO:6** Enable the student to observe and have touch with preclinical aspects of pharmacology at undergraduate level.
P.4.7.4 Pharmaceutical Analysis III	Student should be able to **CO:1** Explain molecular spectroscopy techniques like UV-Visible spectroscopy for the quantification of finished products. **CO:2** Explain atomic spectroscopy techniques like flame emission spectroscopy for quantification of sodium and potassium ions. **CO:3** Describe separation techniques like paper chromatography with its application in qualitative analysis. **CO:4** Describe the calibration method of UV-visible spectrophotometer. **CO:5** Describe separation techniques like thin layer chromatography and HPTLC with its application in qualitative analysis. **CO:6** Explain colorimetric estimation of finished product.

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Final Year B Pharmacy Practical (Semester VIII) CGPA Pattern	
P 4.8.1 Pharmaceutics IX	Student should be able to **CO:1** Formulation of different dosage forms **CO:2** Development of targeted oriented novel formulations **CO:3** Solve the problem occurs during novel formulation development. **CO:4** To prepare novel formulation **CO:5** To evaluate novel formulation
P 4.8.2 Pharmaceutical Analysis IV	Student should be able to **CO:1** Describe the calibration method of UV-visible spectrophotometer and FT-IR. **CO:2** Explain molecular spectroscopy techniques like UV-Visible FT-IR spectroscopy for the qualitative and quantitative analysis of finished products. **CO:3** Explain factors like pH, solvent affecting UV-visible spectra. **CO:4** Describe separation techniques like open tubular column chromatography and its application in qualitative and quantitative analysis. **CO:5** Describe separation techniques like HPLC, GC and their application in qualitative and quantitative analysis. **CO:6** Explain the need for modifications in UV-visible spectrophotometric methods like simultaneous equation and absorbance ratio method used for quantitation.
P 4.8.3 Pharmaceutical Chemistry- IX	Students should be able to **CO:1** Provide the students with enough information of acetylation and nitration through the synthesis of compounds. **CO:2** Analyze physical constant and functional groups present in drugs through IR if applicable. **CO:3** Describe the reaction and mechanism of synthesized compounds. **CO:4** Design and execute the reaction schemes for the synthesis of various medicinal compounds of diverse chemical categories.
P 4.8.4 Pharmacognosy-VI	The student should able to **CO:1** Understand to prepare and evaluate herbal Cosmetics formulation **CO:2** Give explanation on analysis of herbal drugs by Physical and Chemical Parameters **CO:3** Know identification and Isolation of Phytoconstitutents by Chromatographic techniques **CO:4** Estimate quantitative analysis of herbal drugs/ extract **CO:5** Develop and evaluate Herbal formulations
P 4.8.7 Industrial Training Report	Students should be able to **CO:1** Organize the industrial training knowledge, experience and skill in the preparation of the industrial training report. **CO:2** Build effective communication skills in written and oral presentation. **CO:3** Practice the related approach to get relevant information from various sources. **CO:4** Demonstrate good attitude in fulfilling the requirement of Industrial Training Unit. **CO:5** Develop significant commitment in the students' profession specialization.

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First Year B Pharmacy Semester I (PCI Pattern) Practical	
BP107P Human Anatomy and Physiology	Student should be able to **CO:1** Understand basics about microscopy and gross microscopic structures of various tissues of the body. **CO:2** Acquire knowledge about bones of the human body, their location with number and physiology. **CO:3** Perform skilfully common practicals of blood i.e. clotting and bleeding time. **CO:4** Skilful in performing important practical's such as RBC, WBC, ESR, HB count and determining blood group. **CO:5** Perform routine methods to determine heart rate, pulse rate and blood pressure.
BP108P Pharmaceutical Analysis I	Student should be able to **CO:1** Provide knowledge about introduction to apparatus, glass wares and balances used in Pharmaceutical Analysis laboratories. **CO:2** Know how to limit trace impurities present in pharmaceuticals by limit tests for harmless impurities. **CO:3** Get knowledge about titration as preparation and standardization of sodium hydroxide, sulphuric acid, sodium thiosulphate, potassium permanganate and ceric ammonium sulphate. **CO:4** Understand details about assay of pharmaceutical compounds along with standardization of titrant by acid base titration, cerimetry, iodometry, complexometry, permanganometry, non-aqueous titration and precipitation titration. **CO:5** Get details to the learner how to determine normality by electroanalytical methods such as conductometry and potentiometry.
BP109P Pharmaceutics I	Student should be able to **CO:1** Understand and explain the role of pharmacy practice in health care delivery **CO:2** Understand the basics of different dosage forms, pharmaceutical incompatibilities and pharmaceutical calculations **CO:3** To impart knowledge of prescription and its parts, good compounding and dispensing practices **CO:4** To develop competancy in the extemporaneous compounding of pharmaceutical products and dispensing
BP110P Pharmaceutical Inorganic Chemistry	Student should be able to **CO:1** Explain the concept of quality control tests **CO:2** Define limiting test and trace impurities present in pharmaceuticals **CO:3** Define limiting trace impurities present in pharmaceuticals by limit tests for harmful impurities **CO:4** Explain the use of qualitative inorganic tests for identification of unknown compounds **CO:5** List preparations of pharmaceutical inorganic compounds and the test of purity of the inorganic compounds, swelling power, and neutralising capacity.

BP111P Communication skills	Student should be able to **CO:1** Understand the behavioural needs for a Pharmacist to function effectively in the areas of pharmaceutical operation **CO:2** Students should be able to communicate effectively (Verbal and Non Verbal) **CO:3** Students should be able to effectively manage the team as a team player **CO:4** Students should be able to develop interview skills **CO:5** Students should be able to develop Leadership qualities and essentials
BP112RBP Remedial Biology	Student should be able to **CO:1** Upon completion of course student shall be able to develop skill in handling of microscope, cutting of section, mounting and preparation of slide **CO:2** Understand morphology of Stem, Root, Leaf, seed, fruit, flower and their modifications **CO:3** Identify the tissues pertinent to Stem, Root, Leaf, seed, fruit and flower. **CO:4** Detect blood group, determine blood pressure and tidal volume **CO:5** Identify different types of bone.
First Year B Pharmacy Semester II (PCI Pattern) Practical	
BP207P Human Anatomy and Physiology II	Student should be able to **CO:1** Clarify its theoretical concepts related to some of major systems such as nervous, integumentary, digestive, respiratory, cardiovascular, urinary and reproductive systems practically with help of charts, specimens and models. **CO:2** Demonstrate the neurological examination, working of olfactory nerve and total blood count by cell analyzer. **CO:3** Demonstrate the visual acuity of the eye, reflex activity of body parts and positive and negative feedback mechanisms for maintaining homeostasis. **CO:4** Examine the different types of taste and record the BMI and body temperature. **CO:5** Determine tidal volume, vital capacity and to study family planning devices, pregnancy and histology of organs and gonads.
BP208P Pharmaceutical Organic Chemistry I	Student should be able to **CO:1** Perform systematic qualitative analysis parameters such as preliminary test, unsaturation, saturation test, detection of elements, and determination of functional groups. **CO:2** Determine melting point of unknown organic compounds. **CO:3** Synthesis suitable solid derivatives from organic compounds **CO:4** Determine nature of organic compound by performing Solubility test **CO:5** Determine functional group present in organic compound. **CO:6** Explain the construction of molecular models
BP209P Biochemistry	Student should be able to **CO:1** Get detailed knowledge about approaches involved in the scheme of qualitative tests for identification of carbohydrates. **CO:2** Get detailed knowledge about qualitative tests for identification of proteins. **CO:3** Describe study of activity of enzyme salivary amylase from own saliva on starch and effect of temperature on salivary amylase activity. **CO:4** Understand the details about qualitative analysis of urine for abnormal constituents.

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	CO:5 Get details to the learner how to prepare buffer solution and measurement of its pH and determine acid value.
BP210P Computer Applications in Pharmacy	Student should be able to **CO:1** Retrieve the information of a drug using online tools **CO:2** Create a database to store the patient information **CO:3** Get knowledge about computer and its relation with pharmacy **CO:4** to know web technology **CO:5** Create a HTML web page
Second Year B Pharmacy Semester III (PCI Pattern) Practical	
BP305P Pharmaceutical Organic Chemistry II	Student should be able to **CO:1** Explain principle of recrystallization and steam distillation **CO:2** Determine oil values like Acid value, saponification value and Iodine value unknown oil samples. **CO:3** Standardize various reagents required for determination of oil values. **CO:4** Write reaction, mechanism involved in preparation of various organic compounds. **CO:5** Calculate theoretical and practical yield for any given synthesis of organic compound **CO:6** Determine melting point of organic compound for the purpose of verifying completion of reaction
BP306P Physical Pharmaceutics I	Student should be able to **CO:1** Understand basic principles related to importance of physical properties and their influence on dosage form designing **CO:2** Study solubility of drugs, solubility expressions and mechanisms of solute solvent interaction **CO:3** Basics properties of matter and its phases utilized in drug delivery **CO:4** Interfacial and surface properties of various phases in drug delivery **CO:5** Complexes and their importance in pharmaceutical sciences **CO:6** Solutions, types and various properties associated with solutions etc
BP307P Pharmaceutical Microbiology	Students should be able to: **CO:1** Know the various equipment's used in experimental microbiology. **CO:2** Perform the process of sterilization of glassware, preparation and sterilization of media and perform sub culturing of bacteria and fungus and preparation of stabs and slants. **CO:3** Perform Simple, Grams and acid-fast staining to differentiate the bacteria. **CO:4** Able to perform isolation of pure culture of microorganisms by different isolation techniques. **CO:5** Perform microbiological assay of antibiotics by cup plate method and to study motility of microorganisms by Hanging drop method. **CO:6** Perform sterility testing of water

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BP308P Pharmaceutical Engineering	Student should be able to **CO:1** Understand principles involved in the processes of size reduction and size separation in pharmaceutical operations. **CO:2** Study the factors affecting the processes like evaporation and distillation and also determination of efficiency of steam distillation. **CO:3** Learn about construction of drying curves, determination of moisture content and loss on drying. **CO:4** Know the importance of centrifugation and filtration processes. It will also cover the demonstration of various equipment like Fluidized bed dryer, Lyophilizer, Tablet machine, Colloidal mill and Fluid energy mill etc.
Second Year B Pharmacy Semester IV (PCI Pattern) Practical	
BP406P Medicinal Chemistry I	Students should be able to **CO:1** Write reaction & explain MOA for synthesis of drugs/intermediates as given in program curriculum **CO:2** Calculate T. Yield, P. Yield & Determine M.P of synthesized product **CO:3** Perform assay of drugs/intermediates **CO:4** Determine Partition Coefficient of drugs
BP407P Physical Pharmaceutics II	Student should be able to **CO:1** Study the various physicochemical properties of drug molecules for dosage form design **CO:2** Know various evaluation parameter for pharmaceuticals dosage form **CO:3** Study the kinetics and accelerated stability studies. **CO:4** Study preformulation studies **CO:5** Evaluate powder formulation
BP408P Pharmacology I	Student should be able to **CO:1** Get knowledgeable about basics of experimental pharmacology. **CO:2** Know the details of different types of instruments and different types of animals in pharmacology. **CO:3** Understand the concept, role and responsibilities of CPCSEA in experimental pharmacology. **CO:4** Acquire skills to perform common laboratory techniques such as anaesthesia, drug administration into animals by different routes. **CO:5** Understand the importance of simulated experiments with softwares and their applicability in preclinical studies with reference to several studies such as anxiolytic, anticonvulsant, skeletal muscle relaxant, anticatatonic activities and others.
BP409P Pharmacognosy and Phytochemistry I	Students should be able to **CO:1** analyse unorganized crude drugs by chemical tests **CO:2** determine some physical constants of crude drugs. **CO:3** perform leaf preparation and leaf contents determination of crude drugs. **CO:4** determine the number of starch grains by the Lycopodium spore method.

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	CO:5 perform microscopic evaluation of crude drugs.
Third Year B Pharmacy Semester V (PCI Pattern) Practical	
BP506P Industrial PharmacyI	Student should be able to **CO:1** Prepare granules by different methods and compress the tablets by different methods. **CO:2** Describe the compression machine and compression of tablets **CO:3** Prepare hard gelatine capsules using hand operated capsule filling machine **CO:4** Prepare disperse systems **CO:5** Perform formulation of emulsion, suspensions ointments and quality control testing of pharmaceutical products.
BP507P Pharmacology II	Student should be able to **CO:1** Understands the in vitro pharmacology and basics about PSS and its preparation. **CO:2** Know the importance of pharmacological softwares and also get skillful in softwares handling. **CO:3** Perform isolated tissue experiments to check the effect of various drugs. **CO:4** Learn and understand the standard protocol to study preclinical activities of drugs by using various animals. **CO:5** Understand and explain antagonism of drugs theoretically as well as practically. Know the importance of pharmacological experiments to study pharmacology of drugs.
BP508P Pharmacognosy and Phytochemistry-II	Student should be able to **CO:1** Upon completion of course student shall be able to identify crude drug by morphology and histology and powder characteristics. **CO:2** Isolate phytoconstituents from crude drug. **CO:3** Separate sugar by paper chromatography. **CO:4** Separate phytoconstituents of extract by TLC. **CO:5** Identify crude drug by chemical drug.
Third Year B Pharmacy Semester VI (PCI Pattern) Practical	
BP607P Medicinal Chemistry III	Student should be able to **CO:1** Explain organic synthesis of compounds and mechanism involved therein by conventional as well as microwave irradiation **CO:2** Analyze drug contents by Assay of drugs **CO:3** Describe the reaction and mechanism of synthesized compounds **CO:4** Determine physicochemical properties such as logP, clogP, MR, Molecular weight, Hydrogen bond donors and acceptors using software.

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BP608P Pharmacology III	Student should be able to **CO:1** Understands the dose calculation and to check antiallergic and antiulcer effects of drugs. **CO:2** Learn and understand the effect on GI motility, agonistic and antagonistic effects of drugs, and also be able to estimate various biochemical parameters by using semi-autoanalyzer. **CO:3** Understand and perform skilfully some practicals: saline purgative effect, hypoglycemic effect of insulin and Pyrogen test on frog and rabbit respectively. **CO:4** Learn oral toxicity (LD 50), eye and skin irritation of some substances theoretically. **CO:5** Understand calculation of pharmacokinetic parameters and know the importance of biostatistics methods in pharmacological experiments.
BP609P Herbal Drug Technology	Student shall be able to **CO:1** identify crude drug by chemical test **CO:2** estimate phytoconstituents from crude drug. **CO:3** plan experiment **CO:4** estimate phytoconstituents by modern methods. **CO:5** formulate herbal formulation.
Final Year B Pharmacy Semester VII (PCI Pattern) Practical	
BP705P Instrumental Methods of Analysis	Student should be able to **CO:1** Explain molecular spectroscopy techniques like UV-Visible spectroscopy for the quantification of single component formulation analysis (finished product) and multi-component formulation analysis (simultaneous estimation). **CO:2** Study quenching effect on fluorescence and fluorimetric analysis of bulk materials. **CO:3** Explain atomic spectroscopy techniques like flame emission spectroscopy for Na and K ions quantification. **CO:4** Perform determination of chlorides and sulphates by nephelo-turbidometry. **CO:5** Understand and perform planar separation techniques like paper chromatography and thin layer chromatography **CO:6** Perform and understand column chromatography technique for separation of plant pigments. To demonstrate experiment on GC and HPLC.
BP706PS Practice School	Student should be able to **CO:1** Meet the rapidly changing needs and challenges of a professional workplace. **CO:2** Enable students to acquire learning by applying the knowledge and skills they possess, in unfamiliar, open-ended real life situations **CO:3** Creates the required setting for experiential and cooperative learning and education, by providing students with an opportunity to work on relevant assignments, under the guidance of professional experts and under the supervision of faculty **CO:4** Serves as a platform that facilitates and promotes partnership and intellectual exchange between academia and industry.

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President :
Shri Amrishbhai R. Patel
M.L.A.

Principal :
Dr. S. B. Bari
M.Pharm. Ph.D., D.I.M.F.J.C.

Course Outcomes M. Pharm

Course Code	Course Outcome
M. Pharmacy Pharmaceutics	
MPH 101T Modern Pharmaceutical Analytical Techniques	Student should be able to **CO:1** Know about analysis of various drugs in single and combination dosage forms. **CO:2** Study the chromatographical and spectroscopical method of analysis. **CO:3** Know about advanced analytical instrumental techniques for identification, characterization of drugs **CO:4** Understand the analytical instrumental techniques for quantification of drugs.
MPH 102 T Drug Delivery System	Student should be able to **CO:1** Understand the various approaches for development of novel drug delivery systems. **CO:2** Know the criteria for selection of drugs and polymers for the development of delivering system. **CO:3** Know about Controlled Release formulations. **CO:4** Get an idea about formulation and evaluation of Novel drug delivery systems.
MPH 103 T Modern Pharmaceutics	Student should be able to **CO:1** Understand the various approaches for development of novel drug delivery systems. **CO:2** Know the criteria for selection of drugs and polymers for the development of delivering system. **CO:3** Know about Controlled Release formulations. **CO:4** Get an idea about formulation and evaluation of Novel drug delivery systems.
MPH 104T Regulatory Affairs	Student should be able to **CO:1** Know the Concepts of innovator and generic drugs, drug development process **CO:2** Learn about Regulatory guidance's and guidelines for filing and approval process **CO:3** Get the knowledge about Preparation of Dossiers and their submission to regulatory agencies in different countries **CO:4** Learn the Post approval regulatory requirements for actives and drug products.
MPH 201T Molecular Pharmaceutics (Nano Technology & Targeted DDS) (NTDS)	Student should be able to **CO:1** Learn about various approaches for development of novel drug delivery systems. **CO:2** Understand about drug targeting. **CO:3** Study the criteria for selection of drugs and polymers for the development of NTDS **CO:4** Study the formulation and evaluation of novel drug delivery systems.

MPH 202T Advanced Biopharmaceutics & Pharmacokinetics	Student should be able to **CO:1** Understand the concepts in biopharmaceutics and pharmacokinetics. **CO:2** Study the critical evaluation of biopharmaceutic studies involving drug product equivalency. **CO:3** Design and evaluate the dosage regimens of the drugs using pharmacokinetic and biopharmaceutic parameters. **CO:4** Get an idea about potential clinical pharmacokinetic problems and application of basics of pharmacokinetic.
MPH 203T Computer Aided Drug Development	Student should be able to **CO:1** Know about Computational Modeling of Drug Disposition **CO:2** Study the use of Computers in Preclinical Development **CO:3** Get a knowledge about Optimization Techniques in Pharmaceutical Formulation Computers in Market Analysis **CO:4** Know about Artificial Intelligence (AI), Robotics and Computational fluid dynamics (CFD).
MPH 204T Cosmetics and Cosmeceuticals	Student should be able to **CO:1** Know the Key ingredients used in cosmetics and cosmeceuticals. **CO:2** Know about current technologies in the market for development of cosmetics and cosmeceuticals. **CO:3** Know about Various key ingredients and basic science to develop cosmetics and cosmeceuticals. **CO:4** Get a scientific knowledge to develop cosmetics and cosmeceuticals with desired Safety, stability, and efficacy.
M. Pharmacy Quality Assurance	
MQH 101T Modern Pharmaceutical Analytical Techniques	Student should be able to **CO:1** Know about analysis of various drugs in single and combination dosage forms. **CO:2** Study the chromatographical and spectroscopical method of analysis. **CO:3** Know about advanced analytical instrumental techniques for identification, characterization of drugs **CO:4** Understand the analytical instrumental techniques for quantification of drugs.
MQA 102T Quality Management Systems	Student should be able to **CO:1** Study the importance of quality **CO:2** Know about ISO management systems **CO:3** Understand the Tools for quality improvement **CO:4** Know the Quality evaluation of pharmaceuticals **CO:5** Get a knowledge about Stability testing of drug and drug substances
MQA 103T Quality Control and Quality Assurance	Student should be able to **CO:1** Understand the cGMP aspects in a pharmaceutical industry **CO:2** Appreciate the importance of documentation **CO:3** Understand the scope of quality certifications applicable to Pharmaceutical industries **CO:4** Understand the responsibilities of QA & QC departments.

MQA 104T Product Development and Technology Transfer	Student should be able to **CO:1** Understand the new product development process **CO:2** Understand the necessary information to transfer technology from R&D to actual manufacturing by sorting out various information obtained during R&D **CO:3** Elucidate necessary information to transfer technology of existing products between various manufacturing places. **CO:4** Study the Principles of Drug discovery and development process.
MQA 201T Hazards and Safety Management	Student should be able to **CO:1** Understand the environmental problems among learners. **CO:2** Impart basic knowledge about the environment and its allied problems. **CO:3** Develop an attitude of concern for the industry environment. **CO:4** Ensure safety standards in pharmaceutical industry **CO:5** Provide comprehensive knowledge on the safety management
MQA 202T Pharmaceutical Validation	Student should be able to **CO:1** The understand the concepts of calibration, qualification and validation **CO:2** Study the qualification of various equipment's and instruments **CO:3** Know the process validation of different dosage forms **CO:4** Study the validation of analytical method for estimation of drugs
MQA 203T Audits and Regulatory Compliance	Student should be able to **CO:1** Understand the importance of auditing **CO:2** Understand the methodology of auditing **CO:3** Carry out the audit process **CO:4** Prepare the check list for auditing.
MQA 204T Pharmaceutical Manufacturing Technology	Student should be able to **CO:1** Know the information of pharmaceutical industry developments. **CO:2** Understand the common practice in the pharmaceutical industry developments, plant layout and production planning **CO:3** Know the principles and practices of aseptic process technology, non-sterile manufacturing technology and packaging technology. **CO:4** Understand the principles and implementation of Quality by design (QbD) and process analytical technology (PAT) in pharmaceutical manufacturing.
M. Pharma Pharmaceutical Chemistry	
MPC 102T Advanced organic chemistry – I	**CO:1** Know about principles and applications of reterosynthesis **CO:2** Get a knowledge of mechanism & applications of various named reactions. **CO:3** Know the concept of disconnection to develop synthetic routes for small target molecule. **CO:4** Get an idea about various catalysts used in organic reactions
MPC 103T Advanced medicinal chemistry	**CO:1** Know the Different stages of drug discovery. **CO:2** Identify the Role of medicinal chemistry in drug research. **CO:3** Know about Different techniques for drug discovery. **CO:4** Acquire knowledge about various strategies to design and develop new drug like molecules for biological targets

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MPC 104T Chemistry of natural products	**CO:1** Know about Different types of natural compounds and their chemistry and medicinal importance. **CO:2** Study the importance of natural compounds as lead molecules for new drug discovery. **CO:3** Understand the concept of rDNA technology tool for new drug discovery. **CO:4** Develop knowledge of Isolation, purification and characterization of simple chemical constituents from natural source
MPC 201T Advanced spectral analysis	**CO:1** CO:1 Get a knowledge of Interpretation of the NMR and Mass spectra of various organic compounds **CO:2** Study the IR spectra of various organic compounds. **CO:3** Get a Theoretical and practical skills of the hyphenated instruments. **CO:4** Study the Identification of organic compounds.
MPC 202T Advanced organic chemistry – II	**CO:1** To know principles and applications of green chemistry **CO:2** Study the concept of peptide chemistry. **CO:3** Study the various catalysts used in organic reactions. **CO:4** To know the concept of stereochemistry and asymmetric synthesis.
MPC 203T Computer aided drug design	**CO:1** Know the Role of CADD in drug discovery. **CO:2** Study the Different CADD techniques and their applications. **CO:3** Check the various strategies to design and develop new drug like molecules. **CO:4** Know about in silico virtual screening protocols.
MPC 204T Pharmaceutical process	**CO:1** Know the strategies of scale up process of APIs and intermediates. **CO:2** Study the various unit operations in process chemistry. **CO:3** Study the various reactions in process chemistry. **CO:4** Acquire an idea about Process chemistry and Industrial Safety.
M. Pharma Pharmaceutics / Quality Assurance / Pharmaceutical Chemistry	
MRM 301T Research Methodology & Biostatistics	**CO:1** Know about the research and some basis things about research. **CO:2** Learn about statistical test for analysis of samples. **CO:3** Understand about informed consent, ethics committees, conflicts of interest and online business practices. **CO:4** Study about the CPCSEA guidelines. **CO:5** Know about the basic principles for all medical research.

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